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

# SOIL BORING LOG

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 ORIENTATION : Vertical

WATER LEVELS : 2 ft bgs on 03/15/07 START : 3/14/2007 END : 3/21/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 41.6 | | | | | | | "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 | | | | | | |
| | 5.0 | 1.0 | SS-1 | 5-4-3 (7) | **Poorly Graded Sand With Silt (SP-SM)** 3.5-4.5' - very pale orange to moderate yellowish brown, (10YR 8/2 to 10YR 5/4), wet, loose, very fine to fine grained, 10-15% fines, nonplastic, <10% root matter and organic material, trace concretions up to 1/4", very fine silica sand and silt in an iron matrix | | |
| 5 36.6 | | | | | | | Few dense lenses from 5.0-8.5', thin, relatively consistent drilling rate (moderately rapid) |
| | 8.5 | | | | | | |
| | 9.4 | 0.5 | SS-2 | 9-50/5 (59/11") | **Limestone Fragments** 8.5-8.75' - very pale orange, (10YR 8/2), strong HCl reaction, gravel-sized, subrounded to angular, up to 1"x1-1/2" | | Very hard from 9.0-12.5', possible limestone lenses, light chatter, extremely slow advancement rate |
| 10 31.6 | | | | | **Silt (ML)** 8.75-9.0' - grayish orange, (10YR 7/4), moist to wet, hard, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 10-15% very fine to medium grained sand, all carbonate derived | | |
| | 13.5 | | | | | | Relatively consistent from 12.5-28.5', moderately rapid drilling rate |
| | 15.0 | 0.8 | SS-3 | 27-17-4 (21) | **Silt With Limestone Fragments (ML)** 13.5-14.3' - very pale orange, (10YR 8/2), wet, very stiff, nonplastic, mild to moderate HCl reaction, 10-15% very fine to fine grained sand, 3 limestone lenses (<1/2") at 13.5', 13.7' and 14.0', all carbonate derived | | |
| 15 26.6 | | | | | | | |
| | 18.5 | | | | | | |
| | 20.0 | 1.3 | SS-4 | 40-54-50 (104) | | | SS-4 actual sample depth is 18.5-20.0' |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-01 SHEET 2 OF 9 |

# SOIL BORING LOG

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 ORIENTATION : Vertical

WATER LEVELS : 2 ft bgs on 03/15/07 START : 3/14/2007 END : 3/21/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 21.6 | | | | | **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 | | |
| | 23.5 | | | | | | |
| | 25.0 | 1.5 | SS-5 | 17-24-31 (55) | **Sandy Silt With Limestone Fragments (ML)** 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' | | |
| 25 16.6 | | | | | | | |
| | 28.5 | | | | | | |
| | 29.3 | 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 |
| 30 11.6 | | | | | | | |
| | 33.5 33.7 | 0.2 | SS-7 | 50/2.5 (50/2.5") | **Limestone Fragments** 33.5-33.7' - grayish orange to dusky yellowish brown, (10YR 7/4 to 10YR 2/2), mild to moderate HCl reaction, gravel-sized limestone fragments up 1-1/2" diameter, sample includes 1/2" thick iron cemented lenses that have no HCl reaction | | |
| 35 6.6 | | | | | | | |
| | 38.5 | | | | | | |
| | 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 |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
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| 338884.FL | A-01 SHEET 2 OF 9 |

# SOIL BORING LOG

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 ORIENTATION : Vertical

WATER LEVELS : 2 ft bgs on 03/15/07 START : 3/14/2007 END : 3/21/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 21.6 | 23.5 | | | | **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 | | |
| 25 16.6 | 25.0 | 1.5 | SS-5 | 17-24-31 (55) | **Sandy Silt With Limestone Fragments (ML)** 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 | | | | | | |
| 30 11.6 | 29.3 | 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 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 |
| 35 6.6 | 33.5 33.7 | 0.2 | SS-7 | 50/2.5 (50/2.5") | **Limestone Fragments** 33.5-33.7' - grayish orange to dusky yellowish brown, (10YR 7/4 to 10YR 2/2), mild to moderate HCl reaction, gravel-sized limestone fragments up 1-1/2" diameter, sample includes 1/2" thick iron cemented lenses that have no HCl reaction | | |
| | 38.5 | | | | | | |
| 40 | 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 |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-01 SHEET 3 OF 9 |

# SOIL BORING LOG

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 ORIENTATION : Vertical

WATER LEVELS : 2 ft bgs on 03/15/07 START : 3/14/2007 END : 3/21/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 1.6 | | | | | **Sandy Silt With Limestone Fragments (ML)** 38.5-39.58' - olive gray to light olive gray, (5Y 3/2 to 5Y 5/2), wet, hard, low to medium plasticity, slow to rapid dilatancy, moderate to strong HCl reaction, 35% fine to coarse grain sand, trace organic content, limestone interbeds at 38.5-38.7' and intermittently throughout | | |
| | 43.5 | | | | | | |
| | 43.8 | 0.3 | SS-9 | 50/3 (50/3") | **Limestone Fragments** 43.5-43.75' - light olive gray, (5Y 6/1), mild HCl reaction, very fine to fine gravel, up to 3/4"x1/2" | | |
| 45 -3.4 | | | | | | | |
| | 48.5 | | | | | | |
| | | 0.3 | SS-10 | 28-50/2 (78/8") | **Silty Sand (SM)** 48.5-48.8' - yellowish gray, (5Y 8/1), wet, very dense, 30% fines, nonplastic, mild to moderate HCl reaction, fine to medium grained sand, 10% gravel-sized limestone fragments | | Split spoon sample SS-10 actually advanced 48.5-49.2 |
| 50 -8.4 | | | | | Begin Rock Coring at 49.0 ft bgs<br>See the next sheet for the rock core log | | |
| 55 -13.4 | | | | | | | |
| 60 | | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: A-01 | SHEET 4 OF 9 |
|---|---|---|

# ROCK CORE LOG

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 ORIENTATION : Vertical

WATER LEVELS : 2 ft bgs on 03/15/07 START : 3/14/2007 END : 3/21/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | 49.0 | | 0 | | | **Limestone** 49.0-51.2' - dark yellowish brown, (10YR 4/2), fine grained, extremely weak to very weak (R0 to R1), voids (<3/16") over 70% of surface except from 49.65-50.2' where voids (<1/16") cover <20% of surface, fossiliferous, cavities <1/2"x1/4" over <15% of surface, trace organics | Switch to NQ rock coring tooling at 49.0', drive HW casing to 49', seat casing in <6" rock, flush casing with 3-7/8" tricone bit |
| 50 -8.4 | R1-NQ 2.5 ft 88% | 42 | >10 | 49.55-49.65, 50.2-50.3' - Fracture zone (2), rough, undulating, with 1" openings | | | R1: 5 minutes |
| | | | 2 | 50.45' - Mechanical break or fracture, 40 deg, rough, undulating, open <3/4" | | | |
| | 51.5 | | NR | 50.75, 50.9' - Bedding plane or mechanical break (2), <10 deg, rough, undulating, open <1/2" | | **No Recovery 51.2-51.5'** | |
| | R2-NQ 5 ft 98% | 82 | 0 | | | **Limestone** 51.5-56.4' - moderate yellowish brown, (10YR 5/4), fine grained, moderate to strong HCl reaction, very weak to weak (R1 to R2), voids (<3/16") over 60-80% of surface, few cavities <1-1/2"x1" concentrated at 53.8', fossiliferous | |
| | | | 2 | 53.0' - Mechanical break or fracture, <10 deg, rough, stepped to undulating, tight | | | |
| | | | 0 | 53.8' - Mechanical break or fracture, <10 deg, rough, undulating, tight at fracture with associated cavity | | | |
| 55 -13.4 | | | 2 | 54.4' - Mechanical break 55.0, 55.1' - Fractures, 35 deg, rough, undulating, tight | | | |
| | | | 3 | 56.0, 56.2' - Mechanical break or fractures, <10 deg, rough, undulating, open <1/2" | | | R2: 10 minutes |
| | 56.5 | | NR | | | **No Recovery 56.4-56.5'** | |
| | R3-NQ 5 ft 78% | 48 | >10 | 56.5-56.8' - Fracture zone, rough, undulating, gravel-sized (<1-1/2"x1"), open | | **Limestone** 56.5-60.4' - pale yellowish brown, (10YR 6/2), fine grained, very weak to medium strong (R1 to R3), voids (<3/16") over 85% of surface, fossiliferous, trace organics, extremely weak rock (R0) zones at 56.5-56.8', 58.7', 58.85', 59.5', 59.75-60.0' | Water level at 1' below ground surface at 17:30, end drilling on 03/14/07 |
| | | | 2 | 57.0, 57.3, 57.5' - Fractures (3), 50-90 deg, smooth, undulating, intersecting fractures, tight | | | Water level at 2' below ground surface on 03/15/07 07:30 |
| | | | 3 | 58.7, 58.85, 59.5' - Bedding plane or mechanical break (3), smooth, undulating, tight | | | |
| 60 -18.4 | | | >10 | 58.95' - Mechanical break 59.75-60.0' - Fracture zone, rough, undulating, gravel-sized fragments <1"diameter, open | | | |
| | | | NR | | | **No Recovery 60.4-61.5'** | R3: 16 minutes |
| | 61.5 | | | 61.3' - Bedding plane or mechanical break, rough, undulating, broken along weak bedding planes, tight | | | |
| | R4-NQ 5 ft 99% | 98 | 0 | | | **Limestone** 61.5-66.45' - pale yellowish brown, (10YR 6/2), very fine to fine grained, weak to medium strong (R2 to R3), voids (<3/16") over 60-80% of surface at 61.5-61.9', 62.5-62.8', 63.5-65.1' and 65.4-66.3', organic material as <1/4" thick laminations at 63.0-65.2' over 20% of surface; very weak rock (R1) at 62.7-63.1', 65.0-65.5' and 66.3', bioturbated with some secondary infilling at 65.5-66.3' | |
| | | | 1 | 63.15' - Bedding plane, horizontal, rough, undulating, tight | | | |
| | | | 0 | 63.5, 63.7, 63.95, 64.0, 64.05, 64.4, 64.45, 65.2' - Mechanical break (8) | | | |
| 65 -23.4 | | | 0 | | | | |
| | | | 1 | | | | R4: 8 minutes |
| | 66.5 | | NR | | | **No Recovery 66.45-66.5'** | |
| | | | 3 | 66.7, 67.5, 68.2, 68.5, 70.2, 70.3, 70.55' - Mechanical break or bedding plane (7), <10 deg, rough, undulating, <1/4" openings | | | |
| | | | 2 | 67.3' - Fracture, 70 deg and vertical, rough, stepped to undulating, tight | | | Driller's Remark: Slight fluid loss in zone |
| | R5-NQ | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-01 SHEET 5 OF 9 |

# ROCK CORE LOG

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 ORIENTATION : Vertical

WATER LEVELS : 2 ft bgs on 03/15/07 START : 3/14/2007 END : 3/21/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | 5 ft 92% | 62 | 0 | | | **Limestone** | |
| 70 -28.4 | | | 3 | 69.45' - Fracture, 60 deg, smooth, undulating, tight | | 66.5-71.1' - pale yellowish brown, (10YR 6/2), very fine to fine grained, very weak to weak (R1 to R2), voids up to 3/16" over 80% of surface, fossiliferous, trace laminated organics, very weak rock to weak rock at 66.5-67.0' and 70.0-71.1', medium strong rock (R3) at 69.0-70.0' | |
| | | | 1 | | | | R5: 7 minutes |
| | 71.5 | | NR | | | | |
| | | | 1 | | | **No Recovery 71.1-71.5'** | |
| | | | 5 | 72.35' - Bedding plane, <10 deg, rough, undulating, 1/4" soil seam infill, open 1/2" | | **Limestone** | |
| | R6-NQ 5 ft 96% | 50 | 2 | 72.6, 72.85, 72.95' - Bedding plane or mechanical break (3), <10 deg, rough, undulating, tight | | 71.5-76.3' - pale yellowish brown, (10YR 6/2), very fine to fine grained, weak (R2) to medium strong (R3) at 71.5-72.3', 72.7-73.7', and 74.2-74.7' with voids (<3/16") over 80% of surface; extremely weak (R0) to very weak (R1) at 72.3-72.7' and 73.7-74.2' with voids (<3/16") over 30% of surface; extremely weak (R0) to very weak (R1) interbeds from 74.7-76.0'; all fossiliferous | |
| | | | | 73.7' - Mechanical break or bedding plane, 15 deg, rough, undulating, open 1/4" | | | |
| 75 -33.4 | | | 3 | 74.1' - Mechanical break or bedding plane, horizontal, smooth, undulating, 1/4" infill, open 1/4" | | | |
| | | | 5 | 74.8-75.2 and 75.5-76.0' - Clay seams (2), smooth, undulating, extremely weak rock (R0) zones | | | R6: 7 minutes |
| | 76.5 | | NR | | | | |
| | | | 2 | 77.0, 77.3' - Fractures (2), 60 deg and 50-90 deg, rough, stepped to undulating, tight | | **No Recovery 76.3-76.5'** | |
| | | | 3 | 77.95, 78.15, 78.3' - Fractures (3), <10 deg, rough, stepped to undulating, tight | | **Limestone** | |
| | R7-NQ 5 ft 77% | 28 | >10 | 78.65-79.0' - Fracture zone, rough, stepped to undulating, dissolution zone, angular to subangular gravel-sized fragments <1" diameter | | 76.5-79.5' - moderate yellowish brown to very light gray, (10YR 5/4 to N8), very fine to fine grained, weak to medium strong (R2 to R3), except extremely weak (R0) to very weak (R1) rock at 78.1-78.3' and 79.5-79.85'; 76.5-78.3' and 79.85-80.35' - 80% voids <3/16", fossiliferous (molds, casts); 78.3-79.0' - >90% voids <3/16", 30-40% cavities up to 1/2"x1/4", highly fractured zone; 79.0-79.5' - <20% voids <3/16", medium strong rock (R3) | 03/20/2007 set NW casing to 80' to free NQ tooling |
| 80 -38.4 | | | 10 | 79.2' - Fracture, vertical, smooth, undulating, tight | | | 03/21/2007 continue rock coring from 81.5' below ground surface, 100% circulation with NW casing at 80' below ground surface |
| | | | NR | 79.35, 79.5' - Fractures (2), rough, undulating, silt and/or clay sized infilling, tight | | | R7: 10 minutes |
| | 81.5 | | | 79.5-79.65' - Clay seam, 4-1/2" silt and/or clay sized infilling, Elastic Silt (MH) to Lean Clay (CL), moderate plasticity, low dilatancy, strong HCl reaction | | | |
| | | | >10 | | | **Lean Clay - Elastic Silt (CL-ML)** | |
| | | | 0 | 79.85' - Bedding plane, smooth, undulating, tight | | 79.5-79.85' - medium plasticity, slow dilatancy, strong HCl reaction | |
| | | | | | | **No Recovery 80.35-81.5'** | |
| | R8-NQ 5 ft 90% | 76 | 1 | 81.5-81.7' - Fracture zone, rough, undulating, gravel sized fragments <1/2" diameter, angular to subangular | | **Limestone** | |
| | | | | 82.25' - Fracture, 0-40 deg, rough, undulating, open <1" | | 81.5-86.0' - pale yellowish brown to moderate 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 85.6-86.65' | |
| 85 -43.4 | | | >10 | 83.6' - Bedding plane, <10 deg, rough, undulating, tight | | | SC-1 collected at 84.95-86.0' |
| | | | 0 | 84.0' - Mechanical break | | | R8: 9 minutes |
| | 86.5 | | NR | 84.65-84.8' - Fracture zone, horizontal and 20 deg, rough, undulating, fragmented rock, angular gravel sized fragments <1"diameter, open <2" | | | |
| | | | >10 | 84.95' - Mechanical break, rough, undulating, open <1/2" | | | |
| | | | 0 | 86.75-86.95' - Fracture zone, rough, undulating, angular gravel sized fragments <1-1/2" diameter, 2-1/2" open | | | |
| | R9-NQ | | | | | | |

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

# ROCK CORE LOG

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 ORIENTATION : Vertical

WATER LEVELS : 2 ft bgs on 03/15/07 START : 3/14/2007 END : 3/21/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | 5 ft 98% | 80 | 1 | 89.0' - Bedding plane, <10 deg, rough, undulating, open 1/4" | | **Limestone** 83.0-84.5' - mild to moderate HCl reaction, mottled with zones of bioturbation having a secondary infill of a very fine, medium strong rock (R3) matrix, voids (<3/16") over 30% of surface, secondary infilling of bioturbated zone consisting of 20-30% of surface, trace fossil molds | |
| 90 -48.4 | | | 0 | | | | R9: 11 minutes |
| | | | 2 | 90.95' - Bedding plane, horizontal, smooth, undulating, open <1/4" | | | |
| | 91.5 | | NR | 91.25' - Mechanical break or bedding plane, 15 deg, rough, undulating, tight | | **No Recovery 86.0-86.5'** | |
| | | | 1 | 91.6' - Bedding plane, horizontal, smooth, undulating, tight | | **Limestone** 86.5-87.05' - moderate yellowish brown to very light gray, (10YR 4/2 to N8), very fine to fine grained, extremely weak to very weak (R0 to R1), grayish blue mottling (5PB 5/2), voids (3/16") over 60-80% of surface from 84.5-86.0' and fossiliferous with trace organics | |
| | | | 0 | 92.9' - Mechanical break | | | |
| | R10-NQ 5 ft 98% | 82 | 3 | 93.85-93.95' - Fracture zone, rough, undulating, 3 fractures, open <1-1/2" | | | |
| 95 -53.4 | | | 1 | | | | |
| | | | 4 | 95.3' - Fracture, 75 deg, smooth, undulating, tight | | 87.05-89.15' - Same as 86.5-87.05' except very light gray (N8) and grayish blue (5PB 5/2) mottling, voids (3/16") over 50-60% of surface, fossiliferous (microfossils) | R10: 16 minutes |
| | 96.5 | | NR | 95.85-95.9' - Clay seam, horizontal, smooth, undulating, 3/4" clay infilling, Fat Clay (CH), medium gray (N5), moist, soft, high plasticity | | | |
| | | | 1 | 96.05, 96.35' - Mechanical break or bedding plane (2), <10 deg, rough, undulating, tight | | 89.15-90.7' - fine grained, very weak (R1), voids (<3/16") over 30-50% of surface, moderately fossiliferous | |
| | | | 2 | 96.85, 97.55' - Bedding plane, <10 deg, rough, undulating, tight | | 90.7-91.4' - Same as 86.5-87.05' except no mottling | SC-2 collected at 98.05-99.0' |
| | R11-NQ 5 ft 100% | 98 | 0 | 97.05, 99.0, 99.75, 101.05, 101.4' - Mechanical break (5) 98.0' - smooth, undulating, <1/2" silt and/or clay sized infilling | | **No Recovery 91.4-91.5'** | |
| 100 -58.4 | | | 0 | | | **Limestone** 91.5-96.4' - moderate yellowish brown to yellowish gray, (10YR 5/4 to 5Y 7/2), very fine to fine grained, extremely weak to weak (R0 to R2) | |
| | | | 0 | | | 91.55-91.85' - fine grained, very weak (R1), voids (<3/16") over 30-50% of surface, fossiliferous | R11: 8 minutes |
| | 101.5 | | 1 | 101.55, 102.65, 103.75' - Bedding plane or fractures (3), horizontal, smooth, undulating, tight | | 91.85-94.6' - moderate HCl reaction, voids (<3/16") over 60-80% of surface, moderately fossiliferous (molds up to 1/2" x 1/4"), few cavities <1/2" diameter, trace organics | |
| | | | 1 | | | 94.6-96.4' - strong HCl reaction, gradual transition to >30% voids up to 1/16", 1/4" diameter cavity with medium light gray (N6) clay infill | |
| | R12-NQ 5 ft 96% | 86 | 1 | 104.0, 104.85' - Mechanical break | | **No Recovery 96.4-96.5'** | |
| 105 -63.4 | | | 0 | | | **Limestone** 96.5-101.5' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl reaction, extremely weak to very weak (R0 to R1), voids (<3/16") over 70-80% of surface, moderately fossiliferous (molds <1/2"x1/4"), trace organics; 1/2" silt seam at 98.0', slow to fast dilatancy, low plasticity, carbonate material | |
| | | | >10 | 105.5-105.6' - Fracture zone, rough, undulating, gravel sized fragments, <1" diameter | | | R12: 3 minutes |
| | 106.5 | | NR | | | | |
| | | | 0 | | | | |
| | | | 1 | | | | |
| | R13-NQ | | | | | | |

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# ROCK CORE LOG

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 ORIENTATION : Vertical

WATER LEVELS : 2 ft bgs on 03/15/07 START : 3/14/2007 END : 3/21/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | 5 ft 100% | 70 | 4 | 108.65' - Fracture, 75 deg, smooth, undulating, tight | | **Limestone** 101.5-106.3' - 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 50% of surface, few cavities up to 1/2"x1/4", poorly to moderately fossiliferous; 105.6-106.05' weak rock (R2) zone, voids (<3/16") over 70% of surface, moderately fossiliferous, moderate HCl reaction at 105.6-106.05' | |
| 110 -68.4 | | | 4 | 109.1, 109.15, 109.25' - Fractures (3), 90, 30, 50 deg, smooth to rough, undulating, intersecting fractures from 108.7-109.5' | | | R13: 10 minutes |
| | | | 3 | 109.65' - Fractures, 65 deg and 70 deg, rough, undulating, tight | | | |
| | 111.5 | | | 110' - Fracture, 75-85 deg, rough, undulating, tight, intersecting | | | |
| | | | 0 | 110.5-110.65' - Fracture zone, 50 deg and 70 deg, rough, undulating, open <1-1/2" | | | |
| | | | 0 | | | **No Recovery 106.3-106.5'** | |
| | R14-NQ 5 ft 100% | 100 | 0 | 113.35, 114.0, 114.2, 115.2, 116.25, 116.5' - Mechanical break (6) | | **Limestone** 106.5-111.5' - moderate yellowish brown to yellowish gray, (10YR 5/4 to 5Y 7/2), very fine to fine grained, strong HCl reaction, very weak (R1), voids (<3/16") over 60-80% of surface, moderately to highly fossiliferous (molds <1/4" diameter) concentrated at 106.5-107.7' and 110.0-110.3', surface iron staining at 106.8', 107.8' and 109.5' | SC-3 collected at 114.2-115.2' |
| 115 -73.4 | | | 0 | | | | |
| | | | 0 | | | | R14: 7 minutes |
| | 116.5 | | | | | | |
| | | | 1 | 116.6' - Bedding plane, horizontal, smooth, undulating, tight | | 111.5-116.5' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl reaction, very weak (R1), 40% voids to <1/16", poorly to moderately fossiliferous (molds <1/16"), iron staining at 113.8', 114.6' and 115.7' | |
| | | | 0 | | | | |
| | R15-NQ 5 ft 97% | 92 | 0 | 118.85, 119.85' - Mechanical break (2) | | 116.5-119.0' - 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 surface, poorly to moderately fossiliferous (molds <1/2"x1/4") | |
| 120 -78.4 | | | 0 | | | | |
| | | | 2 | 120.5-120.6' - Fracture zone, 25 deg and horizontal, rough, undulating, intersecting, open <1" | | | R15: 9 minutes |
| | 121.5 | | NR | | | 119.0-121.35' - Same as 116.5-119.0' except 80% voids up to 3/16", few cavities up to 1/2" diameter, highly fossiliferous (molds <1/2") | |
| | | | 1 | 121.9' - Bedding plane, horizontal, smooth, undulating, tight | | | |
| | | | 0 | | | **No Recovery 121.35-121.5'** **Limestone** 121.5-122.65' - Same as 119.0-121.35' | |
| | R16-NQ 5 ft 100% | 84 | 0 | | | 122.65-124.0' - pale yellowish brown, (10YR 6/2), very fine to fine grained, very weak (R1), voids (<1/16") over >50% of surface, poorly fossiliferous (molds up to 1/4" diameter), few cavities up to 1/2"x1/4" | |
| 125 -83.4 | | | 0 | | | | |
| | | | >10 | 125.75-126.5' - Fracture zone, rough, undulating, gravel sized fragments <3"x1-1/2" | | 124.0-126.5' - Same as 122.65-124.0' except voids up to 3/16" over 60-80% of surface, extremely weak rock (R0), highly fossiliferous below 125.75', friable | R16: 6 minutes |
| | 126.5 | | | | | | |
| | | | 2 | 127.25, 127.45, 127.7, 131.3' - Bedding plane, horizontal, smooth, undulating, tight | | | |
| | | | 1 | | | | |
| | R17-NQ | | | 128.7, 129.0' - Mechanical break (2) | | | |

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# ROCK CORE LOG

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 ORIENTATION : Vertical

WATER LEVELS : 2 ft bgs on 03/15/07 START : 3/14/2007 END : 3/21/2007 LOGGER : R. Bitely

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

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# ROCK CORE LOG

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 ORIENTATION : Vertical

WATER LEVELS : 2 ft bgs on 03/15/07 START : 3/14/2007 END : 3/21/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 5 ft 86% | 80 | 1 | 148.95' - Bedding plane, horizontal, rough, undulating, open <1/4" | | **Limestone** 146.5-150.8' - moderate yellowish brown to yellowish gray, (10YR 5/4 to 5Y 7/2), very fine to fine grained, mild to moderate HCl reaction, laminated bedding, 146.5-148.9' - weak to medium strong rock (R2-R3), voids (<3/16") over 30% of surface, voids increase to 80% from 148.3-148.9' 148.9-150.8' - very weak rock (R1), voids (up to 3/16") over 60% of surface, moderately fossiliferous (casts) concentrated at 148.9-150.0 | |
| 150 -108.4 | | | 0 | | | | |
| | | | 0 | | | | R21: 13 minutes |
| | 151.5 | | NR | | | | |
| | | | 1 | 151.85' - Bedding plane, horizontal, rough, undulating, tight | | | SC-5 collected 151.85-152.8' |
| | | | 1 | | | | |
| | R22-NQ 5 ft 100% | 92 | 0 | 153.45-153.55' - Clay seam or bedding plane, horizontal, smooth, undulating, 5/8" silt and/or clay sized infilling, tight | | **No Recovery 150.8-151.5'** **Limestone** 151.5-153.45' - Same as 148.9-150.8' except very weak (R1) | |
| 155 -113.4 | | | 0 | | | **Silty Sand (SM)** 153.45-153.55' - wet, loose, silt has rapid dilatancy, 50% fine to medium grained sand, calcareous, 1/4" thick lense | |
| | | | 2 | 155.65, 156.35' - Bedding plane (2), <10 deg, smooth, undulating, tight | | | R22: 14 minutes |
| | 156.5 | | | | | **Limestone** 153.55-156.5' - pale yellowish brown to yellowish gray, (10YR 6/2 to 5Y 7/2), very fine to fine grained, moderate to strong HCl reaction, medium strong (R3), 50-70% voids up to 3/16", poorly to moderately fossiliferous, laminated bedding concentrated at 155.0-156.5', few cavities <1/2"x1/4", 1 large (3/4"x1/2") cavity at 156.4' | |
| | | | 3 | 156.7, 156.8, 156.9' - Bedding plane (3), <10 deg, smooth, undulating, tight | | | |
| | | | 0 | | | | |
| | R23-NQ 5 ft 100% | 92 | 0 | 158.35, 158.6, 159.7' - Mechanical break (3) | | | |
| 160 -118.4 | | | 0 | | | 156.5-161.5' - pale yellowish brown, (10YR 6/2), very fine to fine grained, moderate to strong HCl reaction, weak to very weak (R2 to R1), 60% voids up to 3/16", moderately fossiliferous (molds 3/4"x1/2" diameter), trace organics, trace secondary infill and silt-sized carbonate material at 158.35-158.5' and 160.5', medium strong rock (R3) lense at 158.7-159.7', laminated bedding at 156.5-156.9' and 160.5-160.9' | |
| | | | 1 | 160.65' - Bedding plane, <10 deg, smooth, undulating, tight | | | R23: 7 minutes |
| | 161.5 | | | | | Bottom of Boring at 161.5 ft bgs on 3/21/2007 | Water level at 5' below ground surface on 3/21/2007 at 18:30 |

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# SOIL BORING 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

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 bgs on 03/22/07 START : 3/22/2007 END : 4/5/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 41.6 | 0.0 – 1.5 | 1.1 | SS-1 | 2-2-4 (6) | **Poorly Graded Sand With Organics (SP)** 0.0-0.2' - grayish black, (N2), moist, loose, very fine to fine grained, no HCl reaction, sand is silica, trace nonplastic fines, 20% fine organics | | "Water level is based on Ground Water Monitoring at LNP site (FSAR Table 2.4.12.08)" Water level at 1.5' below ground surface SS-1 collected with hammer only, hammer stem is AWJ rod, NWJ used below SS-1 6" tri-cone roller bit used with mud rotary to open bore hole, rapid drilling from 0-10' below ground surface |
| | 1.5 – 5.0 | | | | **Poorly Graded Sand (SP)** 0.2-1.1' - medium light gray, (N6), moist, loose, very fine to fine grained, sand is silica, trace nonplastic fines, 10% organics and roots | | |
| 5 | | | | | | | |
| 36.6 | 5.0 – 6.5 | 0.9 | SS-2 | 3-4-7 (11) | **Silty Sand (SM)** 5.0-5.9' - light olive gray, (5Y 6/1), wet to moist, medium dense, slow dilatancy, no HCl reaction, fine sand, 22% low plasticity fines | | |
| 10 | | | | | | | |
| 31.6 | 10.3 – 15.0 | 0.3 | SS-3 | 50/3 (50/3") | **Silt With Sand (ML)** 10.0-10.25' - dusky yellow, (5Y 6/4), wet, hard, low to 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) | | Extremely slow drilling rate 10.0-14.5' |
| 15 | | | | | | | Rapid drilling 14.5-20' |
| 26.6 | 16.5 | 1.3 | SS-4 | 21-30-25 (55) | **Silt (ML)** 15.0-16.3' - moderate yellow, (5Y 7/6), wet, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 14% fine to medium sand sized grains, carbonate derived | | |
| 20 | | | | | | | |

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# SOIL BORING 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

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 bgs on 03/22/07 START : 3/22/2007 END : 4/5/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 21.6 | 20.0 | 0.1 | SS-5 | 50/2.5 (50/2.5") | **Limestone Fragments** 20.0-20.1' - grayish yellow, (5Y 8/4), mild HCl reaction, rock fragments to 1/2" with 60% coverage of voids to 1/16" | | Slow drilling, trace light chatter 20-21'<br>Rapid drilling with intermittent dense zones 21-35' |
| 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, hard, nonplastic, rapid dilatancy, mild to moderate HCl reaction, limestone lenses <1/2" thick, voids <1/16" over 70% of limestone surface | | |
| 30 | 30.0 | | | | | | |
| 11.6 | 31.3 | 1.0 | SS-7 | 15-30-50/3 (80/9") | **Silty Sand (SM)** 30.0-31.0' - dark yellowish orange, (10YR 6/6), wet, very dense, fine to coarse grained, moderate HCl reaction, 49% nonplastic fines, 1" thick limestone lense at 30.4', few limestone lenses <1/4" thick interbedded throughout, carbonate derived | | |
| 35 | 35.0 | | | | | | |
| 6.6 | 36.0 | 0.8 | SS-8 | 15-50/2.5 (65/11.5") | **Silty Sand (SM)** 35.0-35.8' - Same as 30.0-31.0' except a few siltier lenses <1/2" thick, no limestone lenses | | Moderate to heavy chatter increasing with depth, moderate to slow drilling 35-40' |
| 40 | | | | | | | |

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# SOIL BORING 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

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 bgs on 03/22/07 START : 3/22/2007 END : 4/5/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 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 to 5Y 5/2), moderate to mild HCl reaction, fragments <1-1/2" x 1/2" in size | | Drilling stops at 17:30 on 03/22/2007<br>Water/mud level 0.5' below ground surface at 07:30, 3/23/07<br>Continue drilling from 40' with mud rotary NWJ rod and 6" tri-cone bit at 08:00 on 03/23/2007<br>Extremely slow drilling, light to moderate chatter 40-44'<br>44.0-45.0' Drill rate increases slightly 40-44' |
| 45 -3.4 | 45.0 46.5 | 1.3 | SS-10 | 37-50-48 (98) | **Sandy Silt (ML)** 45.0-46.3' - light olive gray, (5Y 5/2), wet, hard, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 48% fine to coarse grained sand | | Rapid drill rate 45-55' |
| 50 -8.4 | 50.0 51.5 | 1.3 | SS-11 | 12-24-30 (54) | **Sandy Silt With Gravel (ML)** 50.0-51.3' - moderate olive brown, (5Y 4/4), wet, hard, nonplastic, rapid dilatancy, moderate to strong HCl reaction, 30% sand sized grains, 20% gravel sized grains, few extremely weak (R0) rock limestone lenses <1/2" thick, carbonate derived | | |
| 55 -13.4 | 55.0 55.8 | 0.8 | SS-12 | 50-50/3 (100/9") | **Sandy Silt With Gravel And Limestone (ML)** 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<br>**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<br>Begin Rock Coring at 56.5 ft bgs<br>See the next sheet for the rock core log | | HW casing set to 55', clean out casing with 3-7/8" tri-cone to 56'<br>Rock coring begins at 56.5', no sampling from 56.0-56.5' |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING 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

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

WATER LEVELS : 1.5 ft bgs on 03/22/07 START : 3/22/2007 END : 4/5/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 56.5 | | | | | **Limestone** | |
| | R1-NQ 5 ft 86% | 74 | 1 | 57.1' - Fracture, 30 deg, smooth, undulating, <1/4" open | | 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 HCl 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" | |
| | | | 1 | | | | |
| | | | 2 | 58.35, 58.5, 58.75' - Fractures (3), <10 deg, rough, undulating, <1/4" open<br>58.95' - Mechanical break | | | |
| 60<br>-18.4 | | | 2 | 59.85' - Fracture (2), 60 deg and 30 deg, smooth, undulating, intersecting fractures | | | R1: 13 minutes |
| | | | 0 | | | | |
| | | | NR | | | | |
| | 61.5 | | | | | 56.5-58.2; 58.9-60.5' - weak to medium strong (R2 to R3)<br>58.2-58.9; 60.5-60.8' - very weak (R1)<br>**No Recovery 60.8-61.5'**<br>**Limestone** | |
| | R2-NQ 5 ft 90% | 76 | 2 | 61.7' - Fracture, <10 deg, rough, undulating, <1/2" open<br>62.1' - Fracture, 15 deg, rough, undulating, <1" open | | 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") | |
| | | | >10 | 62.6' - Fracture, 70 deg, smooth, undulating, tight | | | |
| | | | 1 | 62.9' - Fracture, <10 deg, rough, undulating, <1-1/2" open | | | |
| 65<br>-23.4 | | | 2 | 63.7' - Fracture, <10 deg, rough, undulating, <1" open<br>64.0, 64.5' - Mechanical break (2) | | | |
| | | | 0 | 64.7' - Fracture, <10 deg, rough, undulating, tight | | | R2: 11 minutes |
| | 66.5 | | NR | 65.35' - Fracture, <10 deg, smooth, undulating, tight | | 61.5-61.7; 62.9-63.7' - extremely weak to very weak (R0 to R1)<br>61.7-62.9; 64.2-66.0' - weak to medium strong (R2 to R3)<br>**No Recovery 66.0-66.5**<br>**Limestone** | |
| | R3-NQ 5 ft 98% | 98 | 0 | | | 66.5-71.4' - moderate yellowish brown, (10YR 5/4), very fine to fine grained, moderate HCl 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 | |
| | | | 0 | 67.8, 68.9, 70.8, 71.25' - Mechanical break (4) | | | |
| | | | 0 | | | | |
| 70<br>-28.4 | | | 0 | | | | |
| | | | 0 | | | | R3: 12 minutes |
| | 71.5 | | NR | | | 66.5-68.4, 70.0-71.5' - very weak (R1)<br>68.4-70.0' - weak to medium strong (R2 to R3)<br>**No Recovery 71.4-71.5'**<br>**Limestone** | |
| | R4-NQ 5 ft 95% | 84 | 0 | | | 71.5-72.3' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), very fine to fine grained, moderate HCl 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' |
| | | | 0 | 72.85' - Fracture, 65 deg, rough, undulating, tight | | | |
| | | | 1 | 74.0' - Mechanical break<br>74.35' - Fracture, 15 deg, smooth, undulating, tight | | | |
| 75<br>-33.4 | | | 0 | | | | |
| | | | 0 | | | | R4: 15 minutes |
| | 76.5 | | | | | | |

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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

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

WATER LEVELS : 1.5 ft bgs on 03/22/07 START : 3/22/2007 END : 4/5/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | | | NR | | | **Silt (ML)**<br>72.3-72.8' - moist, nonplastic, rapid dilatancy | |
| | | | 0 | | | **Limestone**<br>72.8-76.25' - Same as 71.5-72.3' except voids (<3/16") over up to 80% of surface<br>**No Recovery 76.25-76.5'**<br>**Limestone**<br>76.5-77.0' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), 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 black organics | |
| | | | >10 | 77.65' - Fracture zone (>5), rough, undulating, <1" open | | | |
| | R5-NQ<br>5 ft<br>100% | 60 | 1 | 77.85' - Fracture, 60 deg, rough, undulating, <1/2" open<br>78.5' - Fracture, 25 deg, smooth, undulating, tight | | | |
| 80<br>-38.4 | | | 2 | 78.85' - Bedding plane, <10 deg, smooth, undulating, <1/4" clay infilling, tight<br>79.0' - Mechanical break | | | |
| | | | 3 | 79.6' - Fracture, horizontal, rough, undulating, tight | | | R5: 11 minutes |
| | 81.5 | | | | | | |
| | | | 1 | 80.45' - Fracture, 40 deg, rough, undulating, tight<br>80.7' - Fracture, horizontal, rough, undulating, tight | | **Silt (ML)**<br>77.0-77.3' - moderate olive brown, (5Y 4/4), moist, nonplastic, firm to hard, trace lignite | |
| | | | 0 | 80.85' - Fractures (2), horizontal and 30 deg, intersecting, tight | | **Limestone**<br>77.3-78.15' - Same as 76.5-77.0' | |
| | R6-NQ<br>5 ft<br>88% | 74 | 2 | 81.75' - Fracture, 15 deg, rough, stepped, tight<br>83.5, 83.8' - Fractures (2), 15 deg, rough, undulating, to stepped, tight | | **Silt (ML)**<br>78.15-78.25' - Same as 77.0-77.3' | |
| 85<br>-43.4 | | | 2 | 84.0' - Mechanical break<br>84.65' - Fracture, 50 deg, rough, undulating, tight | | **Limestone**<br>78.25-81.5' - Same as 76.5-77.0' except 1/4" clay lense at 78.8', medium dark gray (N4), plastic, with organics, calcareous, extremely weak to very weak (R0 to R1) from 78.25-79.95' with trace voids and laminated bedding at 78.8'<br>79.5-81.5' - weak to medium strong (R2 to R3), voids (<3/16') over 50-80% of surface, few cavities (1-1/2" x 1/2"), some cavities with secondary infilling<br>81.5-85.9' - very pale orange to moderate yellowish brown, (10YR 8/2 to 10YR 5/4), very fine to fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids (<3/16') covering 20-70% of surface at 81.5-83.5' and 83.8-84.9' increasing with depth, with secondary infilling, bioturbation accounts for 30% of surface area<br>83.5-83.8' - extremely weak to very weak (R0 to R1), with elastic silt laminations and organics<br>**No Recovery 85.9-86.5'** | |
| | | | 0 | 85.15' - Fracture, horizontal, rough, undulating, <1" open | | | R6: 24 minutes |
| | 86.5 | | NR | | | | |
| | | | >10 | 86.65-86.75' - Fracture zone, rough, undulating, <1-1/2" open | | | |
| | | | 0 | 87.05' - Mechanical break | | | SC-2 collected at 87.05-87.8' |
| | R7-NQ<br>5 ft<br>75% | 56 | >10 | 88.85-89.05' - Fracture zone, rough, undulating, <3" open | | | |
| 90<br>-48.4 | | | 2 | 89.85' - Fracture, 80 deg, rough, undulating, tight | | | |
| | | | NR | 90.05' - Fracture, 55 deg, rough, undulating, <1/2" open | | | R7: 15 minutes |
| | 91.5 | | | | | | |
| | | | 1 | | | | |
| | | | 0 | 92.3' - Bedding plane, horizontal, rough, undulating, silt and/or clay sized infilling, <1/4" open<br>93.15' - Mechanical break | | | |
| | R8-NQ<br>5 ft<br>98% | 95 | 1 | | | | |
| 95<br>-53.4 | | | 0 | | | | |
| | | | 0 | | | | R8: 11 minutes |
| | 96.5 | | | | | | Stop coring on 03/23/2007 |

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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

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

WATER LEVELS : 1.5 ft bgs on 03/22/07 START : 3/22/2007 END : 4/5/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | NR | | | **Limestone** | |
| | | | 0 | 96.8, 98.75, 99.0, 99.2' - Mechanical break (4) | | 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' | Resume coring at 08:00 on 03/24/2007 |
| | | | 0 | | | | Water level at 1' below ground surface |
| | R9-NQ 5 ft 100% | 100 | 0 | | | | |
| 100 -58.4 | | | 0 | | | | |
| | | | 0 | | | **No Recovery 90.25-91.5'** | R9: 6 minutes |
| | 101.5 | | | | | **Limestone** | |
| | | | 0 | | | 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 HCl 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' | |
| | | | 0 | | | | |
| | R10-NQ 5 ft 98% | 98 | 0 | 104.0, 106.35' - Mechanical break (2) | | | |
| 105 -63.4 | | | 0 | | | | |
| | | | 0 | | | | R10: 11 minutes |
| | 106.5 | | | | | **No Recovery 96.4-96.5'** | |
| | | | NR | | | **Limestone** | |
| | | | 1 | 106.6' - Fracture (2), vertical and horizontal, rough, undulating, <1/2" open | | 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" | |
| | | | 4 | 107.7, 108.0, 108.25' - Fractures (4), horizontal and 80-90 deg, rough, undulating, four intersecting fractures, tight | | | |
| | R11-NQ 5 ft 99% | 42 | 5 | 108.65, 108.8, 108.9, 109.05, 109.15' - Fractures (>5), horizontal and 80-90 deg, rough, undulating, intersecting fractures, tight | | | Driller's Remark: 30-40% loss of circulation at 108.5' |
| 110 -68.4 | | | 4 | 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 | | 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" | |
| | | | 5 | | | | R11: 5 minutes |
| | 111.5 | | | 111.1, 111.2-111.9' - Fracture zone (2), horizontal and 75-90 deg, rough, undulating, tight | | **No Recovery 106.4-106.5'** | |
| | | | NR | | | **Limestone** | |
| | | | 1 | | | 106.5-111.45' - yellowish gray, (5Y 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 | |
| | | | >10 | 112.45, 112.65, 112.7, 113.0' 113.1, 113.25' 113.6, 113.7, 113.8'5, 115.3' 115.65' - Bedding plane (17), <10 deg, rough, undulating, tight to 1/4" open | | | |
| | R12-NQ 5 ft 100% | 68 | 7 | 112.6, 112.7, 113.2, 113.3' - Fractures (4), 60-70 deg, rough, undulating, intersecting fractures, tight | | | |
| | | | | | | **No Recovery 111.45-111.5'** | |
| | | | | | | **Limestone** | |
| 115 -73.4 | | | 1 | | | 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' |
| | | | 1 | | | | R12: 5 minutes |
| | 116.5 | | | | | | |

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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

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

WATER LEVELS : 1.5 ft bgs on 03/22/07 START : 3/22/2007 END : 4/5/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | | | 1 | 116.6' - Fracture, 60 deg, rough, undulating, tight | | **Limestone** 116.5-121.2' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl reaction, very weak to weak (R1 to R2), voids (<3/16") over 30-70% of rock surface increasing with depth, moderate to highly fossiliferous increasing with depth, fossil molds/casts <1/2" in diameter, several cavities (<1-1/2" x 1/2"), trace secondary infilling and organics | |
| | | | 1 | 118.05' - Bedding plane, horizontal, rough, undulating, <1/4" open | | | |
| | R13-NQ 5 ft 94% | 82 | 0 | | | | |
| 120 -78.4 | | | 2 | 120.0' - Fracture, 75 deg, rough, undulating, <1/4" open | | | |
| | | | >10 | | | | R13: 5 minutes |
| | 121.5 | | NR | 121.0-121.3' - Fracture zone, rough, undulating, <1-1/2" angular gravel sized rock fragments | | **No Recovery 121.2-121.5'** | |
| | | | 1 | 121.8' - Fracture, horizontal, rough, undulating, <1/2" open | | **Limestone** 121.5-123.0' - yellowish gray to pale yellowish brown, (5Y 7/2 to 10YR 6/2), very fine to fine grained, strong HCl reaction, very weak to weak (R1 to R2), voids (<3/16") over 30-50% of rock surface, laminated bedding over 20% of surface from 123.0-125.0' with trace secondary infilling and poorly fossiliferous | Possible loss of circulation, 100% loss of circulation as R14 proceeded |
| | | | 10 | 122.55, 122.65, 122.8, 122.9, 123.05' - Bedding plane (5), <10 deg, smooth, undulating, tight to 1/4" open | | | |
| | R14-NQ 5 ft 96% | 82 | 0 | 122.65, 122.95' - Fractures (2), 80 deg and vertical, rough, undulating, tight | | | |
| 125 -83.4 | | | 0 | 123.85, 124.5, 124.7' - Mechanical break (3) | | 123.0-125.0' - Same as 121.5-123.0' except granular texture up to medium grained, very fossiliferous, fossil casts/molds <1' x 1/2" | |
| | | | 1 | 125.65' - Bedding plane, horizontal, smooth, undulating, tight | | 125.0-126.3' - Same as 121.5-123.0' | R14: 10 minutes |
| | 126.5 | | NR | | | **No Recovery 126.3-126.5'** | |
| | | | 1 | 127.0' - Fracture, 60 deg, rough, undulating, tight | | **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), laminated bedding from 127.35-127.7', voids (<3/16") over 10-40% of rock surface especially from 126.5-127.35' and 130.35-131.5', poorly to moderately fossiliferous, few fossil molds/casts <1/2" x 1/4", trace secondary infilling, trace cavities <3/4" x 1/2" | |
| | | | 0 | 127.7' - Bedding plane, 15 deg, smooth, undulating, tight, possible mechanical break | | | |
| | R15-NQ 5 ft 100% | 100 | 0 | | | | |
| 130 -88.4 | | | 1 | | | | |
| | | | 0 | 130.35' - Fracture, horizontal, rough, undulating, <1/4" open | | | SC-4 collected at 130.4-131.5' R15: 8 minutes |
| | 131.5 | | | | | | |
| | | | 1 | 131.6' - Bedding plane, rough, undulating, <1/2" open, possible mechanical break | | 131.5-136.5' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl reaction, very weak to weak (R1 to R2), limestone with voids (<3/16') over 50% of rock surface interbedded with limestone having laminated bedding with trace voids (<3/16"), moderate to highly fossiliferous zones, fossil molds <1/2" x 1/4", trace secondary infilling of cavities | |
| | | | 0 | | | | |
| | R16-NQ 5 ft 100% | 94 | 0 | 133.6, 134.0, 136.45' - Mechanical break (3) | | | |
| 135 -93.4 | | | 1 | 135.15' - Fracture, 45 deg, rough, undulating, tight | | | |
| | | | 2 | | | | R16: 22 minutes |
| | 136.5 | | | | | | |

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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

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

WATER LEVELS : 1.5 ft bgs on 03/22/07 START : 3/22/2007 END : 4/5/2007 LOGGER : R. Bitely

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

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# ROCK CORE LOG

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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 ORIENTATION : Vertical

WATER LEVELS : 1.5 ft bgs on 03/22/07 START : 3/22/2007 END : 4/5/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | NR | | | **Limestone** | |
| | | | 1 | 156.85, 158.0, 160.8, 161.1' - Bedding plane (4), horizontal, rough, undulating, <1/4" open | | 154.1-154.8' - Same as 151.5-151.9' except laminated bedding, voids (<3/16") over 30-50% of rock surface, poorly to moderately fossiliferous | |
| | | | 1 | | | **Limestone** | |
| | R21-NQ 5 ft 100% | 94 | 0 | 158.7, 158.55, 158.95, 159.15, 159.7' - Mechanical break (5) | | 154.8-155.3' - Same as 151.5-151.9' except weak to very weak (R2 to R1), laminated bedding, | |
| 160 -118.4 | | | 0 | | | 155.3-156.35' - Same as 151.9-154.1' | |
| | | | 2 | | | **No Recovery 156.35-156.5'** | R21: 8 minutes |
| | 161.5 | | | | | **Limestone** | Water level is <1.5' below ground surface at 17:45 |
| | | | 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 (16), <10 deg, smooth, undulating, to rough and planar, tight to <1/4" open | | 156.5-161.5' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), very fine to fine grained, strong HCl reaction, voids (<3/16") over 40-60% of rock surface, trace organics, moderately to highly fossiliferous, laminated bedding, secondary infilling of cavities over <10% of rock surface, open cavities (<1/2") over 10% or rock surface | Original boring A-2 completed to 161.5' and abandoned on 03/24/2007; replacement boring offset 7' NE from original and drilled to 161.5' with 3-7/8" tri-cone roller bit on NWJ rods, samples not collected |
| | | | 1 | | | | |
| | R22-NQ 5 ft 100% | 75 | 0 | 164.0, 164.15' - Mechanical break (2) | | | |
| 165 -123.4 | | | 3 | | | 161.5-166.5' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl reaction, very weak to weak (R1 to R2), voids (<3/16") over 20% of rock surface except from 161.5-162.4' where voids cover 20-50% of rock surface, poorly to moderately fossiliferous with fossil casts <1/4" in diameter, trace laminated bedding | NW casing installed in replacement boring to 161.5 on 03/29/2007, coring begins at 161.5' on 04/03/2007 at 11:30 |
| | | | >10 | | | | |
| | 166.5 | | | | | | Water level is <1.5' below ground surface at 09:00 on 04/03/2007 |
| | | | 5 | 166.5-166.7' - Bedding plane (5), horizontal, smooth, undulating to planar, tight | | | 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 planar, tight | | 166.5-170.4' - yellowish-gray to light olive gray, (5Y 7/2 to 5Y 5/2), very fine to fine grained, very weak to medium strong (R1 to R3), strength increases with depth, trace laminated bedding from 166.5-168.4', voids (<3/16") trace to 30-40% of rock surface from 168.4-170.4', moderately fossiliferous with molds <3/4" x 1/4" | |
| | R23-NQ 5 ft 78% | 58 | 0 | 168.25-168.35' - Fracture zone or bedding plane, smooth, undulating, to rough and planar, tight to <1/4" open, multiple bedding plane fractures with vertical intersecting fractures | | | |
| 170 -128.4 | | | 1 | | | | |
| | | | NR | 169.0, 169.45' - Mechanical break (2) 169.55' - Fracture, <10 deg, rough, undulating, silt and/or clay sized infilling, <1/4" open, trace organic stain | | | R23: 12 minutes |
| | 171.5 | | | | | **No Recovery 170.4-171.5'** | |
| | | | 4 | 171.55, 172.1, 172.2, 172.4, 173.2, 173.65, 173.85, 174.35' - Bedding plane (8), <10 deg, smooth, undulating, to rough and planar, tight to <1/4" open | | **Limestone** 171.5-176.4' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, very weak to medium strong (R1 to R3), medium strong (R3) rock at 171.5-172.1', 172.2-174.5', and 174.95-176.4'; voids (<3/16") over 30-40% of rock surface, poorly fossiliferous with molds <1/2" x 1/4", trace laminated bedding | |
| | | | 1 | | | | |
| | | | | 172.85, 175.35' - Mechanical break (2) | | | |
| | R24-NQ 5 ft 98% | 64 | 4 | 174.1' - Fracture, 70 deg, rough, undulating, tight | | | |
| 175 -133.4 | | | 10 | 174.55-174.65' - Fracture zone, rough, undulating, gravel sized fragments | | | |
| | | | 0 | 174.7, 174.9' - Bedding plane (2), <10 deg, smooth, undulating to planar, tight to <1/4" open | | | SC-6 collected at 175.35-176.4' R24: 7 minutes |
| | 176.5 | | | | | | |

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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 ORIENTATION : Vertical

WATER LEVELS : 1.5 ft bgs on 03/22/07 START : 3/22/2007 END : 4/5/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | NR | 176.6, 179.2' - Mechanical break (2) | | **No Recovery 176.4-176.5'** | |
| | | | 3 | 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 | | **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' | |
| | | | 5 | | | | |
| | R25-NQ 5 ft 86% | 16 | 3 | 178.45-178.44, 180.4-180.45, 180.5-180.6' - Fracture zone (3), smooth to rough, undulating, tight to 1/2" open | | | |
| 180 -138.4 | | | >10 | | | | |
| | | | 10 | | | | R25: 19 minutes |
| | 181.5 | | NR | | | | |
| | | | >10 | 181.5-181.65' - Fracture zone, rough, undulating, gravel sized fragments <1" diameter | | **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" | |
| | | | 4 | 181.7' - Fracture zone, 20 deg, rough, undulating, <1/4" open | | | |
| | R26-NQ 5 ft 90% | 48 | >10 | 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 | | | |
| 185 -143.4 | | | 1 | 184.15' - Fractures, horizontal and vertical, rough, undulating, multiple intersecting fractures | | 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 1-1/2") | |
| | | | 0 | 185.6' - Fracture, <10 deg, rough, undulating, <1/2" open | | | R26: 15 minutes |
| | 186.5 | | NR | | | | |
| | | | 2 | 186.6' - Fracture or mechanical break, rough, undulating, <1/2" open | | **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" | |
| | | | 4 | 187.4, 187.65, 187.95, 188.1, 188.3' - Bedding plane (5), <10 deg, smooth, undulating to planar, tight to 1/4" open | | | |
| | R27-NQ 5 ft 96% | 56 | 0 | | | | |
| 190 -148.4 | | | 4 | 189.65, 189.85, 190.5, 190.9, 191.05' - Fractures or mechanical break (5), rough, undulating, <1/2" open | | | |
| | | | >10 | 190.5, 190.6, 191.05, 191.3' - Fracture zone (4), rough, undulating, rock fragments up to 1" diameter and sand sized grains | | | R27: 10 minutes |
| | 191.5 | | NR | | | | |
| | | | 2 | 191.65' - Fracture or mechanical break, <10 deg, rough, undulating, <1/4" open | | 189.5-191.3' - Same as 186.5-189.5' except extremely weak to weak (R0 to R2), voids (<3/16") over 50% of rock surface, poorly to moderately fossiliferous, several cavities <1/2" | |
| | | | >10 | 192.45' - Fracture or mechanical break, 20 deg, rough, undulating, <1/2" open | | **No Recovery 191.3-191.5'** | |
| | | | | 192.65' - Fracture or mechanical break, <10 deg, rough, undulating, tight | | | Stop coring at 18:00 on 04/03/2007 |
| | R28-NQ 5 ft 96% | 56 | 3 | 192.9-193.1' - Fracture zone, rough, undulating, gravel sized fragments <2" diameter | | | |
| 195 -153.4 | | | 2 | 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 | | | Water level at 1.0' below ground surface at 18:00, 04/03/2007 |
| | | | >10 | 195.05' - Fracture or mechanical break, horizontal, rough, undulating, tight | | | R28: 5 minutes |
| | 196.5 | | | | | | |

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# ROCK CORE LOG

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

WATER LEVELS : 1.5 ft bgs on 03/22/07 START : 3/22/2007 END : 4/5/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | NR | 195.65' - Fracture or mechanical break, 50 deg, rough, undulating, tight | | **Limestone** | 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 |
| | | | >10 | 196.0-196.3' - Fracture zone, rough, undulating, gravel sized fragments <1-1/2" diameter | | 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 | Continue coring from 196.5 at 13:30 on 04/04/2007 |
| | | | 2 | 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 | | | |
| | R29-NQ 5 ft 68% | 20 | >10 | 197.9' - Fracture or mechanical break, 30 deg, rough, undulating, <1/4" open | | | |
| 200 -158.4 | | | 2 | 198.4' - Fracture or mechanical break, <10 deg, rough, undulating, <1/2" open | | | |
| | | | NR | 198.6, 198.8' - Mechanical break (2) 199.25, 199.4, 199.55' - Bedding plane (3), <10 deg, smooth, planar, tight | | 194.5-196.3' - Same as 191.5-194.5' except medium strong (R3), voids (<3/16") over 30% of rock surface, fossiliferous with molds <1/2" in diameter, strong color contact at 194.5' | R29: 7 minutes |
| | 201.5 | | | | | | |
| | | | >10 | 199.7' - Bedding plane, horizontal, smooth, undulating, silt and/or clay sized infilling, organic stained, poorly indurated organic silt lens, <1/4" open | | **No Recovery 196.3-196.5'** | |
| | | | >10 | 201.8' - Fracture or mechanical break, 60 deg, rough, stepped to undulating, tight to <1/4" open | | **Limestone** | |
| | R30-NQ 5 ft 74% | 10 | >10 | 201.9' - Bedding plane, <10 deg, rough, undulating, <1" open | | 196.5-199.0' - pale yellowish brown, (10YR 6/2), very fine to fine grained, moderate HCl 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" diameter over 20-30% of rock surface | |
| | | | >10 | 202.05' - Fracture, vertical, rough, undulating | | | |
| 205 -163.4 | | | | 202.2-202.4, 202.55-202.8' - Fracture zone (2), rough, undulating, gravel sized fragments <1-1/2" diameter | | | |
| | | | NR | 202.9, 203.0, 203.15, 203.35, 203.5, 203.7' - Bedding plane (6), <10 deg, smooth, undulating, tight to <1/4" open | | | R30: 14 minutes |
| | 206.5 | | | | | | |
| | | | >10 | 203.7-203.9, 204.35-204.7' - Fracture zone (2), rough, undulating, gravel sized fragments <2" diameter | | 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 | |
| | | | >10 | 205.0' - Fracture, 40 deg, rough, undulating, <1" open | | | |
| | R31-NQ 5 ft 64% | 40 | 1 | 206.8' - Fracture or mechanical break, 20 deg, rough, undulating, <1/2" open | | **No Recovery 199.9-201.5'** | |
| | | | 1 | 206.95' - Fracture or mechanical break, <10 deg, rough, undulating, <1/2" open | | **Limestone** | |
| 210 -168.4 | | | | 207.35-207.55' - Fracture zone, rough, undulating, gravel sized fragments <1" diameter | | 201.5-204.0' - 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), interbedded with extremely weak to very weak (R0 to R1) limestone, 20% 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 | |
| | | | NR | 207.95, 208.85' - Mechanical break (2) 208.3, 208.4' - Bedding plane (2), <10 deg, rough, undulating, <1/4" open | | | R31: 7 minutes |
| | 211.5 | | | | | | |
| | | | >10 | 209.1' - Fracture or mechanical break, rough, undulating, <1/2" open | | | |
| | | | >10 | 210.0' - Fracture or mechanical break, 35 deg, rough, undulating, <1" open | | | |
| | R32-NQ 5 ft 34% | 7 | | 211.5-212.7' - Fracture zone, rough, undulating, gravel sized fragments <2" diameter | | | |
| | | | | 212.7' - Fracture or mechanical break, <10 deg, rough, undulating | | 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" | |
| 215 -173.4 | | | NR | 213.1' - Fracture or mechanical break, 20 deg, rough, undulating, <1/2" open | | | |
| | | | | 213.1-213.2' - Fracture zone, rough, undulating, gravel sized fragments <1" diameter | | | R32: 11 minutes |
| | 216.5 | | | | | **No Recovery 205.2-206.5'** | |

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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

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

WATER LEVELS : 1.5 ft bgs on 03/22/07 START : 3/22/2007 END : 4/5/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R33-NQ 5 ft 38% | 0 | >10<br>>10<br>NR | 216.7, 216.9' - Bedding plane (2), <10 deg, smooth, undulating, to rough, tight to <1/4" open<br>216.9-218.2' - Fracture zone, rough, undulating, gravel sized fragments <2" diameter, stain on surface @ 217.6' (laminated organics) | | **Limestone**<br>206.5-207.0' - yellowish gray, (5Y 8/1), very fine to fine grained, moderate to strong HCl reaction, very weak to weak (R1 to R2), with lenses of extremely weak (R0) rock, voids (<3/16") over 10-30% of rock surface, poorly to moderately fossiliferous with molds/casts <1/2" in diameter, friable<br>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<br>208.3-209.7' - Same as 206.5-207.0'<br>**No Recovery 209.7-211.5'** | Formation collapsing on core barrel at 216.5', advance NW casing to 209'<br>R33: 14 minutes |
| 220<br>-178.4 | | | | | | | |
| 221.5 | R34-NQ 5 ft 4% | 0 | >10<br>NR | 221.5-221.7' - Fracture zone or mechanical break, rough, undulating, angular gravel sized fragments <1-1/2" diameter | | **Limestone**<br>211.5-213.2' - yellowish gray, (5Y 8/1), very fine to fine grained, 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<br>**No Recovery 213.2-216.5'**<br>**Limestone**<br>216.5-218.4' - yellowish gray, (5Y 8/1), very fine to fine grained, moderate HCl reaction, very weak to weak (R1 to R2), voids (<3/16") over 20-40% of rock surface, moderately fossiliferous with molds/casts <1/2" diameter, trace organic laminations<br>**No Recovery 218.4-221.5'** | Stop coring at 221.5 at 18:30 on 04/04/2007; water level at ground level<br>Resume coring at 07:00 on 04/05/2007<br>Recovery loss for R34 due to core barrel blockage at 221.7'<br>R34: 19 minutes |
| 225<br>-183.4 | | | | | | | |
| 226.5 | R35-NQ 5 ft 36% | 0 | >10<br>>10<br>NR | 226.6, 226.75, 226.9, 226.95, 227.05, 227.2, 227.5' - Fractures or mechanical break (7), <10 deg, rough, undulating, <1" open, gravel sized fragments <1/2" diameter<br>227.5-228.1' - Fracture zone, rough, undulating, angular gravel sized fragments <1" diameter | | **Limestone**<br>221.5-221.7' - yellowish gray, (5Y 8/1), very fine grained, mild to moderate HCl 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<br>**No Recovery 221.7-226.5'** | R35: 12 minutes |
| 230<br>-188.4 | | | | | | | |
| 231.5 | R36-NQ 5 ft 40% | 20 | 0<br>>10<br>NR | 232,5' - Bedding plane, horizontal, smooth, undulating, <1/8" open<br>232.6' - Fracture, 60 deg, rough, undulating, tight<br>232.8-233.5' - Fracture zone, rough, undulating, gravel sized fragments <2" diameter | | **Limestone**<br>226.5-228.3' - yellowish gray, (5Y 7/2), very fine to fine grained, mild to moderate HCl reaction, extremely weak to very weak (R0 to R1), voids (<3/16") over 10-30% of rock surface, poorly to moderately fossiliferous, few cavities <1/4" diameter, trace organics, medium strong (R3) rock from 227.4-227.5'<br>**No Recovery 228.3-231.5'** | SC-7 collected at 231.5-232.5'<br>R36: 18 minutes |
| 235<br>-193.4 | | | | | | | |
| 236.5 | | | | | | | |

| PROJECT NUMBER: | BORING 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

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

WATER LEVELS : 1.5 ft bgs on 03/22/07 START : 3/22/2007 END : 4/5/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R37-NQ 5 ft 58% | 30 | >10 | 236.6' - Fracture or mechanical break, <10 deg, rough, undulating, <1/4" open | | **Limestone** 231.5-233.5' - yellowish gray, (5Y 8/1), very fine to fine grained, mild to moderate HCl reaction, very weak (R1), voids (<3/16") over 10-20% of rock surface, poorly to moderately fossiliferous with fossil molds/casts <1/4", medium strong (R3) rock from 233.15-233.25' | |
| | | | 2 | 236.9-237.15' - Fracture zone, rough, undulating, gravel sized fragments <1" diameter | | | |
| | | | 10 | 237.25, 237.45, 238.0, 238.15, 238.85' - Fracture or mechanical break (5), <10 deg, rough, undulating, tight to <1/4" open | | **No Recovery 233.5-236.5'** | |
| 240 -198.4 | | | NR | 239.2-239.25' - Fracture zone or bedding plane, rough, undulating, <1/2" open, bedding plane fractures with vertical fractures | | **Limestone** 236.5-239.4' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, extremely weak to very weak (R0 to R1), voids (<3/16") over 20-50% of rock surface, trace laminated bedding, poorly to moderately fossiliferous with fossil molds/casts <3/4", few cavities <1/2" in diameter, secondary infilling of cavities at 238.5-239.2' | R37: 13 minutes |
| 241.5 | | | | | | | |
| | R38-NQ 5 ft 36% | 0 | >10 | 241.65' - Bedding plane or mechanical break, horizontal, rough, undulating, <1/4" open | | | |
| | | | 0 | 241.65-241.8' - Fracture zone, rough, undulating, gravel sized fragments <1" diameter | | | |
| | | | NR | 241.85' - Mechanical break<br>241.11, 242.35' - Bedding plane or mechanical break (2), <10 deg, rough, undulating, <1/4" open<br>242.4, 242.55' - Mechanical break (2) | | **No Recovery 239.4-241.5'**<br>**Limestone** 241.5-242.55' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, extremely weak to weak (R0 to R2), strength decreases with depth, voids (<3/16") over 20-40% of rock surface, moderately fossiliferous with molds/casts <3/4" in diameter, trace laminations | |
| 245 -203.4 | | | | | | | R38: 17 minutes |
| 246.5 | | | | | | | |
| | R39-NQ 5 ft 17% | 0 | >10 | 246.65-246.95' - Fracture zone, rough, undulating, gravel sized fragments <3/4" diameter | | **Sandy Silt (ML)** 242.55-243.3' - very fine to medium grained, moderate HCl reaction, carbonate derived silts and sands<br>**No Recovery 243.3-246.5'** | |
| | | | NR | 247.25' - Bedding plane or mechanical break, smooth, undulating, <1/4" open | | **Limestone** 246.5-247.35' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate to strong HCl reaction, extremely weak to very weak (R0 to R1), laminated with organics, trace voids (<3/16"), few cavities <1/4" in diameter, poorly fossiliferous | |
| 250 -208.4 | | | | | | | R39: 17 minutes |
| 251.5 | | | | | | **No Recovery 247.35-251.5'** | Boring completed to 251.5' at 15:30 on 04/05/2007 |
| | | | | | | Bottom of Boring at 251.5 ft bgs on 4/5/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING LOG

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 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.1 | | | | | | | C. Wallestad and N. Jarzyniecki also logged portions of boring A-03 |
| | 3.5 | | | | | | |
| | | 1.2 | SS-1 | 3-4-6 (10) | **Poorly Graded Sand With Silt (SP-SM)** 3.5-4.7' - very pale orange and dark yellowish orange, (10YR 8/2 and 10YR 6/6), wet, loose, very fine to fine grained, silica sand, 6% nonplastic fines, trace root matter, trace iron cemented sand nodules <1/4" diameter | | |
| 5 37.1 | 5.0 | | | | | | Moderate to light chatter, slow advancement at 5.0-8.5' |
| | 8.5 | | | | | | |
| | | 0.9 | SS-2 | 3-8-4 (12) | **Silt (ML)** 8.5-9.4' - pale yellowish orange, (10YR 8/6), wet, stiff, nonplastic to low plasticity, rapid dilatancy, mild to moderate HCl reaction, 5-10% fine to medium grained sand, all carbonate | | |
| 10 32.1 | 10.0 | | | | | | |
| | | | | | | | Very slow drilling at 11.5-13.5' |
| | 13.5 13.6 | 0.0 | SS-3 | 50/1 (50/1") | **No Recovery 13.5-13.6'** | | |
| | | | | | | | Rapid advancement |
| 15 27.1 | | | | | | | |
| | 18.5 18.8 | 0.3 | SS-4 | 50/4 (50/4") | **Silt With Sand (ML)** 18.5-18.8' - pale yellowish orange, (10YR 8/6), wet, hard, nonplastic, rapid dilatancy, mild HCl reaction, 15-20% fine to medium grained sand, all carbonate | | Very dense layer at 18.75', very slow advancement |
| 20 | | | | | | | |

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

# SOIL BORING LOG

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 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.1 | | | | | | | |
| | 23.5 | | | | | | Moderate to rapid advancement at 22.5' |
| | 25.0 | 1.5 | SS-5 | 23-36-46 (82) | **Silty Sand (SM)** 23.5-25.0' - grayish orange, (10YR 7/4), wet, very dense, fine to coarse grained, mild to moderate HCl reaction, 46% nonplastic fines, approximately 5 interbedded extremely weak (R0) limestone lenses <1/2" thick | | Sample SS-5 may be weak limestone |
| 25 / 17.1 | | | | | | | |
| | 28.5 | | | | | | |
| | 30.0 | 1.5 | SS-6 | 8-9-27 (36) | **Silty Sand (SM)** 28.5-30.0' - Same as 23.5-25.0' except dark yellowish orange, (10YR 6/6), dense, 1/2" lense of medium plastic silt at 28.6', approximately 5 interbedded limestone lenses up to 1/2" thick | | |
| 30 / 12.1 | | | | | | | Moderate drilling rate with variable thin, dense zones. |
| | 33.5 | | | | | | |
| | 34.6 | 0.5 | SS-7 | 4-10-50/1.5 (60/7.5") | **Silty Sand With Limestone (SM)** 33.5-34.0' - Same as 28.5-30.0' except 50% of sample is limestone lenses to 1/2" thick | | |
| 35 / 7.1 | | | | | | | |
| | 38.5 | | | | | | |
| | 39.4 | 0.9 | SS-8 | 22-50/5 (72/11") | | | |
| 40 | | | | | | | |

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

# SOIL BORING LOG

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 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.1 | | | | | **Silty Sand With Limestone (SM)** 38.5-39.4' - olive gray, (5Y 4/1), wet, very dense, fine to coarse grained, moderate HCl reaction, 30% nonplastic fines, with interbedded limestone lenses to 1" thick, all carbonate | | Slow drilling with intermittent light chatter at 40.0-43.5' |
| | 43.5 | | | | | | |
| | 43.6 | 0.1 | SS-9 | 50/1 (50/1") | **Limestone Fragments** 43.5-43.6' - olive gray, (5Y 4/1), mild to moderate HCl reaction, coarse sand to fine gravel-sized fragments (<1/2" in diameter), trace fossils and voids <1/16" | | |
| 45 -2.9 | | | | | Begin Rock Coring at 43.5 ft bgs<br>See the next sheet for the rock core log | | |
| 50 -7.9 | | | | | | | |
| 55 -12.9 | | | | | | | |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-03 SHEET 4 OF 12 |

# ROCK CORE LOG

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 43.5 | | 0 | | | **Limestone** 43.5-45.9' - moderate yellowish brown, (10YR 5/4), fine grained, weak to extremely weak (R2 to R0), voids (<1/6") over 60-70% of rock surface, hardness decreases with depth, highly to poorly fossiliferous decreasing with depth, trace laminations | HW casing installed to 43.5'; begin rock coring at 43.5' |
| | R1-NQ 2.5 ft 90% | 88 | 0 | 44.65' - Mechanical break | | | |
| 45 -2.9 | | | 1 | 45.4' - Bedding plane or fracture, <10 deg, rough, undulating, <1/4" open | | | R1: 5 minutes |
| | 46.0 | | NR | | | | |
| | | | 3 | 46.15, 46.25, 46.4' - Bedding plane or mechanical break, 0-<10 deg, smooth, undulating, <1/4" open | | **No Recovery 45.9-46.0'** | |
| | | | 1 | 46.55, 47.2, 47.85' - Mechanical break 47.4-47.65' - Clay seam | | **Limestone** 46.0-50.3' - moderate yellowish brown, (10YR 5/4), fine grained, very weak to extremely weak (R1 to R0), voids (<3/16") over 40-80% of rock surface increasing with depth, poorly fossiliferous, moderately to highly fossiliferous with fossil molds from 47.7-49.2' | |
| | R2-NQ 5 ft 86% | 77 | 0 | 48.5' - Mechanical break | | | |
| | | | 1 | 49.25-49.45' - Clay seam | | | |
| 50 -7.9 | | | 1 | | | | R2: 4 minutes |
| | | | NR | 50.25' - Bedding plane or mechanical break, <10 deg, smooth, undulating, tight | | **No Recovery 50.3-51.0'** | |
| | 51.0 | | | | | | |
| | | | 0 | | | **Limestone** 51.0-55.9' - moderate yellowish brown, (10YR 5/4), very fine to fine grained, moderate HCl reaction, very weak to weak (R1 to R2), voids (<1/16") over 80-90% of rock surface, moderately to highly fossiliferous with molds up to 1/2"x1/4", extremely weak at 52.0-52.5' | |
| | | | 4 | 52.3, 52.5' - Bedding plane or mechanical break, <10 deg, rough, undulating, <1/8" open | | | |
| | R3-NQ 5 ft 98% | 84 | 2 | 52.85' - Fracture or mechanical break, 50 deg, rough, undulating, tight | | | |
| | | | 2 | 53.0' - Bedding plane or mechanical break, 35 deg, rough, undulating, tight | | | |
| 55 -12.9 | | | 2 | 53.2' - Fracture or mechanical break, 20 deg, rough, undulating, tight 53.3' - Fracture or mechanical break, 50 deg, rough, undulating, tight | | | R3: 8 minutes |
| | 56.0 | | NR | 53.45, 53.6' - Mechanical break | | **No Recovery 55.9-56.0'** | |
| | | | 1 | 54.25' - Fracture or mechanical break, 60 deg, rough, undulating, tight | | **Limestone** 56.0-60.5' - moderate yellowish brown, (10YR 5/4), very fine to fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), voids (<3/16") over 80-90% of rock surface, moderately to highly fossiliferous, with fossil molds 1/2"x1/4", extremely weak to very weak at 57.25-57.55' and 59.95-60.5' | |
| | | | 5 | 55.4' - Fracture or mechanical break, <10 deg, rough, undulating, tight | | | |
| | R4-NQ 5 ft 90% | 67 | 1 | 55.7' - Bedding plane or mechanical break, <10 deg, rough, undulating, 1/8" infilling, sand infilling, open 56.55' - Fracture or mechanical break, 30 deg, rough, undulating, tight | | | |
| | | | 2 | 57.25, 57.35, 57.5, 57.55, 58.0, 58.4' - Bedding plane or mechanical break, <10 deg, rough, undulating, <1/4" open | | | |
| 60 -17.9 | | | 2 | 59.25' - Bedding plane or mechanical break, <10 deg, smooth, undulating, <1/4" open | | | R4: 10 minutes |
| | 61.0 | | NR | 59.95' - Bedding plane or mechanical break, horizontal, rough, undulating, <1/2" open | | **No Recovery 60.5-61.0'** | |
| | | | 1 | 60.2, 60.45' - Bedding plane or mechanical break, <10 deg, rough to smooth, undulating, 1/4" open | | | |
| | | | 1 | 61.8' - Fracture or mechanical break, 30 deg, rough, undulating, sandy or fragmented infilling, 1/2" to 1/4" open | | | |
| | R5-NQ | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
| 338884.FL | A-03 | SHEET 5 OF 12 |

# ROCK CORE LOG

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 5 ft 84% | 74 | 1 | 62.5' - Bedding plane or mechanical break, horizontal, rough, undulating, 1/2" to 1/4" open | | **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 mottled patterns from 61.6-63.4', mottling decreasing with depth, voids to 1/16" covering <5% of rock surface from 64.0-65.2', poorly to moderately fossiliferous with molds to 1/2"x1/8", solution cavities/bioturbation at 63.45', weak to medium strong at 62.5-64.3' | |
| | | | 1 | 63.45' - Mechanical break | | | |
| 65 -22.9 | | | 1 | 63.7-64.0' - Fracture or mechanical break, <10 deg, rough, undulating, rock fragment infilling, 3-1/2" open | | | R5: 12 minutes |
| | 66.0 | | NR | 64.65' - Bedding plane or mechanical break, horizontal, smooth, undulating, 1/8" open | | | |
| | | | 2 | 65.05' - Bedding plane or mechanical break, <10 deg, rough, undulating, 1/8" open | | | |
| | | | 0 | 66.3' - Fracture or mechanical break, 60 deg, rough, undulating, tight | | | |
| | R6-NQ 5 ft 100% | 98 | 1 | 66.8' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | | |
| | | | 0 | 68.45' - Bedding plane, horizontal, smooth, undulating, tight | | **No Recovery 65.2-66.0'** | |
| 70 -27.9 | | | 1 | 70.0' - Bedding plane or mechanical break, horizontal, smooth, undulating, tight | | **Limestone** 66.0-71.0' - pale yellowish brown, (10YR 6/2), mild to moderate HCl reaction, very weak to medium strong (R1 to R3), voids (1/6") over 30-70% of rock surface, poorly fossiliferous, trace molds, trace cavities to 3/4"x1/4" some cavities with secondary infilling, laminated bedding with organics from 67.3-67.7 | R6: 9 minutes |
| | 71.0 | | | 70.2, 71.0' - Mechanical break | | | |
| | | | 1 | 71.55' - Fracture, 25 deg, rough, stepped, 1/4" open | | | |
| | | | 3 | 72.4' - Fracture, 60 deg, smooth, undulating, tight | | 71.0-72.9' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), very fine to fine grained, moderate HCl reaction, extremely weak to medium strong (R0 to R3), voids (3/16") over 20-80% of rock surface, moderately fossiliferous with fossil molds, trace secondary infilling of cavities, mottled | |
| | R7-NQ 5 ft 74% | 53 | NR | 72.65' - Fracture or mechanical break, 20 deg, rough, undulating, tight | | | Driller's Remark: Silt seam from 72.9-73.9' based on drilling speed and circulation |
| | | | 0 | 72.8' - Bedding plane or mechanical break, horizontal, smooth, undulating, tight | | | Driller's Remark: 30% loss of circulation fluids at approximately 74' |
| 75 -32.9 | | | 1 | 72.9-73.9' - Clay seam, driller reports soil horizon | | **No Recovery 72.9-73.9'** | R7: 9 minutes |
| | | | 4 | 74.5' - Fracture, 40 deg, rough, undulating, tight | | **Limestone** 73.9-75.7' - Same as 71.0-72.9' | |
| | 76.0 | | NR | 75.15, 75.25' - Bedding plane, horizontal, smooth, undulating, tight | | **No Recovery 75.7-76.0'** | |
| | | | 1 | 75.5, 75.55' - Bedding plane or mechanical break, horizontal, smooth to rough, undulating, tight | | **Limestone** 76.0-76.9' - light olive gray, (5Y 5/2), very fine to fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids (1/16") over 10-90% of rock surface, cavities to 2"x1/8" | |
| | | | 0 | 76.9' - Bedding plane or mechanical break, <10 deg, rough, undulating, open 1" | | | |
| | R8-NQ 5 ft 49% | 27 | 0 | 77.1' - Fracture, 70 deg, rough, undulating, 1/2" open | | | |
| | | | NR | 77.3-77.5' - Clay seam<br>77.75, 77.85, 77.9, 78.05' - Bedding plane, horizontal, smooth, undulating, tight | | 76.9-77.3' - yellowish gray, (5Y 7/2), very fine to fine grained, extremely weak (R0), voids (1/6") covering 75% of rock surface | |
| 80 -37.9 | | | | | | **Fat Clay To Highly Plastic Silt (CH)** 77.3-77.5' - moderate HCl reaction | R8: 9 minutes |
| | 81.0 | | | | | **Limestone** 77.5-78.1' - Same as 76.9-77.3' | |
| | | | 2 | 81.35, 81.4' - Fracture or mechanical break, <10 deg, smooth to rough, undulating, organic staining over 50-80% of surface, <1/2" open | | 78.1-78.45' - Same as 76.0-76.9'<br>**No Recovery 78.45-81.0'** | SC-1 collected at 81.4-82.4' |
| | | | 1 | 82.7, 83.25, 83.4' - Mechanical break | | | |
| | R9-NQ | | | | | | |

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# ROCK CORE LOG

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 5 ft 98% | 84 | 2 | 83.6, 83.7' - Bedding plane, rough, undulating | | **Limestone** 81.0-85.35' - yellowish gray to very light gray, (5Y 7/2 to N8), very fine to fine grained, weak to medium strong (R2 to R3), extremely weak at 83.6-83.7', laminated from 81.0-81.4', voids (<1/16") over 30% of rock surface, organics rare from 81.35-81.4', secondary infilling of very fine grained matrix from 81.4-83.6', fossiliferous with molds up to 1/2"x1/4" with some secondary infilling, cavities up to 3" with secondary infilling, voids (3/16") over 80-90%, organics, fossiliferous, and cavities up to 1-1/2", possible bioturbation at 81.4-83.6' 85.35-85.9' - Same as 81.0-85.35' except extremely weak to very weak (R0 to R1), molds up to 1"x1/4" with some secondary infilling, cavities up to 1-1/2"x1/2", trace organics **No Recovery 85.9-86.0'** **Limestone** 86.0-87.0' - Same as 85.35-85.9' except fat clay (CH) to elastic silt (MH) seams at 86.8' and 87.5', secondary infilling of cavities at 86.65-86.8', cavities up to 1-1/2"x1/2" 87.0-87.65' - yellowish gray, (5Y 7/2), very fine to fine grained, extremely weak (R0), fossil molds up to 1/2"x1/4", cavities few, some secondary infilling 87.65-90.3' - light olive gray to dark yellowish brown, (5Y 5/2 to 10YR 4/2), very fine to fine grained, very weak to medium strong (R1 to R3), voids (<3/16") over 60% of rock surface, cavities few (up to 1/2"), trace organics, possible bioturbation, very fossiliferous, molds and casts up to 1/4"x1/2" **No Recovery 90.3-91.0'** **Limestone** 91.0-93.0' - dusky yellow, (5Y 6/4), very fine to fine grained, very weak to medium strong (R1 to R3), fossiliferous with casts up to 3/4"x1/2", voids (3/16") over 30% of rock surface, cavities up to 1/2"x1/4" over 15% of rock surface, yellowish gray (5Y 7/2) secondary infilling up to 2"x2" with trace voids (1/16"), trace organics | |
| 85 -42.9 | | | 0 | | | | R9: 12 minutes |
| | | | >10 | 85.55-85.9' - Fracture zone, rough, undulating to stepped | | | |
| | 86.0 | | NR | | | | |
| | | | >10 | 86.0-86.3' - Fracture zone, rough, undulating to stepped, intersecting fractures | | | |
| | | | 1 | 86.8-87.0' - Bedding plane, <10 deg, 1/2" clay infilling, 1/2" open 87.6' - Bedding plane, <10 deg, smooth, undulating, 1/4" open | | | |
| | R10-NQ 5 ft 86% | 64 | 0 | 88.5' - Mechanical break | | | |
| | | | >10 | | | | |
| 90 -47.9 | | | >10 | 89.7-90.3' - Fracture zone, rough, undulating, intersecting fractures | | | R10: 7 minutes |
| | 91.0 | | NR | | | | |
| | | | 0 | | | | End drilling for the day 3/10/07 at 91.0' Resume drilling on 3/11/07 at 91.0', water level is 1.3' below ground surface |
| | | | 1 | 92.0, 94.3' - Mechanical break | | | |
| | R11-NQ 5 ft 100% | 76 | 0 | 92.8' - Bedding plane or mechanical break, <10 deg, smooth, undulating 93.5' - Mechanical break | | | |
| | | | 4 | 94.05, 94.5' - Bedding plane or mechanical break, <10 deg, rough, undulating 94.65' - Fracture, smooth, undulating, 1/4" open | | | |
| 95 -52.9 | | | >10 | 94.75' - Fracture, 50 deg, infilling, up to 1/2" open | | | R11: 24 minutes |
| | 96.0 | | | | | | |
| | | | 0 | 95.1-96.0' - Fracture zone, intersecting fractures | | | SC-2 collected at 96.0-97.0' |
| | | | 0 | 97.05, 99.5, 96.0-96.2' - Mechanical break | | | |
| | R12-NQ 5 ft 100% | 87 | 1 | 98.7' - Mechanical break, 50 deg, rough, stepped | | | |
| | | | 1 | | | | |
| 100 -57.9 | | | 5 | 99.9' - Bedding plane, <10 deg, smooth, undulating, up to 1/4" open 100.35, 100.4' - Fracture, <10 deg, rough, undulating, up to 1/4" open | | | R12: 10 minutes |
| | 101.0 | | | | | | |
| | | | 1 | 100.55-101.0' - Fracture zone, 80-85 deg, rough, undulating, fracture interval separated by bedding plane fractures | | | |
| | | | 1 | 100.7-100.9' - Fracture zone or bedding plane, rough, undulating | | | |
| | R13-NQ | | | 101.2, 103.3, 103.5, 103.6, 104.4' - Mechanical break | | | |

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# ROCK CORE LOG

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 5 ft 100% | 98 | 0 | 101.3' - Fracture, 50 deg, rough, undulating<br>102.5' - Mechanical break, <5 deg, rough, undulating | | 93.0-96.0' - yellowish gray, (5Y 7/2), weak to medium strong (R2 to R3), voids over <10% of rock surface increasing to 30% from 93.65-94.35', fossiliferous with molds/casts up to 1/2"x1/4", possibly bioturbated from 93.65-94.35'<br>**Limestone**<br>96.0-101.0' - yellowish gray, (5Y 7/2), very fine to fine grained, very weak to medium strong (R1 to R3), voids (3/16") over 35% of rock surface decreasing to 15-20% at 99.8', fossiliferous with casts/molds up to 1/2"x1/4", organics visible in solution cavities at 98.4-98.6', secondary infilling with voids over <10% of surface and with trace fossils<br>101.0-106.0' - yellowish gray, (5Y 7/2), very fine to fine grained, weak to very weak (R2 to R1), voids over 20-30% of rock surface, fossiliferous with casts up to 1"x1/2", fossils and voids increase from zone at 102-103.5', clay infilling over 5% of voids, secondary infilling of yellowish gray (5Y 8/1) limestone with <10% voids and fossils; sparsely fossiliferous from 101-102.5' with 15-25% voids on rock surface<br>106.0-106.9' - light olive gray to yellowish gray, (5Y 5/2 to 5Y 7/2), very fine to fine grained, very weak (R1), voids (1/16") over 20% of rock surface, fossiliferous with molds/casts up to 1"x1/2", laminar bedding planes<br>106.9-111.0' - yellowish gray, (5Y 5/2), very fine to fine grained, very weak to weak (R1 to R2), voids (3/16") over 25-30% of rock surface, fossiliferous with fossils up to 1/4"x1/4", possible dissolution cavities up to 1/2"x1/2"<br>111.0-119.0' - yellowish gray, (5Y 7/2), very fine to fine grained, very weak (R1), voids (<1/16") over 10-30% of rock surface, voids with secondary infilling over additional 25% of rock surface, secondary infilling is yellowish gray (5Y 8/1)<br>119.0-121.0' - yellowish gray, (5Y 7/2), very fine to fine grained, weak (R2), voids (3/16") over 30% of rock surface, highly fossiliferous, with fossils up to 1/2"x1/4", dissolution cavities up to 1/4" in diameter over 15% of rock surface | |
| 105<br>-62.9 | | | 1 | | | | |
| | | | 0 | 104.95' - Bedding plane, rough, undulating | | | R13: 8 minutes |
| | 106.0 | | | | | | |
| | | | 0 | 106.5, 108.3, 109.2' - Mechanical break | | | |
| | | | 1 | 107.35' - Bedding plane, <15 deg, rough, undulating, 1/4" open | | | |
| | R14-NQ 5 ft 100% | 87 | 3 | 108.1, 108.6, 108.8' - Bedding plane, 10 deg, smooth to rough, undulating, tight to up to 1/8" open at 108.8' | | | |
| | | | 1 | | | | |
| 110<br>-67.9 | | | | 109.75' - Mechanical break, 10-15 deg, rough, undulating | | | SC-3 collected at 109.75-110.65'<br>R14: 5 minutes |
| | | | 3 | | | | |
| | 111.0 | | | 110.65, 110.85, 110.95' - Bedding plane, <10 deg, rough, undulating, up to 1/4" open | | | |
| | | | 3 | 111.05' - Fracture zone, rough, undulating, intersecting fractures | | | |
| | | | 0 | 111.7, 112.1, 115.15-115.2, 115.85' - Mechanical break | | | |
| | R15-NQ 5 ft 100% | 89 | 6 | 113.1, 113.35, 113.45, 113.55, 113.7, 113.8, 114.1, 144.3, 144.35, 114.75, 114.85' - Fracture zone or bedding plane, <10 deg, smooth to rough, undulating, up to 1/8" open, healed fracture at 119.6' | | | |
| | | | 5 | | | | |
| 115<br>-72.9 | | | | | | | R15: 9 minutes |
| | | | 1 | 115.5' - Bedding plane, <10 deg, smooth to rough, undulating, up to 1/8" open | | | |
| | 116.0 | | | | | | |
| | | | 3 | 116.1, 116.45, 116.55' - Bedding plane, <10 deg, smooth to rough, undulating, up to 1/4" open | | | |
| | | | 0 | | | | |
| | R16-NQ 5 ft 100% | 88 | 0 | 118.5, 118.45, 116.75, 119.8, 120.9' - Mechanical break | | | |
| | | | 1 | 119.3' - Bedding plane, rough, undulating, ground rock infilling, up to 1/2" open | | | |
| 120<br>-77.9 | | | | | | | R16: 6 minutes |
| | | | 2 | | | | |
| | 121.0 | | | 120.6' - Bedding plane, rough, undulating | | | |
| | | | 1 | 120.95' - Fracture or mechanical break, rough, undulating, high angle fracture | | | |
| | | | | 121.35' - Bedding plane, 15 deg, rough, undulating, 1/2" open | | | |
| | | | 2 | 122.0' - Bedding plane, rough, undulating to stepped, tight | | | |
| | R17-NQ | | | | | | |

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# ROCK CORE LOG

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, 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, undulating, up to 1/4" open | | **Limestone** 121.0-126.0' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 6/1), very fine to fine grained, voids (3/16") over 30% of rock surface, secondary infilling with yellowish gray (5Y 8/1) to medium gray (N5) limestone, voids increase to 40-50% at 123.8-124.0 and 125.2-126.0', fossiliferous with highly fossiliferous zones at 121.0-122.2', 123.8-124.2' and 125.2-126.0' (casts/molds), dissolution cavities at 121.8' and 122.1' up to 1"x1/2", smaller dissolution cavities throughout, laminar bedding at 122.9' | |
| | | | 0 | 123.4' - Bedding plane, smooth to rough, undulating, up to 1/2" open | | | |
| 125 -82.9 | | | 1 | 123.5, 123.7, 124.15, 125.7' - Mechanical break | | | R17: 11 minutes |
| | 126.0 | | | 125.75' - Fracture, 55 deg, rough, undulating | | | |
| | | | >10 | | | | |
| | | | 1 | 126.9-126.95' - Fracture zone, intersecting fractures, up to 1/4" open | | | |
| | R18-NQ 5 ft 100% | 98 | 2 | 127.4' - Bedding plane, rough, undulating, up to 1/4" open<br>127.5, 130.15, 130.9' - Mechanical break<br>128.4, 128.7' - Bedding plane, tight to 1/4" open | | 126.0-127.1' - Same as 121.0-126.0' except very weak to weak (R1 to R2), voids decreasing with depth | |
| | | | 0 | | | | |
| 130 -87.9 | | | 0 | | | 127.1-131.0' - yellowish gray, (5Y 7/2; 5Y 8/1), very fine to fine grained, very weak (R1), voids (1/16") over 10% of rock surface becoming infilled with depth, laminar bedding, fossiliferous with some fossils up to 1/4" in diameter, trace cavities | R18: 7 minutes<br>SC-4 collected at 130.15-131.1' |
| | 131.0 | | | | | | |
| | | | 0 | | | | |
| | | | 2 | 131.95, 133.3, 134.35, 135.5' - Mechanical break<br>132.4, 132.9' - Fracture, 40 deg, smooth to rough, undulating | | 131.0-134.8' - yellowish gray to dusky yellow, (5Y 7/8 to 5Y 6/4), very fine to fine grained, very weak to weak (R1 to R2), voids (1/8") over 10-30% of rock surface increasing with depth, fossiliferous as casts/molds, fossils more abundant at 132.7-133.2', laminar bedding planes | |
| | R19-NQ 5 ft 100% | 94 | 4 | 133.45' - Bedding plane, <5 deg, smooth, undulating | | | |
| | | | 0 | 133.55' - Fracture, 80 deg, rough to smooth, undulating, tight | | | |
| 135 -92.9 | | | 0 | | | 134.8-136.0' - yellowish gray, (5Y 7/6), very fine to fine grained, weak (R2), voids (3/16"), fossiliferous (casts), dissolution cavities at 134.9-135.2' (1"x1/2") | R19: 8 minutes |
| | 136.0 | | | 135.5, 133.6' - Fracture, 75 deg and 80 deg, rough to smooth, undulating, fractures intersect at 133.55' | | | |
| | | | 4 | 136.05' - Bedding plane, 40 deg, rough to smooth, undulating | | 136.0-141.5' - yellowish gray and light olive gray, (5Y 7/2 and 5Y 5/2), very fine to fine grained, very weak to weak (R1 to R2), voids (1/16") over 10% of rock surface increasing to 1/8" at 138.7' covering 25:% of rock surface, dissolution cavities up to 1/4" with some secondary calcite mineralization, poorly fossiliferous, laminar bedding | |
| | | | >10 | 136.35, 136.7, 136.85' - Bedding plane, 40 deg, rough to smooth, undulating, up to 1/4" open | | | |
| | R20-NQ 5 ft 100% | 69 | 2 | 136.45, 137.1, 137.75, 139.0' - Mechanical break | | | |
| | | | 1 | 137.3-137.75' - Fracture zone or bedding plane, multiple high angle intersecting fractures | | | |
| 140 -97.9 | | | 3 | 138.2, 138.5, 139.2' - Bedding plane, 40 deg, rough to smooth, undulating, up to 1/4" open<br>140.0, 140.3' - Fracture (2), 60 deg and 65 deg, rough, undulating, up to 1/4" open | | | R20: 8 minutes<br>Driller's Remark: 100% loss of circulation fluids at 140' |
| | 141.0 | | | | | | |
| | | | 1 | 140.7' - Bedding plane, <10 deg, smooth, undulating, up to 1/2" open<br>141.3, 141.95, 145.9' - Mechanical break | | | SC-5 collected at 141.85-142.9' |
| | | | 0 | 141.45' - Bedding plane, <10 deg, smooth, undulating | | | |
| | R21-NQ | | | | | | |

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# ROCK CORE LOG

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 5 ft 91% | 53 | >10 | 143.0' - Bedding plane, <10 deg, smooth to rough, undulating, up to 1" open | | **Limestone** 141.5-143.1' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), very fine to fine grained, very weak to weak (R1 to R2), voids over 20% of rock surface, cavities over 10% of rock surface up to 1-1/3"x3/4", most voids and cavities infilled with medium gray (N6) material, fossiliferous (as casts) 143.1-145.55' - yellowish gray to very light gray, with light olive grey mottling, (5Y 7/2 to N8, with 5Y 5/2), very fine to fine grained, weak to medium strong (R2 to R3), voids over 15% of rock surface, dissolution cavities up to 1/2" in diameter, fossiliferous (as casts) **No Recovery 145.55-146.0'** **Limestone** 146.0-147.2' - Same as 143.1-145.55' except laminar beds up to 4" thick, trace to 20% voids over rock surface, trace organics 147.2-150.0' - dusky yellow to very pale orange, (5Y 6/4 to 10YR 8/2), very fine to fine grained, very weak (R1), voids (<3/16") over 30% of rock surface, dissolution cavities up to 1/4" in diameter, fossiliferous (fossils 1/16"-1" in length), some voids and cavities with dusky yellow (5Y 6/4) to light olive gray (5Y 6/1) secondary infilling **No Recovery 150.0-151.0'** **Limestone** 151.0-152.75' - dusky yellow to light gray, (5Y 6/4 to N7), very weak to weak (R1 to R2), voids (up to 1/16") over 40% of rock surface, dissolution cavities up to 1"x1/2", organic layer at 152.0' with very fine grained limestone layer with no voids (<1/4" thick) 152.75-155.45' - yellowish gray, (5Y 7/2), very fine to fine grained, weak (R2), very weak at 154.45-155.4', voids (up to 3/16") over 20% of rock surface, poorly fossiliferous, laminar beds **No Recovery 155.45-156.0'** **Limestone** 156.0-156.45' - Same as 152.75-155.45' except very weak (R1), laminar organics (<3/4") thick, moderately fossiliferous with casts up to 1/4"x1" | |
| 145 -102.9 | | | >10 | 143.3' - Bedding plane, <10 deg, some recrystallization on 20% of surface | | | |
| | | | >10 | 143.5-144.6; 145.05-145.55' - Fracture zone, intersecting fractures | | | R21: 22 minutes |
| | 146.0 | | NR | | | | |
| | | | 4 | 146.1-146.15' - Fracture zone, open | | | |
| | | | 3 | 146.3' - Bedding plane, <10 deg, smooth to rough, undulating to planar, organic staining on fracture face, up to 1/2" open 146.9, 147.4' - Fracture, 50 deg | | | |
| | R22-NQ 5 ft 80% | 71 | 2 | 147.55' - Bedding plane, <10 deg, 1/4" open 147.9' - Bedding plane, 10-15 deg, up to 1" open | | | |
| | | | 1 | 148.4, 149.0' - Bedding plane, <10 deg, up to 1/2" open | | | |
| 150 -107.9 | | | NR | | | | R22: 25 minutes |
| | 151.0 | | | | | | |
| | | | 4 | 151.05' - Fracture, 20 deg, up to 1/2" open | | | |
| | | | 1 | 151.65, 151.8, 151.9' - Bedding plane, <20 deg, up to 1/2" open 152.0' - Bedding plane, <5 deg, tight | | | |
| | R23-NQ 5 ft 89% | 71 | 1 | | | | |
| | | | 6 | 153.8' - Mechanical break, 50 deg 154.35-154.6' - Fracture zone or bedding plane, <10 deg, 1/2" open at 156.5 | | | |
| 155 -112.9 | | | >10 | | | | R23: 12 minutes |
| | 156.0 | | NR | 155.4-155.55' - Fracture zone, intersecting fractures | | | |
| | | | >10 | 156.0-156.1' - Fracture zone, open 156.35, 156.45' - Bedding plane, <10 deg, rough, undulating, up to 1/8" open | | | |
| | | | 1 | 156.4' - Fracture, 85 deg, 1/8" open 157.6' - Bedding plane, <10 deg, rough, undulating, 1/4" open | | | |
| | R24-NQ 5 ft 92% | 66 | 2 | 158.5-158.8' - Fracture zone, 50 deg, rough, undulating, organic staining over 10-20% | | | |
| | | | 6 | 159.0-159.45' - Fracture zone, rough, undulating, intersecting fractures, up to 1/4" open | | | |
| 160 -117.9 | | | 0 | 159.55, 159.75' - Bedding plane, 10 deg, rough, undulating, 1/8" open | | | R24: 8 minutes |
| | 161.0 | | NR | 160.5' - Fracture, 50 deg, rough, undulating, 1/8" open | | | End drilling for the day 03/11/2007, 18:30 at 161.0' Resume drilling on 03/12/2007, water level is 1.0' below ground surface |
| | | | 1 | 161.55' - Bedding plane, <5 deg, rough to smooth, undulating, up to 1/4" open | | | |
| | | | 2 | 162.05' - Bedding plane, <5 deg, rough to smooth, undulating, up to 1/8" open | | | |
| | R25-NQ | | | 162.75, 163.75, 164.55' - Mechanical break, rough, undulating | | | |

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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | 5 ft 86% | 85 | 1 | | | **Limestone** 156.45-160.6' - very fine to fine grained, very weak to weak (R1 to R2), alternating laminar beds up to 8" thick 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 surface, poorly to moderately fossiliferous | |
| | | | 2 | | | | |
| 165 -122.9 | | | 0 | 164.95' - Bedding plane, smooth to rough, undulating, up to 1/2" open | | | R25: 19 minutes |
| | 166.0 | | NR | | | | |
| | | | 3 | 166.6, 166.75, 166.8, 167.1, 167.2, 167.4, 167.55, 167.65, 167.7, 167.8, 167.95, 168.10, 168.15, 168.2, 168.35, 168.45, 168.50, 169.9, 170.0' - Bedding plane or mechanical break, <5 deg, smooth, undulating to planar, open up to 1/4" | | **No Recovery 160.6-161.0'** **Limestone** 161.0-165.3' - light olive gray to yellowish gray, (5Y 5/2 to 5Y 7/2), very fine to fine grained, voids (up to 3/16") over <10% of rock surface, fossil casts over <10% of rock surface, laminar bedding characterized by color change and % voids, trace organics, highly fossiliferous from 162.05-163' with increase in voids (up to 1/4") over 35% of rock surface, some secondary infilling of voids with yellowish gray (5Y 7/2) to gray (N7) limestone | |
| | | | 8 | | | | |
| | R26-NQ 5 ft 85% | 38 | 6 | | | | SC-6 collected at 168.6-169.6' |
| | | | 1 | | | | |
| 170 -127.9 | | | 1 | | | | R26: 15 minutes |
| | 171.0 | | NR | | | | |
| | | | 3 | 171.55' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | **No Recovery 165.3-166.0'** **Limestone** 166.0-168.7' - yellowish gray to moderate olive brown, (5Y 7/2 to 5Y 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 surface, several cavities (>5) from 1/4"-1/8" on bedding laminations, poorly fossiliferous 168.7-170.25' - Same as 166.0-168.7' except mild to moderate HCl reaction, moderately to highly fossiliferous (casts/molds), trace bedding plane laminations, trace secondary infilling of fossil molds at 169.8-169.9' | |
| | | | 9 | 171.8' - Bedding plane, 20 deg, smooth, undulating, <1/8" open | | | |
| | R27-NQ 5 ft 97% | 34 | 3 | 171.95-172.25' - Fracture zone, <5 deg, rough to smooth, undulating, up to 1/4" open 172.4' - Fracture, 80 deg, rough to smooth, undulating, recrystallization on fracture surface | | | |
| | | | 4 | 172.6' - Bedding plane, smooth to rough, undulating, silt-sized infilling, organic staining, up to 1/4" open | | | |
| 175 -132.9 | | | 5 | 172.9, 172.95, 173.1, 173.5, 174.0, 174.35, | | | R27: 6 minutes |
| | 176.0 | | NR | 174.65' - Bedding plane or mechanical break, <5 deg, smooth, undulating | | | |
| | | | 1 | 174.5' - Bedding plane or mechanical break, 35 deg, smooth, undulating | | | |
| | | | 5 | 175.0, 175.25-175.35, 175.55, 175.65, 175.75' - Bedding plane or mechanical break, rough, undulating, <1/2" open, friable from 175.25-175.35' | | | |
| | R28-NQ 5 ft 91% | 32 | 7 | 176.95' - Bedding plane or mechanical break, 20 deg, smooth to rough, undulating | | **No Recovery 170.25-171.0'** **Limestone** 171.0-175.85' - light olive gray to pale yellowish brown, (5Y 5/2 to 10YR 6/2), very fine to fine grained, extremely weak to weak (R0 to R2), weakest along bedding plane fractures, voids (<3/16") over 50-80% of rock surface, laminated bedding at 171.8', 172.9' and 174.8-175.05', several cavities (<1/2") over 20% of rock surface, poorly fossiliferous | |
| | | | >10 | 177.25, 177.3' - Bedding plane or mechanical break, 10 deg, smooth, undulating | | | |
| 180 -137.9 | | | 3 | 178.7, 178.8' - Bedding plane, <10 deg, rough, undulating, up to 1/4" open | | | R28: 19 minutes |
| | 181.0 | | NR | 178.75' - Fracture, 60 deg and 65 deg 178.95' - Bedding plane, <10 deg, rough, undulating, up to 1" open | | | |
| | | | 2 | 179.2-179.25' - Fracture zone, rough, undulating, 1/2" open | | | |
| | | | 3 | 179.3' - Bedding plane, <5 deg, smooth to rough, planar | | | |
| | R29-NQ | | | 179.45' - Bedding plane or mechanical break, smooth to rough, 1/2" to 1/4" open | | **No Recovery 175.85-176.0'** | |

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# ROCK CORE LOG

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 5 ft 88% | 54 | >5 | 179.5, 179.65, 179.8, 179.85, 179.95, 180.0, 180.1, 180.15' - Bedding plane, <10 deg, smooth to rough, undulating, up to 1/2" open | | **Limestone** 176.0-178.5' - pale yellowish brown to very light gray, (10YR 6/2 to N8), very fine to fine grained, weak to medium strong (R2 to R3), voids (<3/16") over 60-80% of rock surface, dissolution cavity at 179.3' (1-1/2"x1"), few fossil molds | |
| | | | 4 | 179.6-179.8' - Fracture zone, rough, undulating | | | |
| 185 -142.9 | | | 0 | 181.3, 181.35' - Bedding plane or mechanical break, horizontal, rough, undulating, 1/4" open | | | R29: 15 minutes |
| | 186.0 | | NR | | | | |
| | | | 1 | 181.45-181.6' - Fracture zone, 0-55 deg, rough, undulating, intersecting fractures | | 178.5-178.7' - Same as 176.0-178.5' except medium strong (R3), voids (<1/16") over 0-30% of rock surface, trace mottling | SC-7 collected at 186.0-186.75' |
| | | | 5 | 182.75, 182.9, 183.0, 183.05, 183.35, 183.4, 183.45, 184.2, 184.3' - Bedding plane or mechanical break, smooth to rough, undulating, friable zones at 183.0-183.5' | | 178.7-179.0' - Same as 176.0-178.5' 179.0-179.5' - Same as 178.5-178.7' 179.5-180.55' - Same as 176.0-178.5' | |
| | R30-NQ 5 ft 100% | 56 | 5 | 186.75, 187.05' - Bedding plane or mechanical break, <10 deg, rough, undulating, <1/4" open | | **No Recovery 180.55-181.0'** | |
| | | | 3 | 187.2, 187.35, 187.75, 187.9, 188.1, 188.45, 188.65, 188.75' - Bedding plane, <10 deg, rough to smooth, undulating, with some <1/4" open | | **Limestone** 181.0-185.4' - pale yellowish brown, (10YR 6/2), very fine to fine grained, very weak to medium strong (R1 to R3), with extremely weak (R0) and friable silty lens, voids (<3/16") over 60% of rock surface, few cavities (3/4"x1/4") poorly fossiliferous with few casts/molds, bioturbated, friable lens at 184.55-184.6' | |
| 190 -147.9 | | | 4 | 189.25' - Fracture, 50 deg, smooth, undulating | | | R30: 18 minutes |
| | 191.0 | | | | | | |
| | | | 3 | 189.65, 189.75, 190.4, 190.55, 190.75' - Bedding plane, <10 deg, rough to smooth, undulating, <1/8" open | | | |
| | | | 2 | 191.1, 191.35, 191.7' - Fracture, <10 deg, rough, undulating | | **No Recovery 185.4-186.0'** | |
| | | | | 192.15' - Mechanical break | | **Limestone** 186.0-191.0' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), very fine to fine grained, weak to medium strong (R2 to R3), voids (<3/16") over 70-80% of rock surface, moderately to highly fossiliferous especially at 186.0-186.75' (molds/casts), laminated bedding over 50% of rock surface | |
| | R31-NQ 5 ft 99% | 62 | 3 | 192.85, 193.0-193.1' - Fracture zone, rough, undulating, <1/2" open | | | |
| | | | | 193.45, 193.6' - Mechanical break | | | |
| | | | 3 | 193.75, 193.95, 194.1' - Bedding plane or mechanical break, <10 deg, rough, undulating to stepped | | | |
| 195 -152.9 | | | 1 | 194.55' - Mechanical break, 40 deg 194.75-194.9' - Fracture zone, rough, undulating | | | R31: 10 minutes |
| | 196.0 | | NR | 195.6-195.8' - Fracture, rough, undulating, 2" fragment missing over 180 degrees of core section | | | |
| | | | 3 | | | 191.0-193.0' - moderate yellowish brown to yellowish gray, (10YR 5/4 to 5Y 7/2), fine grained, very weak to weak (R1 to R2), voids (<3/16") over 80% of rock surface, dissolution cavities (<1-1/2" diameter), laminated over 30% of rock surface, highly fossiliferous | |
| | | | >10 | 196.45' - Bedding plane, horizontal, rough, undulating, silt and/or clay sized infilling, 1/2" open | | | |
| | R32-NQ 5 ft 84% | 40 | 3 | 196.9-197.45' - Fracture zone, rough, undulating 198.55' - Bedding plane, horizontal, rough, undulating, 1/4" silt infilling | | | |
| | | | >10 | 198.8, 198.85, 199.15' - Bedding plane, <10 deg, rough, undulating, <1/4" open | | 193.0-194.0' - Same as 191.0-193.0' except very weak (R1), voids (<1/16") over 40% of rock surface, few dissolution cavities (<1/2"x1/8") | |
| 200 -157.9 | | | >10 | 199.4-199.65; 199.95-200.1' - Fracture zone, rough, undulating to stepped | | | R32: 11 minutes |
| | | | NR | 199.65-199.95' - Fracture zone, smooth to rough, undulating, high angle fracture planes intersecting bedding plane at 199.8', tight | | 194.0-195.95' - Same as 191.0-193.0' except voids (<3/16") over 30-80% of rock surface, fossils decreasing with depth, highly fossiliferous with casts/molds and 2" diameter dissolution cavities at 195.6-195.8' | |
| | 201.0 | | | | | **No Recovery 195.95-196.0'** | Total depth of boring is 201.0' |

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# ROCK CORE LOG

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES | | | SYMBOLIC LOG | LITHOLOGY | COMMENTS |
|---|---|---|---|---|---|---|---|
| | | R Q D (%) | FRACTURES PER FOOT | DESCRIPTION<br>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. |
| | | | | | | **Limestone**<br>196.0-197.45' - pale yellowish brown to very pale orange, (10YR 6/2 to 10YR 8/2), very fine to fine grained, 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'<br>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<br>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'<br>**No Recovery 200.2-201.0'**<br>Bottom of Boring at 201.0 ft bgs on 3/12/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
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# SOIL BORING 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

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

WATER LEVELS : 0.1 ft bgs on 03/26/07 START : 3/25/2007 END : 3/27/2007 LOGGER : R. Bitely, C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 41.3 | 0.0 – 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 | | "Water level is based on Ground Water Monitoring at LNP site (FSAR Table 2.4.12.08)" |
| | | | | | | | Water table between 1.5' and 5' below ground surface, based on split spoon sample |
| | | | | | | | Rapid drilling rate |
| 5 | 5.0 | | | | | | |
| 36.3 | 5.0 – 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 | 10.0 | | | | | | |
| 31.3 | 10.0 – 11.5 | 1.3 | SS-3 | 16-4-8 (12) | **Fat Clay (CH)** 10.0-10.2' - light olive gray, (5Y 5/2), wet, soft, medium to high plasticity, slow to no dilatancy, no HCl reaction, trace very fine grained silica sand | | Light chatter at 11 feet |
| | | | | | **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' |
| 15 | 15.0 | | | | | | |
| 26.3 | 15.0 – 16.5 | 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 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
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# SOIL BORING 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

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

WATER LEVELS : 0.1 ft bgs on 03/26/07 START : 3/25/2007 END : 3/27/2007 LOGGER : R. Bitely, C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 21.3 | 20.0 – 21.5 | 1.0 | SS-5 | 18-11-11 (22) | **Silt And Limestone Lenses (ML)** 20.0-21.0' - grayish yellow to grayish orange, (5Y 8/4 to 10YR 7/4), moist to wet, very stiff, nonplastic, rapid dilatancy, moderate to strong HCl reaction, all carbonate, 50% silt and 50% limestone lenses <2" thick, voids and fossil structures intact | | |
| 25 / 16.3 | 25.0 – 26.5 | 1.5 | SS-6 | 8-10-16 (26) | **Silt And Limestone Lenses (ML)** 25.0-26.5' - Same as 20.0-21.0' except yellowish gray, (5Y 7/2), 2" elastic silt or lean clay (CL) seam at 25.5'-25.65'; moderate plasticity with slow dilatancy | | Moderate to heavy chatter 25-37', moderate to slow drilling rate |
| 30 / 11.3 | 30.0 – 30.3 | 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 HCl reaction, all carbonate, limestone fragments <1/2" thick | | |
| 35 / 6.3 | 35.0 – 35.9 | 0.9 | SS-8 | 20-50/5 (70/11") | **Silt With Sand (ML)** 35.0-35.9' - moderate yellowish brown to dusky yellowish brown, (10YR 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 carbonate particles | | Moderate to heavy chatter from 37-39', extremely slow drilling (15 minutes / 2 feet) |
| 40 | | | | | | | Heavy chatter from 39-40', slow drilling rate |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

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

WATER LEVELS : 0.1 ft bgs on 03/26/07 START : 3/25/2007 END : 3/27/2007 LOGGER : R. Bitely, C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 1.3 | 40.0 | 0.1 | SS-9 | 50/2 (50/2") | **Limestone Fragments** 40.0-40.1' - pale yellowish brown, (10YR 6/2), very dense, mild to moderate HCl reaction, very fine to fine grained, <10% voids <1/16" diameter | | Moderate to heavy chatter from 40-55', moderate to rapid drilling rate |
| 45 -3.7 | 45.0 | 1.4 | SS-10 | 27-42-50/4.5 (92/10.5") | **Silty Sand (SM)** 45.0-46.4' - moderate yellowish brown, (10YR 5/4), moist to wet, very dense, very fine to coarse grained, mild to moderate HCl reaction, 30% nonplastic fines | | |
| 50 -8.7 | 46.4 50.0 50.2 | 0.2 | SS-11 | 50/2 (50/2") | **Limestone Fragments** 50.0-50.2' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, wafer-shaped fragments <1/2" thick | | |
| 55 -13.7 | 55.0 55.3 | 0.1 | SS-12 | 50/3 (50/3") | **Limestone Fragments** 55.0-55.1' - Same as 50.0-50.2' Begin Rock Coring at 55.0 ft bgs See the next sheet for the rock core log | | End SPT at 55' below ground surface; switch to rock coring Set HW casing to 55' below ground surface at 17:00 Break for day at 17:00 Water level at 0' (ground surface) |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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 ORIENTATION : Vertical

WATER LEVELS : 0.1 ft bgs on 03/26/07 START : 3/25/2007 END : 3/27/2007 LOGGER : R. Bitely, C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -13.7 | 55.0 | | | | | | Continue drilling at A-04 at 07:30 on 03/26/07 |
| | R1-NQ 1.5 ft 60% | 60 | 0 | 55.7' - Mechanical break | | **Limestone** 55.0-55.9' - moderate yellowish brown, (10YR 5/4), very fine to fine grained, moderate HCl reaction, extremely weak to weak (R0 to R2), strength decreasing with depth, voids <3/16" over 60% of surface, trace organic laminations | Begin rock coring at 55' Water level at 1 inch below ground surface at 07:30 |
| | | | NR | | | | |
| | 56.5 | | | | | | |
| | R2-NQ 5 ft 72% | 48 | 4 | 56.9, 57.0, 57.4, 57.95, 58.05, 58.9, 59.55, 60.0' - Fractures (8), <10 deg, rough, undulating, along bedding planes, open <1/2" | | **No Recovery 55.9-56.5'** **Limestone** 56.5-60.1' - moderate yellowish brown, (10YR 5/4), very fine to fine grained, extremely weak (R0), to compacted non-indurated carbonate silts, <10% organics, voids <3/16" over 30% of surface, weakest material at 56.5-57.2' and 58.5-60.0' | R1: 2 minutes |
| | | | 3 | 57.4' - Fracture, 60 deg, rough, undulating, open <1/2" | | | |
| | | | >10 | 58.5' - Fracture, 40 deg, rough, undulating, open <1/2" | | | |
| | | | 2 | 59.15-59.55' - Fracture zone, rough, undulating, gravel-sized fragments <2" diameter | | | |
| 60 -18.7 | | | | | | | |
| | | | NR | | | **No Recovery 60.1-61.5'** | R2: 8 minutes |
| | 61.5 | | | | | | |
| | R3-NQ 5 ft 95% | 82 | 0 | | | **Limestone** 61.5-66.25' - moderate yellowish brown, (10YR 5/4), very fine to fine grained, mild to moderate HCl reaction, extremely weak to weak (R0 to R2), <10% laminated organics, voids <3/16" over 40-50% of surface, strongest rock zones 62.0-63.0' and 63.7-65.8', few cavities <1"x1/2" | |
| | | | 1 | 63.1' - Fracture or mechanical break, 35 deg, rough, undulating, tight | | | |
| | | | 0 | 63.3, 61.75, 64.1' - Mechanical break (3) | | | |
| 65 -23.7 | | | 3 | 64.55, 64.65' - Fractures or mechanical break (2), <10 deg, rough, undulating, open <1/2" | | | |
| | | | 2 | 65.2' - Fracture or mechanical break, 35 deg, rough, undulating, open <1/2" | | | R3: 18 minutes |
| | 66.5 | | NR | 65.85, 66.05' - Fractures or mechanical break (2), <10 deg, rough, undulating, along bedding planes, open <1/2" | | **No Recovery 66.25-66.5'** | |
| | R4-NQ 5 ft 95% | 78 | 1 | 66.9, 67.9' - Fractures or mechanical break (2), <10 deg, rough, undulating, open <1/2" | | **Limestone** 66.5-71.25' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), very fine to fine grained, moderate HCl reaction, extremely weak to medium strong (R0 to R3), voids < 3/16" over 30-50% of surface, few fossil casts and molds <1/4" diameter, trace secondary infill of cavities 1/4" diameter | |
| | | | 1 | | | | |
| | | | 4 | 68.75, 69.1' - Fractures (2), 70 to 90 deg, rough, undulating, tight | | | |
| 70 -28.7 | | | 0 | 69.3' - Fracture or mechanical break, <10 deg, rough, undulating, tight 69.4, 70.05, 71.0' - Mechanical break (3) | | | |
| | | | 0 | | | | R4: 8 minutes |
| | 71.5 | | NR | | | **No Recovery 71.25-71.5'** | |
| | R5-NQ 5 ft 62% | 53 | 0 | | | **Limestone** 71.5-74.6' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), very fine to fine grained, moderate HCl reaction, very weak to medium strong (R1 to R3), voids <3/16" over <30% of surface, moderately fossiliferous, fossil molds and casts <1-1/2" x 1/2", few cavities <1"x1/2" | Driller's Remark: Slight water loss <10% |
| | | | 3 | 73.05, 73.15' - Fractures (2), horizontal, rough, undulating, open <1/2" | | | Driller's Remark: Strength decreasing abruptly from 74.8' to 75.4' |
| | | | 4 | 73.1' - Fracture, vertical, rough, undulating, intersects with 73.05' and 73.15', open 1/2" 74.25, 74.35' - Fractures (2), horizontal and 50 deg, rough, undulating, open <1/4" | | | |
| 75 | | | | | | | |

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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 on 03/26/07 START : 3/25/2007 END : 3/27/2007 LOGGER : R. Bitely, C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -33.7 | | | NR | 74.5' - Fracture, horizontal, rough, undulating, along bedding plane, open <1/4" | | **No Recovery 74.6-76.5'** | R5: 10 minutes |
| | 76.5 | | | | | | |
| | R6-NQ 5 ft 91% | 76 | 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 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', non-indurated silt to extremely weak rock (R0) 76.5-77.3', trace voids <3/16", no fossils, trace laminated bedding | SC-1 collected at 76.75-77.6' |
| | | | 3 | 77.65, 78.1, 78.2' - Fractures or mechanical break (3), <10 deg, smooth, undulating, along bedding planes, open <1/4" to tight | | | |
| | | | 2 | 78.7, 78.85' - Fractures (2), 80 deg and 50 deg, rough, undulating, open 1/4" to 1/2" | | | |
| 80 -38.7 | | | 0 | | | | |
| | | | 1 | 80.5' - Fracture or mechanical break, <10 deg, rough, undulating, tight | | 77.3-80.1' - Same as 76.0-77.3' except medium strong (R3), voids <3/16" over 30-50% of surface, trace fossil casts, trace secondary infill | R6: 18 minutes |
| | 81.5 | | NR | | | | |
| | R7-NQ 5 ft 100% | 86 | 2 | 82.15, 82.45' - Mechanical break or fractures (2), <10 deg, rough, undulating, open <1/2" | | 80.1-81.05' - Same as 77.3-80.1' except secondary infill with voids <3/16" over 30-50% of surface, poorly fossiliferous, heavily bioturbated with 50% of bioturbation with secondary infilling, cavities up to 1/2"x5" | |
| | | | >10 | | | | |
| | | | 0 | 83.5-83.9' - Fracture zone, rough, undulating, gravel-sized fragments <1-1/2" diameter | | **No Recovery 81.05-81.5'** | |
| 85 -43.7 | | | 0 | | | **Limestone** 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 to medium strong (R0 to R3), voids <3/16" over 30-60% of surface, heavily fossiliferous, fossil molds/casts <1"x1/4", cavities <1/2"x1/4", few cavities with secondary infill | |
| | | | 0 | | | | R7: 9 minutes |
| | 86.5 | | | | | | |
| | R8-NQ 5 ft 98% | 84 | 1 | 87.35' - Fracture or mechanical break, 60-90 deg, rough, undulating, tight to open 1/8" | | | |
| | | | 4 | 87.65' - Fracture or mechanical break, 20 deg, rough, undulating, tight to open 1/8" | | 82.0-82.25' - Same as 81.5-82.0' except very weak (R1), laminated/variegated bedding 30% of zone | |
| | | | 0 | 88.25, 88.4, 88.45' - Mechanical break or fractures (3), rough, undulating, open <1/2" at 88.25', others are tight | | 82.25-84.8' - Same as 81.5-82.0' | |
| 90 -48.7 | | | 0 | 88.9, 88.95, 89.35' - Mechanical break (3) | | 84.8-85.25' - Same as 81.5-82.0' except non-indurated silts as secondary infill, very very weak (<R0) | |
| | | | 0 | | | 85.25-85.4' - Same as 81.5-82.0' | R8: 11 minutes |
| | 91.5 | | NR | | | 85.4-86.0' - Same as 81.5-82.0' except extremely weak (R0), trace voids | |
| | R9-NQ 5 ft 99% | 50 | 2 | 91.65' - Fracture, horizontal, smooth, planar, along bedding plane, tight | | 86.0-86.5' - Same as 81.5-82.0' | SC-2 collected at 95.65-96.45' |
| | | | 10 | 92.2' - Fracture, 70 deg, rough, undulating, tight<br>92.85-92.9' - Fracture zone, rough, planar | | | |
| | | | 10 | 93.6, 93.7, 93.8, 93.9, 94.05' - Fractures, 80 deg, rough, undulating, tight | | | |
| 95 | | | | | | | |

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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 on 03/26/07 START : 3/25/2007 END : 3/27/2007 LOGGER : R. Bitely, C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -53.7 | | | 10 | 94.45' - Fracture, <10 deg, rough, undulating, tight | | **Limestone** 86.5-91.4' - moderate yellowish brown to yellowish gray, (10YR 5/4 to 5Y 8/1), very fine to fine grained, strong HCl reaction, extremely weak to weak (R0 to R2), voids <3/16" over 30%, moderately to highly fossiliferous, fossil casts and molds less than 1"x1/2"; cavity zones from 87.1-88.45' and 90.0-91.4'; trace unfilled cavities 1-1/2"x1"; heavily bioturbated or dissolution cavities over 25% of core, 20% filled with secondary infill of poorly indurated silts to extremely weak rock (R0) | |
| | | | 1 | 94.8-95.2' - Fractures, 80 deg, rough, undulating, tight | | | R9: 14 minutes |
| | 96.5 | | NR | 95.45' - Fracture, 65 deg, rough, undulating, tight | | | |
| | | | 2 | 95.65' - Bedding plane, horizontal, smooth, undulating, along bedding plane, tight | | | |
| | | | 1 | 96.65' - Fracture or mechanical break, 20 deg, rough, undulating, tight to open 1/8" | | | |
| | R10-NQ 5 ft 100% | 50 | 2 | 97.15' - Fracture, 80-90 deg, rough, undulating, tight<br>97.9' - Fracture, 70 deg, rough, undulating, tight | | | |
| 100 -58.7 | | | 1 | 99.0, 99.2' - Mechanical break or bedding plane (2), <10 deg, rough, undulating, tight to open 1/8" | | **No Recovery 91.4-91.5'** | |
| | | | 2 | 99.4' - Fracture, 85 deg, rough, undulating, tight | | **Limestone** 91.5-93.05' - yellowish gray, (5Y 8/1), very fine to fine grained, strong HCl reaction, extremely weak to medium strong (R0 to R3), weak zones at 92.35-93.05', voids <3/16" over 0-15% surface, poorly fossiliferous, trace organics | R10: 6 minutes |
| | 101.5 | | | 100.4, 100.6' - Fracture (2), 50 deg and 80 deg, smooth, undulating to stepped, tight | | | |
| | | | 10 | 100.85' - Mechanical break or bedding plane, <10 deg, smooth, undulating, tight | | | |
| | | | 0 | 101.55, 101.6, 101.85, 101.95, 102.0' - Fractures or bedding plane (5), 70-90 deg and horizontal, rough, undulating, tight to open <1/4" | | **Fat Clay To Elastic Silt (CH)** 93.05-93.25' - olive gray, (5Y 3/2), strong HCl reaction, high plasticity from 93.05-93.15', moderate to low plasticity from 93.15-93.25', non-indurated silt | |
| | R11-NQ 5 ft 98% | 86 | 0 | 102.45' - Fracture, 60 deg, rough, undulating, tight | | | |
| 105 -63.7 | | | 0 | 103.7, 104.0' - Mechanical break (2) | | **Limestone** 93.25-96.45' - Same as 91.5-93.05' except weak zones at 93.25-93.4' and 95.5-96.45'; at 94.3-95.5' voids <3/16" over 60% of surface and highly fossiliferous with fossil casts and molds up to 1/4" diameter | |
| | | | 0 | | | | R11: 5 minutes |
| | 106.5 | | NR | | | **No Recovery 96.45-96.5'** | |
| | | | 1 | 107.2' - Fracture, 70 deg, rough, undulating, tight | | **Limestone** 96.5-101.5' - very pale orange to grayish orange, (10YR 8/2 to 10YR 7/4), very fine to fine grained, strong HCl reaction, extremely weak (R0), medium strong (R3) zone from 99.3-100.2'; voids <3/16" cover 10-25% of surface, except voids <3/16" cover 40-60% of surface at 99.3-100.2'; moderately fossiliferous with fossil casts and molds to 1"x3/4", trace secondary infill in casts, trace organics, trace laminae. | |
| | | | 10 | | | | |
| | | | 2 | 108.3' - Fractures (3), 70-90 deg, rough, undulating, intersecting fractures, tight to open <1/4" | | | |
| | R12-NQ 5 ft 100% | 86 | | | | | |
| 110 -68.7 | | | 0 | 109.1, 109.25' - Fractures (2), 70 deg and horizontal, rough, undulating, intersecting fractures, tight to open <1/4" | | | |
| | | | 0 | | | | R12: 7 minutes |
| | 111.5 | | | | | | |
| | | | 0 | | | 101.5-106.4' - Same as 96.5-101.5' except extremely weak to weak (R0 to R2), voids <3/16" cover 10-25% | |
| | | | 0 | | | **No Recovery 106.4-106.5'** | |
| | R13-NQ 5 ft 100% | 100 | 0 | 113.45, 114.05, 116.3' - Mechanical break (3) | | | |
| 115 | | | | | | | |

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|---|---|
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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 on 03/26/07 START : 3/25/2007 END : 3/27/2007 LOGGER : R. Bitely, C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -73.7 | | | 0 | | | **Limestone** | SC-3 collected at 115.45-116.3' |
| | | | 0 | 115.45' - Mechanical break | | 106.5-111.5' - yellowish gray, (5Y 7/2), very fine to fine grained, very weak to weak (R1 to R2), voids <3/16" over 20-50% of surface, moderately fossiliferous, fossil casts and molds <1/2" diameter, trace iron staining | R13: 12 minutes |
| | 116.5 | | | | | | |
| | R14-NQ 5 ft 100% | 96 | 0 | | | **Limestone** 111.5-116.5' - yellowish gray, (5Y 8/1), very fine to fine grained, strong HCl reaction, weak (R2), voids <3/16" over <20% of surface, trace laminations, poorly fossiliferous, few fossil molds 1/2"x1/4" | |
| | | | 0 | | | | |
| | | | 0 | 119.05' - Mechanical break | | | |
| 120 -78.7 | | | 0 | | | 116.5-120.7' - yellowish gray, (5Y 8/1), very fine to fine grained, strong HCl reaction, very weak to weak (R1 to R2), trace laminations, voids <3/16" over 10-50% of surface (highly variable across length), moderately to heavily fossiliferous with fossil casts and molds up to 1/4" diameter, especially 117.5-118.0' and 118.5-119.5', laminated bedding from 116.85-117.0' | R14: 17 minutes |
| | | | 2 | 120.7, 120.9' - Mechanical break or bedding plane (2), horizontal, smooth, undulating, tight to open 1/2" | | | |
| | 121.5 | | | | | | |
| | R15-NQ 5 ft 100% | 94 | 1 | 121.95, 122.0' - Fractures (2), 50 deg and 30 deg, rough, undulating, intersecting fractures, open 1" | | 120.7-121.5' - Same as 116.5-120.7' except extremely weak (R0) rock to non-indurated silt, laminated from 120.7-120.9' | |
| | | | 0 | | | | |
| | | | 3 | 123.95, 124.0, 124.25' - Bedding plane (3), horizontal, smooth, planar to stepped, tight | | | |
| 125 -83.7 | | | 0 | | | 121.5-123.6' - yellowish gray to grayish orange, (5Y 8/1 to 10YR 7/4), very fine to fine grained, strong HCl reaction, weak (R2), voids to 3/16" over 50% of surface, decreasing with depth, fossil casts and molds to 1/2"x1/4" over 30% of surface. | R15: 12 minutes |
| | | | 0 | | | | |
| | 126.5 | | | | | | |
| | R16-NQ 5 ft 99% | 89 | 1 | 127.2, 130.45, 131.0, 131.05, 131.35' - Fractures (5), <10 deg, smooth, planar to undulating, along bedding planes, tight to open 1/4" | | 123.6-126.55' - Same as 121.5-123.6' except voids to 3/16" over 20-40% of surface, trace fossil molds and casts to 1/4" diameter, possibly bioturbated 123.6-126.55' | |
| | | | 0 | | | | |
| | | | 0 | | | 126.55-131.45' - very pale orange to pale yellowish brown, (10YR 8/2 to 10YR 6/2), very fine to fine grained, strong HCl reaction, very weak to weak (R1 to R2), voids to 3/16" over 10-20% of surface except 130.15-130.85' voids to 3/16" over 60% of surface, poorly to moderately fossiliferous except 130.15-130.85' highly fossiliferous, with casts and molds to 1/2"x1/4", trace infill material | |
| 130 -88.7 | | | 0 | 130.1' - Mechanical break | | | |
| | | | 4 | | | | R16: 11 minutes |
| | 131.5 | | | | | | |
| | | | NR | 131.55, 133.9' - Fractures (2), horizontal, smooth, planar, along bedding planes, tight | | **No Recovery 131.45-131.5'** | SC-4 collected at 133.9-134.7' |
| | | | 1 | | | | |
| | | | 0 | | | | |
| | R17-NQ 5 ft 99% | 98 | 1 | | | | |
| 135 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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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 on 03/26/07 START : 3/25/2007 END : 3/27/2007 LOGGER : R. Bitely, C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -93.7 | | | 2 | 134.7, 135.1' - Bedding plane or mechanical break (2), 10-20 deg, smooth, undulating, trace organics, tight | | **Limestone**<br>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 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 | R17: 8 minutes |
| | | | 0 | | | | |
| | 136.5 | | NR | | | | |
| | | | 1 | 136.65, 140.2, 140.65' - Fractures or mechanical break (3), rough, undulating, along bedding planes, open <1/2" | | | |
| | | | 0 | | | | |
| | R18-NQ<br>5 ft<br>98% | 86 | 0 | | | | R18: 10 minutes |
| 140<br>-98.7 | | | 1 | | | **No Recovery 136.45-136.5'**<br>**Limestone**<br>136.5-141.4' - yellowish gray, (5Y 8/1), very fine to fine grained, strong HCl reaction, weak to medium strong (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 <3/16" over 30-40% in infill, several bioturbation or dissolution cavities with secondary infilling up to 2" x 1" | DR: 100% circulation loss at 141.5' below ground surface |
| | | | >10 | 140.65, 140.95' - Fracture zone, rough, undulating, fragments <1-1/2" diameter | | | |
| | 141.5 | | NR | | | | Stop drilling at 17:30 on 03/26/07 at 141.5' below ground surface<br>Water level at 1.8' below ground surface at 17:30 |
| | | | 1 | | | | |
| | | | 10 | 142.45, 142.55' - Fracture zone, rough, undulating, fragments <1/2" diameter, angular, open <1" | | | Continue rock coring 03/27/07 at 08:00<br>Water level at 1.3' below ground surface<br>No circulation |
| | R19-NQ<br>5 ft<br>97% | 75 | 2 | 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 | | | |
| 145<br>-103.7 | | | 1 | 143.8' - Fracture, horizontal, smooth, undulating, along bedding plane, tight | | 141.5-143.6' - light olive gray to moderate yellowish brown, (5Y 5/2 to 10YR 5/4), very fine to fine grained, 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) with secondary infill, trace organic laminations | |
| | | | 1 | 144.0, 144.5' - Mechanical break (2)<br>144.9' - Fracture, <10 deg, smooth, undulating, tight | | | R19: 12 minutes |
| | 146.5 | | NR | | | | |
| | | | 1 | 145.95' - Fracture, <10 deg, smooth, undulating, along bedding plane, tight to open <1/4" | | | |
| | | | 0 | 146.6' - Fracture, horizontal, rough, undulating, along bedding plane, open <1/4" | | | |
| | R20-NQ<br>5 ft<br>100% | 98 | 0 | | | 143.6-146.35' - Same as 141.5-143.6' except moderate HCl reaction, voids <3/16" over <5%-30% variable, trace laminated bedding especially 143.8-144.0' and 145.9-146.0', poorly fossiliferous | |
| 150<br>-108.7 | | | 1 | 149.55' - Fracture, horizontal, smooth, undulating, along bedding plane, open <1/4" | | **No Recovery 146.35-146.5'**<br>**Limestone**<br>146.5-149.6' - grayish orange to 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 149.35-149.6', voids <3/16" over <20% of surface, poorly fossiliferous, trace cavities with secondary infill <1"x1/2" | |
| | | | 0 | | | | R20: 8 minutes |
| | 151.5 | | | | | | |
| | | | 1 | | | | |
| | | | 3 | 152.1, 153.0, 153.15, 153.25, 153.35, 153.7' - Fractures or mechanical break (6), along bedding planes, smooth to rough, undulating, tight<br>152.9' - Mechanical break | | | SC-5 collected at 152.1-152.9' |
| | R21-NQ<br>5 ft<br>100% | 90 | 1 | 153.9, 154.15, 154.4' - Mechanical break (3)<br>154.0' - Mechanical break | | | |
| 155 | | | | | | | |

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|---|---|
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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 on 03/26/07 START : 3/25/2007 END : 3/27/2007 LOGGER : R. Bitely, C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -113.7 | | | 0 | 154.95, 156.3' - Mechanical break | | **Limestone**<br>149.6-151.5' - Same as 146.5-149.6' except moderate HCl reaction, voids <3/16" over <10-20% of surface, variable, poorly fossiliferous, trace laminations, trace cavities <1/4" diameter<br>151.5-153.0' - yellowish gray to moderate yellowish brown, (5Y 7/2 to 10YR 5/4), very fine to fine grained, moderate to strong HCl reaction, medium strong (R3), voids <3/16" over <20% of surface, poorly fossiliferous, trace dissolution cavities <1/2"x1/4", trace laminations<br>153.0-153.7' - Same as 151.5-153.0' except very weak (R1), highly laminated, cavities < 1"x1/4" over 30-40% of surface, trace organics<br>153.7-154.9' - Same as 151.5-153.0'<br>154.9-156.5' - Same as 151.3-153.0' except very weak rock (R1) at 154.9-155.4', voids <3/16" over <20% of surface, moderately fossiliferous, trace cavities 1-1/2"x1/2" with secondary infill<br>156.5-161.4' - yellowish gray to moderate yellowish brown, (5Y 7/2 to 10YR 5/4), very fine to fine grained, strong HCl reaction, weak (R2), voids <3/16" over <5%-30% of surface, voids over 30% occur at 156.3-157.3' and 160.1-160.9', extremely weak to very weak bedding planes <1/2" thick at 158.65' and 160.9', poorly to moderately fossiliferous, fossil molds and casts <1/2"x1/4", trace laminations, trace secondary infill of cavities <2"x1"<br>**No Recovery 161.4-161.5'**<br>Bottom of Boring at 161.5 ft bgs on 3/27/2007 | R21: 22 minutes<br><br>R22: 9 minutes<br><br>10:30 03/27/07: Reach total depth at 161.5' with criteria at 80% recovery and 70% RQD |
| | 156.5 | | 0 | | | | |
| | R22-NQ 5 ft 98% | 96 | 1 | 156.55' - Fracture or mechanical break, horizontal, rough, undulating, open <1/4" | | | |
| | | | 0 | | | | |
| | | | 0 | 158.65, 160.9' - Mechanical break (2)<br>158.85, 158.95, 159.10, 160.1' - Mechanical break (4) | | | |
| 160<br>-118.7 | | | 0 | | | | |
| | | | 0 | | | | |
| | 161.5 | | NR | | | | |

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|---|---|
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# SOIL BORING 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

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

WATER LEVELS : 3.5 ft bgs on 3/06/07 START : 2/26/2007 END : 3/1/2007 LOGGER : T. Valentine, R. Bitely, J. Schaeffer

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.0 | | | | | | | Water level is based on Ground Water Monitoring at LNP site (FSAR Table 2.4.12.08)<br>2-3/8" tricone roller bit |
| | 3.5 | | | | | | |
| | 5.0 | 0.7 | SS-1 | 5-5-4 (9) | **Poorly Graded Sand With Silt (SP-SM)**<br>3.5-4.2' - moderate yellow to moderate olive brown, (5Y 7/6 to 5Y 4/4), wet, loose, 10-15% nonplastic fines, 30% very fine silica sand, trace iron cemented sand concretions to 1/8" | | |
| 5<br>37.0 | | | | | | | |
| | 8.5 | | | | | | |
| | 9.8 | 1.2 | SS-2 | 9-18-50/4 (68/10") | **Silt (ML)**<br>8.5-9.7' - dark yellowish orange, (10YR 6/6), moist to wet, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 9% fine to medium sand-sized, all carbonate | | |
| 10<br>32.0 | | | | | | | |
| | 13.5 | | | | | | |
| | 15.0 | 1.3 | SS-3 | 25-28-31 (59) | **Silt With Sand (ML)**<br>13.5-14.8' - Same as 8.5-9.7' except 20% very fine to medium sand | | |
| 15<br>27.0 | | | | | | | |
| | 17.5 | | | | | | |
| | 18.1 | 0.3 | SS-4 | 33-50/1 (83/7") | **Silt With Sand (ML)**<br>17.5-17.8' - Same as 13.5-14.8' except lens of fine to coarse sand-sized material from 18.6-18.7' | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

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

WATER LEVELS : 3.5 ft bgs on 3/06/07 START : 2/26/2007 END : 3/1/2007 LOGGER : T. Valentine, R. Bitely, J. Schaeffer

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.0 | | | | | | | |
| | 23.5–24.2 | 0.6 | SS-5 | 25-50/2 (75/8") | **Silty Sand (SM)** 23.5-24.1' - dark yellowish orange, (10YR 6/6), wet, very dense, mild to moderate HCl reaction, fine to coarse sand, 35% nonplastic fines, all carbonate | | |
| 25 / 17.0 | | | | | | | |
| | 28.5–29.7 | 0.9 | SS-6 | 8-8-50/2 (58/8") | **Silty Sand (SM)** 28.5-29.4' - Same as 23.5-24.1' except fragmented limestone lenses 1/4"-1/2" thick at 28.75' and 29.4' | | |
| 30 / 12.0 | | | | | | | |
| | 33.5–35.0 | 1.2 | SS-7 | 13-16-7 (23) | **Silty Sand With Gravel (SM)** 33.5-34.7' - dark yellowish orange, (10YR 6/6), wet, medium dense, mild to moderate HCl reaction, fine to coarse sand, 25% fine to coarse gravel, 30% nonplastic fines, all carbonate | | |
| 35 / 7.0 | | | | | | | Driller's Remark: Intermittent heavy chatter on drilling 37.0-38.5'<br>Driller's Remark: Very dense material, difficult drilling 37.0-40.0' |
| | 38.5–38.6 | 0.0 | SS-8 | 50/1.5 (50/1.5") | **No Recovery 38.5-38.6'** | | |
| 40 | | | | | | | |

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

# SOIL BORING 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

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

WATER LEVELS : 3.5 ft bgs on 3/06/07 START : 2/26/2007 END : 3/1/2007 LOGGER : T. Valentine, R. Bitely, J. Schaeffer

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.0 | | | | | | | |
| | 43.5–43.8 | 0.1 | SS-9 | 50/3 (50/3") | **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 | | |
| 45 -3.0 | | | | | | | |
| | 48.5–49.0 | 0.5 | SS-10 | 50/4 (50/4") | **Fat Clay (CH)** 48.5-48.6' - pale olive, high plasticity; **Silt With Sand And Gravel (ML)** 48.6-48.8' - moderate olive brown, (5Y 4/4), wet, low plasticity, rapid dilatancy, mild to moderate HCl reaction, 25% fine to coarse sand, 20% gravel | | |
| 50 -8.0 | | | | | | | |
| | 53.5–54.3 | 0.5 | SS-11 | 47-50/3 (97/9") | **Silty Sand With Gravel (SM)** 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 limestone, all carbonate | | Driller's Remark: Heavy chatter from rig |
| 55 -13.0 | | | | | | | |
| | 58.0 | 0.0 | SS-12 | 50/0 (50/0") | Begin Rock Coring at 58.0 ft bgs See the next sheet for the rock core log | | |
| 60 | | | | | | | |

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|---|---|
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# 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 ORIENTATION : Vertical

WATER LEVELS : 3.5 ft bgs on 3/06/07 START : 2/26/2007 END : 3/1/2007 LOGGER : T. Valentine, R. Bitely, J. Schaeffer

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 58.0 | | | | | | |
| | R1-NQ 2 ft 80% | 54 | 3 | 58.05' - Mechanical break, vertical, rough, stepped | | **Limestone** | |
| | | | 2 | 58.1' - Mechanical break, 10 deg, rough, stepped | | 58.0-59.7' - light olive gray, (5Y 5/2), very fine to fine grained, strong HCl reaction, weak to medium strong (R2 to R3), voids up to 3/16" on 50% of surface, cavities up to 1/2", microfossils with few macrofossils, 1" low to moderate plasticity silt at 59.5-59.6' | Driller's Remark: hard, switch to 3 7/8" rock core bit to depth |
| 60 -18.0 | 60.0 | | NR | 58.3' - Mechanical break, 60 deg, rough, undulating | | | R1: 2 minutes Even, continuous boring |
| | R2-NQ 1.5 ft 60% | 31 | >10 | 59.05' - Bedding plane or mechanical break, rough, undulating | | | R2: 2 minutes Short run to adjust tooling for 5' continuous run length |
| | 61.5 | | NR | 59.45' - Fracture, 70 deg, smooth, undulating | | **No Recovery 59.7-60.0'** | |
| | R3-NQ 5 ft 75% | 55 | 1 | 60.0-60.4' - Fracture zone or mechanical break, multiple intersecting fractures, various angles, bedding plane fractures at 60.2', 60.25', and 60.4, rough to smooth, undulating to stepped, tight | | **Limestone** 60.0-60.8' - Same as 58.0-59.7 except medium strong to very strong (R3 to R5), trace organic laminations, seams up to 1/16" thick, voids <3/16" over 60% of surface, few cavities up to 1x1/4" | SC-1 collected at 62.0-62.8' |
| | | | 1 | 61.7' - Mechanical break | | | |
| | | | 3 | 62' - Bedding plane, horizontal, smooth, undulating | | | |
| | | | 6 | 62.8' - Bedding plane, 40 deg, rough, stepped | | **No Recovery 60.8-61.5** | |
| 65 -23.0 | | | NR | 63.1' - Mechanical break | | **Limestone** 61.5-65.25' - Same as 60.0-61.5' except moderate yellowish brown to pale yellowish brown, (10YR 5/4 to 10YR 6/2), extremely weak (R0), voids up to 1/12" on 30% of surface, large cavities up to 3" with silt infill | |
| | 66.5 | | | 63.35' - Mechanical break, 40 deg, rough, stepped | | | |
| | R4-NQ 5 ft 98% | 77 | 4 | 63.7' - Mechanical break, 60 to 90 deg, smooth, undulating | | | R3: 9 minutes |
| | | | 3 | 63.8' - Mechanical break, 50 deg, smooth, undulating, intersecting 67.7' mechanical break | | **No Recovery 65.25-66.5'** | |
| | | | 0 | 64.05' - Mechanical break, horizontal, rough, undulating | | **Limestone** 66.5-67.3' - Same as 61.5- 66.5' except very weak to medium strong (R1 to R3), voids <1/16" over 10% of surface, trace cavity infill | |
| | | | 1 | 64.65-64.75' - Mechanical break (4), rough, undulating, multiple intersections and angles, ground rock | | | |
| 70 -28.0 | | | 1 | 64.75' - Fracture, 60 deg, smooth, undulating | | 67.3-68.1' - Same as 66.5-67.3' except weak to medium strong (R2 to R3), voids up to 3/16" over 50% of surface, cavities up to 1/2" | SC-2 collected at 68.45-69.45' |
| | | | 1 | 65.05' - Bedding plane, 40 deg, smooth, undulating | | | |
| | | | NR | 67.05, 67.15, 67.30, 67.65' - Mechanical break (4), <10 deg, rough, stepped to undulating | | 68.1-68.45' - Same as 67.3-68.1' except very weak (R1), friable surface, no voids or cavities | |
| | 71.5 | | | 68.15, 68.45' - Bedding plane, horizontal, smooth, undulating | | 68.45-71.4' - Same as 68.1-68.45' except dense, strong HCl reaction, medium strong (R3), voids up to 1/16" over 20% of surface, trace organics, microfossils | R4: 13 minutes |
| | R5-NQ 5 ft 88% | 55 | 1 | 68.3' - Mechanical break | | | |
| | | | 2 | 69.7, 70.1' - Mechanical break | | | |
| | | | 3 | 70.4' - Fracture, 60 deg, smooth, undulating | | **No Recovery 71.4-71.5'** | |
| 75 -33.0 | | | 1 | 71.05' - Fracture or mechanical break, 10 to 50 deg, rough, stepped to undulating | | **Limestone** 71.5-72.4' - Same as 68.45-71.4' except pale yellowish brown to yellowish gray, (10YR 6/2 to 5Y 7/2), very weak to weak (R1 to R2), voids <3/16" over 60% of surface | |
| | | | >10 | 71.2' - Fracture, vertical, rough, stepped to undulating | | | |
| | | | NR | 72.15' - Bedding plane, horizontal, smooth, undulating | | | |
| | 76.5 | | | 72.4' - Mechanical break or bedding plane, horizontal, smooth, undulating, <1/2" open | | 72.4-72.65' - Same as 71.5-72.4' except extremely weak to weak (R0 to R2), few cavities 1/4 x 1/8" | |
| | | | >10 | 72.65' - Bedding plane, horizontal, smooth, undulating | | | |
| | | | | 72.8' - Fracture, 70 deg, rough, undulating | | 72.65-75.1' - Same as 72.4-72.65' except medium strong (R3), voids up to 3/16" over 50%, cavities up to 1/2x1/4" over 40%, sharp contact at 75.1' | R5: 11 minutes |
| | | | | 73.8' - Fracture, horizontal, rough, undulating | | | |
| | | | | 74.5, 74.75, 74.85' - Mechanical break | | | |
| | | | | 75.1' - Fracture, 20 deg, smooth, undulating | | | |
| | | | | 75.15, 75.25' - Mechanical break, horizontal, rough, undulating, 1/2" open | | | |
| | | | | 75.55' - Fracture, 50 deg, rough, undulating | | | |

| 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 ORIENTATION : Vertical

WATER LEVELS : 3.5 ft bgs on 3/06/07 START : 2/26/2007 END : 3/1/2007 LOGGER : T. Valentine, R. Bitely, J. Schaeffer

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R6-NQ 5 ft 94% | 57 | 4 | 75.6, 75.65' - Mechanical break or fracture zone, multiple intersecting fractures and angles, ground rock | | **Limestone** 75.1-75.6' - Same as 72.65-75.1' except extremely weak to very weak (R0 to R1), weakens with depth, voids up to 3/16" over 30% | |
| | | | 3 | 75.8' - Bedding plane, horizontal, smooth, undulating | | | |
| 80 -38.0 | | | 2 | 76.85-77.4' - Fracture zone, rough, undulating, various angles | | **Calcareous Silty Fat Clay (CH)** 75.6-75.9' - moist, hard, high plasticity, strong HCl reaction | |
| | | | 0 | 77.4' - Fracture, 50 deg, rough, undulating<br>77.65, 77.95, 78.0, 78.05' - Bedding plane, <10 deg, smooth, undulating | | **No Recovery 75.9-76.5'** | R6: 18 minutes |
| | 81.5 | | NR | 78.55, 78.95, 79.35' - Bedding plane, horizontal, smooth, undulating | | **Calcareous Silty Fat Clay (CH)** 76.5-76.85' - Same as 75.6-75.9' except pale yellowish brown, (10YR 6/2), moist | |
| | R7-NQ 5 ft 100% | 83 | 1 | 79.5' - Mechanical break | | **Limestone** 76.85-78.65' - pale yellowish brown, (10YR 6/2), strong HCl reaction, extremely weak to weak (R0 to R2), trace laminations with organics, voids up to 3/16" over 20%, cavities up to 1/4x1/8" over 5% of surface | SC-3 collected at 82.45-83.25' |
| | | | 0 | 80.3, 80.5' - Bedding plane, <10 deg, rough, undulating<br>80.55-80.7' - Mechanical break | | | |
| | | | 5 | 81.9, 84.3' - Mechanical break<br>82.25' - Mechanical break, 40 deg, smooth, undulating<br>83.6-83.65' - Fracture zone, rough, stepped, various angles, ground rock | | | |
| 85 -43.0 | | | 2 | 84.55, 85.2, 85.6, 85.95' - Mechanical break, rough, undulating to stepped, <1/2" open | | 78.65-79.85' - Same as 76.85-78.65' except weak to medium strong (R2 to R3), voids up to 3/16" over 30-50% of surface | R7: 13 minutes |
| | | | 3 | | | 79.85-80.50' - Same as 78.65-79.85' except dark yellowish brown, (10YR 4/2), voids up to 3/16" over 70% of surface, cavities up to 1/2" | |
| | 86.5 | | | | | | |
| | R8-NQ 5 ft 90% | 67 | 1 | 86.45' - Bedding plane, horizontal, smooth, undulating<br>86.75' - Fracture or mechanical break, 70 deg, rough, stepped | | 80.50-81.20' - Same as 79.85-80.5' except yellowish gray, (5Y 8/1), very fine grained, medium strong (R3), voids up to 3/16" over 15% of surface, fossil molds | |
| | | | >10 | 87.9-88.3' - Fracture zone or mechanical break, rough, undulating, various angles | | **No Recovery 81.2-81.5'** | |
| | | | 2 | 88.5' - Bedding plane, horizontal, smooth, undulating<br>88.9' - Fracture or mechanical break, rough, stepped, 1/2" open | | **Limestone** 81.5-83.1' - Same as 80.50-81.20' except possible bioturbation | |
| 90 -48.0 | | | 1 | 89.1, 89.75, 90.65' - Bedding plane or fractures, smooth, undulating | | 82.25-83.6' - few voids | |
| | | | 1 | 89.4' - Mechanical break | | 83.1-85.6' - strong HCl reaction, weak to medium strong (R2 to R3), voids <1/16" over 70-80% of surface, cavities up to 3/4x1/2" over 30% of surface, few fossil molds, potential bioturbation | R8: 12 minutes |
| | 91.5 | | NR | | | | |
| | R9-NQ 5 ft 86% | 48 | 5 | 91.5-91.6' - Fractures or mechanical break (3), rough, various angles, stepped to undulating | | 85.95-86.5' - yellowish gray, (5Y 8/1), strong HCl reaction, very weak to weak (R1 to R2), voids up to 1/16" over 30%, cavities up to 1/4x1/8 " over 15% of surface | |
| | | | 3 | 91.95' - Fracture, horizontal, rough, stepped, <1/2" open<br>92.25, 92.5-92.6' - Fractures, horizontal, rough, stepped | | | |
| | | | >10 | 92.9' - Fracture, horizontal, rough, stepped<br>93.7-94.25' - Fractures (>10) | | 86.5-87.9' - yellowish gray to dark yellowish brown, (5Y 8/1 to 10YR 4/2), very weak to medium strong (R1 to R3), voids <1/4" over 70 % of surface, cavities <1/2x1/4" over 30-40% of surface, possible bioturbation | |
| 95 -53.0 | | | 0 | | | | |
| | | | 3 | 95.65' - 70 deg, rough, undulating | | | R9: 14 minutes |
| | 96.5 | | NR | | | | |
| | | | >10 | 96.95' - Fracture or mechanical break, 0 to 45 deg, rough, stepped | | 87.9-91.0' - Same as 86.7-87.9' except voids <1/4" over 40-70 % of surface, cavities <1/4x1/4" over 10-20% of surface | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
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# 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 ORIENTATION : Vertical

WATER LEVELS : 3.5 ft bgs on 3/06/07 START : 2/26/2007 END : 3/1/2007 LOGGER : T. Valentine, R. Bitely, J. Schaeffer

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

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
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# 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 ORIENTATION : Vertical

WATER LEVELS : 3.5 ft bgs on 3/06/07 START : 2/26/2007 END : 3/1/2007 LOGGER : T. Valentine, R. Bitely, J. Schaeffer

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R14-NQ 5 ft 44% | 12 | >10 | 115.95-116.3' - Fractures (6+), rough, undulating, intersecting at various angles | | | |
| | | | 1 | 116.6' - Bedding plane, horizontal, smooth, undulating | | **No Recovery 118.7-121.5'** | |
| 120 -78.0 | | | NR | 116.6-117.7' - Fracture zone, rough, undulating, multiple intersecting fractures, gravel < 1-1/2" diameter<br>118.35, 118.55' - Fractures, 55 deg, smooth, undulating | | | R14: 4 minutes |
| | 121.5 | | | | | | |
| | R15-NQ 5 ft 100% | 76 | 0 | | | **Limestone**<br>121.5-123.65' - Same as 116.5-121.5' except grading into weak rock with depth (R2) | SC-5 collected at 121.5-122.6' |
| | | | 3 | 122.6, 124.3' - Mechanical break<br>122.95' - Bedding plane, horizontal, smooth, undulating | | | |
| | | | 0 | 123.3' - Fracture, 35 deg, smooth, undulating<br>123.65' - Fracture, 20 deg, smooth, undulating | | 123.65-125.0' - Same as 121.5-123.65' except weak to medium strong (R2 to R3), highly fossiliferous, voids <1/4" over 50-70% of surface, cavities <3/4"x1/2" over 40% of surface | |
| 125 -83.0 | | | 3 | 125' - Bedding plane, horizontal, smooth, undulating | | | |
| | | | 6 | 125.4, 125.45, 125.6, 125.7, 125.75, 125.9, 126.15, 126.25' - Bedding plane, horizontal, smooth, undulating | | 125.0-125.45' - Same as 123.65-125.0'<br>125.45-126.5' - Same as 123.65-125.0' | R15: 5 minutes |
| | 126.5 | | | | | | |
| | R16-NQ 5 ft 98% | 82 | 2 | 126.85, 126.95' - Bedding plane, horizontal, smooth, undulating | | **Limestone**<br>126.5-131.4' - very fine to fine grained, strong HCl reaction, very weak to weak (R1 to R2), voids (< 3/16") variable 0-30% of surface, (especially at 127.05-128.5' and 129.6-131.4'), cavities (<1/4") over 20% of surface from 129.6-131.4', fossiliferous (molds/casts), secondary infill in molds | |
| | | | 0 | 127.2, 129.3, 129.45, 129.6, 130.25' - Mechanical break | | | |
| | | | 0 | | | | |
| 130 -88.0 | | | 0 | | | | |
| | | | 0 | | | 127.05-128.5' - Same as 125.45-126.5' except many fossil molds and casts with few secondary infill of molds | R16: 7 minutes |
| | 131.5 | | NR | | | | |
| | R17-NQ 5 ft 100% | 54 | 5 | 131.65' - Fracture, <10 deg, rough, undulating | | 128.5-129.6' - Same as 121.5-123.65<br>129.6-131.4' - Same as 128.5-129.6 except many fossil molds and casts with few secondary infill of molds | |
| | | | >10 | 132.05, 132.35' - Bedding plane, horizontal, smooth, undulating<br>132.35-132.5' - Fractures, smooth, undulating, perpendicular fractures 0 and 90 degrees | | **No Recovery 131.4-131.5'** | |
| | | | 1 | 132.65' - Bedding plane, horizontal, smooth, undulating, <1/4" open | | **Fat Calcareous Clay (CH)**<br>131.5-131.55' - yellowish gray, (5Y 7/2), moist to wet, soft, high plasticity | |
| 135 -93.0 | | | 1 | 132.85, 133.05, 133.1, 133.25, 133.3, 133.45' - Bedding plane, horizontal, smooth, undulating | | **Limestone**<br>131.55-132.6' - yellowish gray, (5Y 7/2), strong HCl reaction, very weak to weak (R1 to R2), voids <1/4" over 20-70% of surface, variable, cavities <1/4" diameter over 20% of surface, variable, fossil molds throughout with some infilling | |
| | | | 5 | 133.45-133.55' - Fracture zone, horizontal, rough, undulating, gravel <1/2", angular<br>133.6' - Bedding plane, horizontal, smooth, undulating | | | R17: 6 minutes |
| | 136.5 | | | | | | |
| | | | 7 | 135.05' - Fracture, 40 deg, smooth, undulating, <1/4" open | | | |

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|---|---|---|
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# 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 ORIENTATION : Vertical

WATER LEVELS : 3.5 ft bgs on 3/06/07 START : 2/26/2007 END : 3/1/2007 LOGGER : T. Valentine, R. Bitely, J. Schaeffer

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R18-NQ 5 ft 100% | 58 | 2 | 135.4' - Fracture, 30 to 50 deg, smooth, undulating | | 132.6-133.0' - Same as 131.55-132.6' except light olive brown, (5Y 5/2), very fine to fine grained, weak to medium strong (R2 to R3), few fossils, voids <1/4" over 5% of surface, fossil molds <1/8" | |
| | | | 0 | 135.55,135.6, 135.80, 136.3, 136.5' - Fractures, <10 deg, smooth, undulating | | | |
| 140 -98.0 | | | 5 | 136.65, 136.75, 137.05, 137.1, 137.2, 137.25, 137.4, 137.6' - Bedding plane, 0 to 10 deg, smooth, undulating | | 133.0-136.5' - Same as 131.55-132.6' | |
| | | | 5 | 138.4' - Fracture, 15 deg, rough, undulating | | **Limestone** | R18: 7 minutes |
| | 141.5 | | | 139.65, 139.75, 140.0, 140.3, 140.35, 140.9, 141.1, 141.15, 141.3, 141.45, 141.5' - Bedding plane, horizontal and <10 deg, undulating, rough to smooth | | 136.5-137.1' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl reaction, very weak to weak (R1 to R2), variable 0-30% 15-20% of surface, cavities (<1/2"), variable 15-20%of surface, fossiliferous, trace molds and laminated bedding, rare secondary infill of cavities | |
| | R19-NQ 5 ft 86% | 42 | 1 | 141.65' - Bedding plane, <10 deg, smooth, undulating | | | |
| | | | 1 | 142.6' - Mechanical break | | | |
| | | | 4 | 143.35' - Fracture or mechanical break, 20 deg, rough, stepped | | 137.1-137.25' - Same as 136.5-137.1' except pale yellowish brown to moderate yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), medium strong (R3) | |
| | | | | 143.65' - Fracture, horizontal, rough, undulating | | | |
| 145 -103.0 | | | >10 | 144.05' - Fracture, horizontal, rough, undulating | | | |
| | | | 5 NR | 144.3-145.05' - Fracture zone, rough, intersecting fractures at various angles, <1" gravel, angular, stepped to undulating, partial recovery | | 137.25-139.75' - Same as 136.5-137.1' | R19: 24 minutes |
| | 146.5 | | | | | 139.75-140.0' - Same as 137.1-137.25' | |
| | R20-NQ 5 ft 98% | 90 | 1 | 145.25' - Bedding plane, horizontal, rough, undulating | | 140.0-141.5' - Same as 136.5-137.1' | SC-6 collected at 146.5-147.4' |
| | | | 0 | 145.45' - Fracture, vertical, smooth, undulating | | **Limestone** | |
| | | | 2 | 145.55, 145.65, 146.15' - Bedding plane, horizontal, smooth, undulating | | 141.5-145.5' - dark yellowish brown to pale yellowish brown, (10YR 4/2 to 10YR 6/2), very fine to fine grained, strong HCl reaction, weak to medium strong (R2 to R3), with extremely weak (R0) zone at 141.6-141.65', voids (<3/16") over 10-50% of surface, cavities and fossil molds (up to 1" diameter) over 40% of surface, about 50% of cavities have secondary infill, very fossiliferous (molds) | |
| | | | | 145.8, 146.05, 146.35' - Fractures (3), vertical, smooth, undulating | | | |
| 150 -108.0 | | | 2 | 147.45' - Bedding plane, horizontal, smooth, undulating | | | |
| | | | 1 | 148.35' - Mechanical break | | | R20: 10 minutes |
| | 151.5 | | NR | 149.15, 149.25, 149.75, 150.0, 150.75, 151.4' - Bedding plane, horizontal and <10 deg, smooth, undulating | | | |
| | R21-NQ 5 ft 94% | 80 | 0 | | | 145.5-145.8' - pale yellowish brown, (10YR 6/2), very fine grained, strong HCl reaction, medium strong (R3), laminated bedding, voids (<3/16") over 0-20% of surface | |
| | | | 0 | 152.75, 153.2, 153.35' - Mechanical break | | **No Recovery 145.8-146.5'** | |
| | | | 6 | 153.85, 153.9, 154.05, 154.15, 154.3, 154.35, 154.9, 155.0' - Bedding plane, 0 to 10 deg, smooth, undulating | | **Limestone** | |
| 155 -113.0 | | | 2 | | | 146.5-151.4' - pale yellowish brown, (10YR 6/2), very fine to fine grained, strong HCl reaction, weak to medium strong (R2 to R3), voids (<3/16") over 0-20% of surface (voids <1/4" over 80% of surface from 150.7-151.05'), few cavities <3/4"x1/2", few cavities with infill, fossiliferous | |
| | | | 0 | 155.55, 155.65' - Mechanical break | | | R21: 11 minutes |
| | 156.5 | | NR | | | | |
| | | | 1 | 156.6' - Bedding plane, horizontal, smooth, undulating | | 150.7-151.4' - Same as 146.5-150.7' except voids <1/4" over 80% of surface | SC-7 collected at 156.55-157.55' |
| | | | | 157.6' - Mechanical break | | **No Recovery 151.4-151.5'** | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: A-05 | SHEET 9 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 ORIENTATION : Vertical

WATER LEVELS : 3.5 ft bgs on 3/06/07 START : 2/26/2007 END : 3/1/2007 LOGGER : T. Valentine, R. Bitely, J. Schaeffer

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 160<br>-118.0 | R22-NQ<br>5 ft<br>96%<br>161.5 | 71 | 8<br>6<br>0<br>0<br>NR | 157.75, 157.8, 157.9, 158.0' - Bedding plane, horizontal, smooth, undulating<br>158.1' - Fracture, vertical, smooth, undulating<br>158.15, 158.25, 158.3' - Bedding plane or mechanical break, 0 to 90 deg, smooth, undulating<br>158.6, 158.65, 158.75, 158.9, 159.15' - Bedding plane, horizontal, smooth, undulating<br>160.1, 160.65, 161.05' - Mechanical break | | **Limestone**<br>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)<br>151.60-151.65' - Same as 151.5-154.95' except voids <1/4" over 60% of surface<br>151.65-153.2' - Same as 151.60-151.65' except no voids, few cavities <1/4" diameter<br>153.2-154.2' - Same as 151.65-153.2' except voids <1/8" over 30-60% of surface<br>154.2-154.92' - Same as 153.2-154.2' except highly laminated with organics, voids <1/4" over <10-20% of surface<br>**Limestone**<br>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<br>**No Recovery 156.2-156.5'**<br>**Limestone**<br>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<br>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<br>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, cavities up to 1"x1/2" over 30% of surface<br>**No Recovery 161.3-161.5'**<br>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 |

# SOIL BORING 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

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 : 1.0 ft bgs on 03/09/07 START : 3/6/2007 END : 3/9/2007 LOGGER : R. Bitely, L. Prochaska

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.5 | | | | | | | |
| | 3.5 | | | | | | |
| | | 1.3 | SS-1 | 4-4-4 (8) | **Poorly Graded Sand With Silt (SP-SM)** 3.5-4.1' - dark yellowish orange, (10YR 6/6), wet, loose, very fine to fine grained, 10-15% nonplastic fines, trace organics, trace coarse sand-sized iron cemented sand concretions, sand is silica | | |
| 5 37.5 | 5.0 | | | | **Clayey Sand (SC)** 4.1-4.8' - pale yellowish brown, (10YR 6/2), moist, loose, very fine to fine grained, 40% medium to high plastic fines, trace organics, sand is silica | | |
| | 8.5 | | | | | | |
| | | 1.0 | SS-2 | 5-5-6 (11) | **Silt (ML)** 8.5-9.5' - dark yellowish orange, (10YR 6/6), wet, stiff, nonplastic, rapid dilatancy, moderate HCl reaction, 10% very fine grained sand, 5% medium to coarse grained sand, all carbonate | | |
| 10 32.5 | 10.0 | | | | | | |
| | 13.5 | | | | | | |
| | | 0.8 | SS-3 | 38-50/5.5 (88/5.5") | **Silt With Sand (ML)** 13.5-14.25' - grayish orange, (10YR 7/4), moist to wet, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 10-15% very fine sand-sized, 5% medium sand-sized, trace fine gravel-sized, all carbonate | | |
| | 14.5 | | | | | | |
| 15 27.5 | | | | | | | |
| | 18.5 | | | | | | Driller's Remark: Hard layer 18.0-21.0' |
| | 18.7 | 0.2 | SS-4 | 50/2 (50/2") | **Limestone Fragments** 18.5-18.7' - grayish orange, (10YR 7/4), mild HCl reaction, fragments to 3/8" | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

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 : 1.0 ft bgs on 03/09/07 START : 3/6/2007 END : 3/9/2007 LOGGER : R. Bitely, L. Prochaska

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.5 | | | | | | | |
| | 23.5 | | | | | | |
| | | 1.1 | SS-5 | 10-13-24 (37) | **Silty Sand (SM)** 23.5-24.6' - grayish orange, (10YR 7/4), wet, dense, rapid dilatancy, moderate HCl reaction, fine to coarse sand, 47% nonplastic fines, 3/4" thick limestone lense at 24.4-24.5', all carbonate | | |
| 25 17.5 | 25.0 | | | | | | Driller's Remark: Very hard layer 25.5-27.0' |
| | 28.5 | | | | | | |
| | | 1.4 | SS-6 | 31-50-50/5 (100/11") | **Silt With Sand (ML)** 28.5-29.9' - dark yellowish orange, (10YR 6/6), moist to wet, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 30% fine to medium sand-sized (amount varies in lenses), all carbonate | | |
| 30 12.5 | 29.9 | | | | | | Driller's Remark: Very hard layer 30.0-35.0' |
| | 33.5 | | | | | | |
| | 33.8 | 0.3 | SS-7 | 50/3.5 (50/3.5") | **Limestone Fragments** 33.5-33.8' - grayish orange, (10YR 7/4), mild HCl reaction, gravel-sized fragments (1/16"-1"), 75% coverage of <1/16" voids on fragment surfaces | | |
| 35 7.5 | | | | | | | |
| | 38.5 | | | | | | Driller's Remark: Hard layers 38.0-38.5' and 38.5-42.0' |
| | 38.8 | 0.3 | SS-8 | 50/3 (50/3") | | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

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 : 1.0 ft bgs on 03/09/07 START : 3/6/2007 END : 3/9/2007 LOGGER : R. Bitely, L. Prochaska

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.5 | | | | | **Limestone Fragments** 38.5-38.8' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, fine to coarse gravel-sized fragments up to 2" diameter, 70-80% coverage of <1/16" voids on fragment surfaces | | Dense drilling 40.0-43.0', light chatter variable |
| | 43.5 | | | | | | |
| | 43.8 | 0.3 | SS-9 | 50/3.5 (50/3.5") | **Limestone Fragments** 43.5-43.8' - pale yellowish brown, (10YR 6/2), mild HCl reaction, coarse sand-sized to fine gravel-sized fragments (1/16"-1"), 2" silt lense (ML) at bottom of sample | | |
| 45 -2.5 | | | | | | | |
| | 48.5 | | | | | | |
| | | 1.3 | SS-10 | 49-15-20 (35) | **Limestone Fragments** 48.5-49.0' - Same as 43.4-43.8' except fragments 1/2"-2" | | |
| 50 -7.5 | 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 | | |
| | 53.5 | | | | | | |
| | 53.9 | 0.4 | SS-11 | 50/5 (50/5") | **Limestone Fragments** 53.5-53.9' - light olive gray, (5Y 5/2), moderate HCl reaction, sand and gravel-sized | | |
| 55 -12.5 | | | | | | | Dense drilling 56.0-57.0', light chattering |
| | 58.5 | | | | | | Stop drilling at 18:30 on 3/6/07, set HW casing to 40' |
| | 58.6 | 0.1 | SS-12 | 50/1 (50/1") | **Limestone Fragments** 58.5-58.6' - light olive gray, (5Y 5/2), mild to moderate HCl reaction, only a single 2" fragment | | |
| 60 | | | | | Begin Rock Coring at 58.5 ft bgs<br>See the next sheet for the rock core log | | |

| PROJECT NUMBER: | 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 ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 03/09/07 START : 3/6/2007 END : 3/9/2007 LOGGER : R. Bitely, L. Prochaska

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | RQD (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| 58.5 | | | | | | | 3/7/07 advanced HW casing to 58.5' |
| 60 -17.5 | R1-NQ 3 ft 97% | 68 | 2 | 58.7, 59.4' - Mechanical break (2)<br>58.85, 59.1, 59.5' - Bedding plane (3), 40 deg, smooth, undulating | | **Limestone**<br>58.5-61.4' - pale yellowish brown, (10YR 6/2), very fine to fine grained, strong HCl reaction, medium strong (R3) at 58.5-59.0' grading to very weak (R1) at 59.0-61.4', 80% coverage of <1/16" voids on surface from 58.5-59.0', trace voids and few cavities <1/4" diameter from 59.0-61.4' | |
| | | | 4 | | | | |
| | | | 3 | 60.25' - Bedding plane or fracture, horizontal, smooth, undulating, intersecting high angle fracture | | | R1: 3 minutes |
| 61.5 | | | NR | 60.3' - Fracture, 75 deg, smooth, undulating | | | |
| | R2-NQ 5 ft 92% | 62 | 0 | 60.8, 61.0' - Bedding plane (2), horizontal, smooth, undulating | | **No Recovery 61.4-61.5'** | |
| | | | >10 | 60.9' - Fracture, 80 deg, smooth, undulating, tight<br>62.55, 62.65' - Bedding plane (2), horizontal, smooth, undulating | | **Limestone**<br>61.5-66.1' - pale yellowish brown, (10YR 6/2), very fine to fine grained, moderate to strong HCl reaction, very weak to medium strong (R1 to R3), 60% coverage of <1/16" voids on surface from 64.75-65.25', trace voids and few cavities up to 3/4"x1/12" 61.5-64.75' and 65.25-66.5', trace organics in laminations | |
| | | | 2 | 62.65-62.8' - Fracture zone, rough, undulating, >10 fractures at various angles | | | |
| 65 -22.5 | | | 2 | 63.1, 63.2, 63.6' - Fractures or mechanical break (3), smooth to rough, undulating, low angle | | | |
| | | | 10 | 64.1, 65.0' - Bedding plane or mechanical break (2), smooth to rough | | | R2: 10 minutes |
| 66.5 | | | NR | 64.45-65.95' - Fracture zone, rough, undulating, 5+ fractures at intersecting angles | | **No Recovery 66.1-66.5'** | |
| | R3-NQ 5 ft 76% | 40 | >10 | 65.75' - Bedding plane, smooth, undulating<br>65.75' - Fracture, 40 deg, smooth, undulating | | **Limestone**<br>66.5-70.3' - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to 10YR 4/2), fine grained, moderate to strong HCl reaction, very weak to medium strong (R1 to R3), hardness increasing with depth, 60% coverage of <1/16" voids on surface, no cavities 68.15-70.3', 67.7-67.8' silt lense, carbonate, low plasticity | Many cavities or lost material from coring at 66.5-68.15' |
| | | | >10 | 66.5-67.8' - Fracture zone, rough, undulating to stepped, intersecting fractures at various angles | | | |
| | | | 2 | 68.05, 68.15' - Bedding plane or mechanical break (2), <10 deg, rough to smooth, undulating | | | |
| 70 -27.5 | | | 0 | 69.25, 69.4' - Bedding plane, <10 deg, smooth, undulating | | | |
| | | | NR | 69.75, 71.85, 72.5, 74.9' - Mechanical break (4) | | **No Recovery 70.3-71.5'** | R3: 8 minutes |
| 71.5 | | | | | | | |
| | R4-NQ 5 ft 76% | 68 | 1 | 72.1, 72.6' - Bedding plane (2), <10 deg, smooth, undulating | | **Limestone**<br>71.5-75.3' - pale yellowish brown to very light gray, (10YR 6/2 to N8), very fine to fine grained, moderate HCl reaction, medium strong (R3) at 71.5-75.15', very weak to extremely weak (R1 to R0) at 75.15-75.3', 25-75% coverage of <1/16" voids on surface, many cavities <1/4" diameter with few cavities <1/2" (fossil molds), fossiliferous | |
| | | | 1 | | | | |
| | | | 1 | 74.05' - Fracture, 20 deg, smooth, undulating | | | |
| 75 -32.5 | | | 3 | 74.5, 74.65' - Bedding plane (2), <10 deg, smooth, undulating<br>75.15' - Fracture, 20 deg, rough, undulating | | | |
| | | | NR | | | **No Recovery 75.3-76.5'** | R4: 16 minutes |
| 76.5 | | | | | | | |
| | | | >10 | 76.5-76.6' - Fracture zone, rough, undulating to stepped, trace silt infill<br>76.7' - Mechanical break or bedding plane, <10 deg, rough, undulating | | **Limestone**<br>76.5-76.9' - pale yellowish brown, (10YR 6/2), very fine to fine grained, strong HCl reaction, very weak (R1), 20% coverage of <1/16" voids on surface | |
| | | | NA | 76.9, 78.25' - Clay seam (2), clay contact | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: A-06 | SHEET 5 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 ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 03/09/07 START : 3/6/2007 END : 3/9/2007 LOGGER : R. Bitely, L. Prochaska

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R5-NQ 5 ft 86% | 20 | 0 | 78.4' - Mechanical break or bedding plane, <10 deg, smooth, undulating<br>78.55' - Mechanical break or fracture, 50-70 deg, smooth, undulating | | **Fat Clay (CH)**<br>76.9-78.25' - very pale orange, (10YR 8/2), moist, medium stiff to stiff, low dilatancy, moderate to high plasticity, 30% silt | Laminated organics varve-like deposition at 79.4-79.5' |
| 80<br>-37.5 | | | 4 | 78.75, 79.2, 79.3' - Bedding plane (3), <10 deg, smooth, undulating | | **Limestone**<br>78.25-80.8' - very light gray to dark yellowish brown, (N8 to 10YR 4/2), very fine to fine grained, weak to medium strong (R2 to R3), 40% coverage of <1/16" voids on surface varying/decreasing with depth, laminated organics 79.4-79.5'<br>**No Recovery 80.8-81.5'**<br>**Limestone**<br>81.5-82.75' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), very fine to fine grained, weak to medium strong (R2 to R3), 70% coverage of <1/16" voids on surface, 20% coverage of <1/2" cavities on surface, several cavities <1/2" with secondary infill, all acid reactive<br>82.75-83.2' - Same as 81.5-82.75' except 30% coverage of <3/16" voids on surface, 15-20% coverage of <1/4" cavities on surface<br>83.2-85.8' - Same as 81.5-82.75' except 80% coverage of <3/16" voids on surface, 30% coverage of <1/2" cavities on surface, fossiliferous<br>**No Recovery 85.8-86.5'**<br>**Limestone**<br>86.5-90.3' - pale yellowish brown to dark yellowish brown, (10YR 6/2 to 10YR 4/2), very fine to fine grained, mild to moderate HCl reaction, very weak to medium strong (R1 to R3), 60% coverage of <1/16" voids on surface, many cavities <1"x1/4" over 20-30% of surface, fossiliferous, mottled coloration, weak to moderate HCL reaction, trace organics<br>**No Recovery 90.3-91.5'**<br>**Limestone**<br>91.5-92.2' - dark yellowish brown to pale yellowish brown, (10YR 4/2 to 10YR 6/1), very fine to fine grained, strong HCl reaction, extremely weak to very weak (R0 to R1), voids <3/16" over 80% of core surface, few cavities (<1/4") over 20% of surface<br>92.2-93.0' - Same as 91.5-92.2' except weak to medium strong (R2 to R3), fossiliferous, voids <3/16" over 60% of core surface, decreasing with depth, cavities up to 2-1/2"x1" with extremely weak (R0) limestone or silt infill | |
| | | | 0 | | | | R5: 10 minutes |
| | | | NR | | | | |
| | 81.5 | | | | | | |
| | R6-NQ 5 ft 86% | 54 | >10 | 81.6' - Fracture or mechanical break, <10 deg, rough, undulating<br>81.8-82.0' - Fracture zone, rough, undulating, multiple intersecting factures at various angles | | | 81.5-82.75' possible bioturbation, 82.75-83.2' wormholes/bioturbation<br>SC-1 collected at 82.25-83.2' |
| | | | 2 | | | | |
| | | | 0 | 82.25, 83.2, 83.4, 84.6' - Mechanical break or fractures (4), rough, stepped to undulating, variable angularities | | | |
| 85<br>-42.5 | | | 2 | | | | |
| | | | 4 | 85.3' - Mechanical break or fracture, 0-50 deg, rough, stepped | | | R6: 16 minutes |
| | | | NR | 85.55-85.8' - Fracture zone, rough, undulating, multiple (<4) fractures, various angles | | | |
| | 86.5 | | | | | | |
| | R7-NQ 5 ft 76% | 58 | >10 | 87.2' - Fracture, 35 deg, rough, undulating | | | |
| | | | >10 | 87.35-87.8' - Fracture zone, rough, undulating to stepped, multiple fractures at various angles | | | |
| | | | 0 | 87.95, 88.9, 89.3' - Mechanical break (3)<br>89.0' - Mechanical break or bedding plane, 40 deg, rough, undulating | | | |
| 90<br>-47.5 | | | 10 | 89.2-89.3' - Fracture zone, rough, undulating to stepped, intersecting fractures at various angles | | | R7: 23 minutes |
| | | | NR | | | | |
| | 91.5 | | | | | | |
| | R8-NQ 5 ft 90% | 58 | >10 | 91.6' - Fracture, vertical, rough, undulating<br>91.65' - Mechanical break or fracture, 15 deg, rough, stepped to undulating | | | |
| | | | 2 | 91.85' - Fracture, vertical, rough, undulating<br>92.05-92.2' - Fracture zone, rough, undulating to stepped, multiple fractures at various angles | | | |
| | | | 1 | 92.95' - Mechanical break or fracture, 25-70 deg, rough, undulating, variable fracture angle | | | |
| 95<br>-52.5 | | | 2 | 93.3' - Bedding plane, horizontal, smooth, undulating | | | SC-2 collected at 95.05-95.85' |
| | | | 1 | 94.1' - Bedding plane, smooth, planar | | | R8: 29 minutes |
| | | | NR | 94.25-94.35' - Clay seam, soil horizon<br>94.7' - Fracture, 35 deg, rough, stepped | | | |
| | 96.5 | | | | | | |
| | | | 1 | 95.0' - Mechanical break, 70 deg, rough, undulating | | | 96.5-96.85' hammer test for calibration (50/4")<br>Top 4" of core lost to hammer test for calibration, measurements of core depths start from 96.85' |
| | | | >10 | 95.05' - Clay seam, soil horizon, clay contact <1/4", potential fracture infill, open 1/4"<br>95.85' - Mechanical break or fracture, 15 deg, rough, stepped | | | |

| PROJECT NUMBER: | 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 ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 03/09/07 START : 3/6/2007 END : 3/9/2007 LOGGER : R. Bitely, L. Prochaska

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R9-NQ 5 ft 82% | 60 | 0 | 97.5, 99.6' - Mechanical break (2)<br>97.95' - Fracture, 60 deg, rough, undulating<br>98.0-98.6' - Fracture zone, rough, stepped, multiple (>20) intersecting fractures at various angles, gravel sized fragments <3" | | **Limestone**<br>93.0-94.1' - Same as 91.5-92.2' except weak to medium strong (R2 to R3), trace voids <3/16" and cavities<br>94.1-95.1' - Same as 91.5-92.2' except very weak to weak (R1 to R2), trace voids <3/16" and cavities<br>95.1-96.0' - Same as 91.5-92.2' except very weak to medium strong (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'<br>**No Recovery 96.0-96.85'**<br>**Limestone**<br>96.85-100.6' - pale yellowish brown, (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<br>**No Recovery 100.6-101.5'**<br>**Limestone**<br>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<br>**No Recovery 106.45-106.5'**<br>**Limestone**<br>106.5-111.2' - pale yellowish brown, (10YR 6/2), very fine to fine grained, extremely weak to weak (R0 to R2), 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<br>**No Recovery 111.2-111.5'**<br>**Limestone**<br>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<br>**No Recovery 116.4-116.5'** | |
| 100 -57.5 | | | 1 | 100.2' - Mechanical break | | | |
| | | | NR | | | | R9: 7 minutes |
| | 101.5 | | | | | | |
| | | | 0 | 101.95, 103.3, 103.6, 105.0' - Mechanical break (4) | | | |
| | | | 1 | 103.15' - Mechanical break or fracture, 40 deg, rough, stepped | | | |
| | R10-NQ 5 ft 99% | 97 | 0 | | | | |
| 105 -62.5 | | | 0 | | | | |
| | | | 0 | | | | R10: 13 minutes |
| | 106.5 | | | | | | |
| | | | NR | | | | |
| | | | 2 | 106.85' - Fracture, 30 deg, rough, stepped | | | |
| | | | 1 | 107.4' - Fracture or mechanical break, 70 deg, smooth, stepped, open | | | |
| | R11-NQ 5 ft 94% | 60 | 2 | 108.5' - Bedding plane, horizontal, smooth, undulating, 1/2" open<br>108.7' - Fracture or mechanical break, 60 deg, smooth, stepped | | | |
| 110 -67.5 | | | 3 | 109.0' - Bedding plane, horizontal, smooth, undulating | | | |
| | | | 0 | 110.15, 110.25' - Bedding plane (2), <10 deg, rough, stepped | | | R11: 16 minutes |
| | 111.5 | | NR | 110.4' - Bedding plane, <10 deg, smooth, undulating | | | |
| | | | 1 | 110.85' - Mechanical break | | | |
| | | | 1 | 112.35, 112.6' - Bedding plane (2), <10 deg, rough, undulating | | | |
| | R12-NQ 5 ft 98% | 92 | 2 | 114.0' - Fracture, 40 deg, smooth, undulating<br>114.35, 115.45' - Bedding plane (2), smooth, planar | | | |
| 115 -72.5 | | | 1 | | | | |
| | | | 0 | | | | SC-3 collected at 115.45-116.2'<br>R12: 14 minutes |
| | 116.5 | | NR | 116.2' - Mechanical break | | | |
| | | | 1 | | | | |
| | | | 1 | 117.3' - Fracture, 70 deg, smooth, planar<br>117.55' - Fracture or mechanical break, 30 deg, rough, stepped | | | |

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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 ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 03/09/07 START : 3/6/2007 END : 3/9/2007 LOGGER : R. Bitely, L. Prochaska

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R13-NQ 5 ft 98% | 92 | 1 | | | **Limestone** 116.5-117.5' - yellowish gray, (5Y 7/2), very fine to fine grained, very weak to weak (R1 to R2), 30-50% coverage of <1/16" voids on surface, 1 cavity 1/2" diameter, fossiliferous (molds), trace organics | |
| 120 -77.5 | | | 2 | 119.45, 119.7' - Fracture or mechanical break (2), 50 deg and 80 deg, rough, undulating | | | |
| | | | 1 | 119.6' - Fracture or mechanical break, 60 deg, rough, planar | | | R13: 9 minutes |
| | 121.5 | | NR | 120.95' - Fracture or mechanical break, <10 deg, rough, stepped | | 117.5-121.4' - Same as 116.5-117.5' except 50-70% coverage of <3/16" voids on surface, 20% coverage of 1/4" to 1" cavities on surface, highly fossiliferous (molds) | |
| | R14-NQ 5 ft 90% | 70 | 4 | 121.6, 121.65' - Bedding plane (2), <10 deg, smooth, stepped | | **No Recovery 121.4-121.5'** | |
| | | | 1 | 122.0' - Mechanical break or fracture, <10 deg, rough, stepped | | **Limestone** 121.5-125.4' - very pale orange, (10YR 8/2), very fine to fine grained, 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) | |
| | | | 1 | 122.5' - Bedding plane, horizontal, smooth, undulating<br>122.65' - Mechanical break or fracture, 50 deg, rough, undulating | | | |
| 125 -82.5 | | | 0 | 123.65, 123.9' - Fracture or mechanical break (2), 45 deg and 80 deg, rough, undulating | | | |
| | | | 2 | 125.7' - Bedding plane, horizontal, smooth, planar | | 125.4-126.0' - Same as 121.5-125.4' except thinly (1/16") laminated with pale yellowish brown, (10YR 6/2), very fine to fine grained, weak to medium strong (R2 to R3), organics, mild HCl reaction except for laminations | R14: 8 minutes |
| | 126.5 | | NR | | | | |
| | R15-NQ 5 ft 100% | 42 | >10 | 125.9' - Bedding plane, horizontal, smooth, undulating<br>126.5-126.83' - Fracture zone, smooth, undulating, multiple intersecting fractures, fragments up to 2" diameter | | | Sample can be crushed between fingers to silt size material (calcerous) |
| | | | 3 | 126.85' - Bedding plane, horizontal, smooth, undulating | | **No Recovery 126.0-126.5'** | |
| | | | >10 | 127.15' - Bedding plane or mechanical break, rough, undulating | | **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) | |
| 130 -87.5 | | | >10 | 127.7, 127.8, 128.0' - Bedding plane (3), <10 deg, smooth, undulating<br>128.15' - Bedding plane or mechanical break, horizontal, rough, undulating | | | |
| | | | >10 | 128.5, 128.75, 128.9, 129.0' - Bedding plane (4), horizontal, rough, undulating | | | R15: 5 minutes |
| | 131.5 | | | | | | |
| | R16-NQ 5 ft 100% | 84 | 5 | 129.15-129.35' - Fracture zone, rough, stepped<br>129.55-129.65' - Fracture zone, rough, stepped | | 131.5-134.7' - very pale orange, (10YR 8/2), very fine to fine grained, 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 | |
| | | | 3 | 130.2, 130.8' - Bedding plane (2), rough, undulating | | | |
| | | | 0 | 131.0-131.5' - Fracture zone, rough, stepped to undulating<br>131.6' - Bedding plane or mechanical break, rough, undulating, 1/2" open | | | SC-4 collected at 134.0-134.85' |
| 135 -92.5 | | | 2 | 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 lenses up to 1" thick | |
| | | | 2 | 132.4' - Fracture or mechanical break, <10 deg, rough, stepped<br>132.5, 132.55' - Bedding plane (2), horizontal, smooth, undulating | | | R16: 7 minutes |
| | 136.5 | | | | | | |
| | | | 0 | 133.2, 133.55' - Bedding plane (2), <10 deg, rough, undulating | | | |
| | | | 0 | 134.85, 135.1' - Bedding plane (2), <10 deg, smooth, undulating | | | |

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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 ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 03/09/07 START : 3/6/2007 END : 3/9/2007 LOGGER : R. Bitely, L. Prochaska

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R17-NQ 5 ft 100% | 100 | 0 | 135.9, 135.95' - Fracture or mechanical break (2), 60 deg, rough, undulating, intersecting | | **Limestone** 136.5-141.5' - very pale orange, (10YR 8/2), very fine to fine grained, extremely weak to weak (R0 to R2), <1/16" voids, highly fossiliferous (molds), interbedded with horizontal laminations up to 1 1/2" thick which are yellowish gray (5Y 7/6) and exhibit no fossils and few voids <1/16", large fossil cast 1" in diameter at 141.1' | |
| 140 -97.5 | | | 1 | 139.65' - Bedding plane or mechanical break, smooth, undulating | | | |
| | | | 1 | 141.1' - Mechanical break, rough, undulating | | | R17: 11 minutes |
| | 141.5 | | | | | | |
| | | | 1 | 142.2' - Fracture or mechanical break, 20 deg, rough, stepped, 1/2" open | | 141.5-144.95' - yellowish gray to very pale orange, (5Y 7/2 to 10YR 8/2), very fine grained, medium strong (R3), 40-50% coverage of voids on surface, solution cavities up to 1 1/2" with secondary infill of fine grained limestone with voids over 80-90% of surface, all fossiliferous with multiple casts in matrix and secondary infill, organic staining occuring on fresh surface at 144.1-144.95' | |
| | | | 0 | | | | SC-5 collected at 142.5-143.75' |
| | R18-NQ 5 ft 88% | 68 | 2 | 143.8' - Mechanical break | | | |
| 145 -102.5 | | | >10 | 144.1, 144.3' - Mechanical break or fracture (2), <10 deg, rough, undulating to stepped, 1/4" open | | | |
| | | | 0 | 144.6, 144.7, 144.9' - Mechanical break or fracture (3), horizontal, rough, undulating, organic staining | | | R18: 38 minutes |
| | 146.5 | | NR | 144.9-144.95' - Fracture zone, smooth to rough, undulating to stepped, organic staining | | 144.95-145.9' - yellowish gray to very pale orange, (5Y 7/2 to 10YR 5/2), very fine to fine grained, medium strong (R3), 20-40% coverage of <1/16" voids on surface, trace fossils, no cavities | |
| | | | 3 | 145.6' - Mechanical break | | | 1/4" clay infill at 151.2' |
| | | | >10 | 146.9' - Mechanical break or bedding plane, <10 deg, smooth, undulating, 1/4" open<br>147.0' - Mechanical break | | **No Recovery 145.9-146.5'** | |
| | R19-NQ 5 ft 98% | 60 | 1 | 147.2, 147.45, 147.65, 147.7, 147.8, 147.9, 148.15, 148.2, 148.3, 148.35, 148.5' - Mechanical break or bedding plane (11), <10 deg, smooth to rough, undulating | | **Limestone** 146.5-151.4' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 3/2), fine grained, very weak to medium strong (R1 to R3), 50-80% coverage of <1/16" voids on surface, moderately fossiliferous, trace laminations, trace mottling/potential secondary infilling on cavities <1 1/2" | |
| 150 -107.5 | | | 0 | 149.05' - Fracture, 40 deg, rough, undulating | | | |
| | | | 1 | | | | R19: 8 minutes<br>Stop drilling at 18:00 on 3/8/07 |
| | 151.5 | | NR | 151.2' - Clay seam, horizontal, 1/4" open, 1/4" clay infill | | **No Recovery 151.4-151.5'** | Resume drilling at 08:15 on 3/9/07 |
| | | | 0 | | | **Limestone** 151.5-153.8' - pale yellowish brown, (10YR 6/2), very fine to fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), 30-60% coverage of <3/16" voids on surface variable, fossiliferous, fossil molds and casts up to 1/2" to 1/4" | Driller's Remark: Depth to water before drilling at 1' below ground surface |
| | | | 1 | 152.45' - Mechanical break | | | |
| | R20-NQ 5 ft 95% | 73 | 5 | 153.3' - Fracture or mechanical break, horizontal, smooth, undulating, 1/4" open<br>153.8' - Fracture or mechanical break, horizontal, smooth, undulating | | | |
| 155 -112.5 | | | >10 | 153.95-154.65' - Mechanical break<br>154.1, 154.15, 154.2, 154.3, 154.35' - Bedding plane (5), <10 deg, smooth, undulating, <1/4" open | | 153.8-155.4' - pale yellowish brown to dark yellowish brown, (10YR 6/2 to 10YR 4/2), very fine to fine grained, extremely weak to weak (R0 to R2), poorly laminated bedding, highly fossiliferous, fossil molds and casts <1/4", organics on laminar partings, 60% coverage of <3/16" voids on surface, 20% coverage of <3/4" cavities on surface, 1" carbonate derived silt lens at 155.3-155.4' | |
| | | | 0 | 154.65' - Fracture or mechanical break, <10 deg, rough, undulating | | | |
| | 156.5 | | NR | 155.3-155.4' - Fracture zone, <10 deg, rough, stepped to undulating | | | R20: 27 minutes |
| | | | 2 | 156.1' - Mechanical break | | | |
| | | | 4 | 156.65' - Bedding plane or mechanical break, horizontal, smooth, undulating, 1/4" open | | | |

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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 ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 03/09/07 START : 3/6/2007 END : 3/9/2007 LOGGER : R. Bitely, L. Prochaska

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 160<br>-117.5 | R21-NQ<br>5 ft<br>99%<br>161.5 | 76 | 5<br>1<br>0 | 157.05' - Fracture or mechanical break, 30 deg, rough, stepped, 1/2" open, silt size infill<br>158.0' - Bedding plane or mechanical break, horizontal, rough, undulating, 1/4" open<br>158.25, 158.35, 158.45' - Fractures or mechanical break (3), horizontal, smooth to rough, undulating, 1/4" open<br>158.6' - Bedding plane, rough, undulating, 1/4" open<br>158.8, 158.83, 158.85, 158.9' - Bedding plane or mechanical break (4), smooth to rough, undulating, 1/4" open<br>159.45' - Fracture, 60 deg, rough, undulating, 1/4" open<br>160.45' - Mechanical break | | 155.4-156.25' - Same as 151.5-153.8'<br>**No Recovery 156.25-156.5'**<br>**Limestone**<br>156.5-157.8' - 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), 40-70% coverage of <3/16" voids on surface, fossiliferous with molds and casts<br>157.8-159.0' - yellowish gray, (5Y 7/2), very fine grained, mild HCl reaction, medium strong (R3), interbedded, 10-30% coverage of <1/16" voids on surface, few fossils<br>159.0-161.4' - Same as 156.5-157.8'<br>**No Recovery 161.4-161.5'**<br>Bottom of Boring at 161.5 ft bgs on 3/9/2007 | SC-6 collected at 160.45-161.45'<br>R21: 27 minutes |

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# SOIL BORING 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.3 | 0.0 | 1.0 | SS-1 | 1-2-2-1 (4) | **Topsoil** 0.0-0.1' - wood debris<br>**Poorly Graded Sand (SP)** 0.1-1.0' - pale yellowish brown, (10YR 6/2), moist, very loose, no HCl reaction, very fine to fine grained silica sand to <1/16", trace nonplastic fines, trace organics | | |
| | 2.0 | 1.4 | SS-2 | 3-3-4-5 (7) | 2.0-2.4' - Same as 0.1-1.0' except color darkens with depth<br>**Poorly Graded Sand With Silt (SP-SM)** 2.4-3.4' - dark yellowish orange, (10YR 6/6), moist, loose, very fine to fine grained, nonplastic, no HCl reaction, 5-10% nonplastic fines, trace fine organics and roots, mottled, sand is silica | | NR=No Recovery |
| | 4.0 | 1.0 | SS-3 | 2-2-50/5 (52/11") | **Silty Sand (SM)** 4.0-4.4' - moderate yellowish brown, (10YR 5/4), moist, loose, very fine to fine grained, low plasticity, no HCl reaction, 30% low plastic fines, trace organics, sand is silica | | |
| 5 37.3 | 5.4 | | | | | | |
| | 6.0 | | | | | | |
| | 6.4 | 0.4 | SS-4 | 50/5 (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 | 0.8 | SS-5 | 45-3-2-1 (5) | **Silt With Sand (ML)** 4.7-5.0' - yellowish gray, (5Y 8/1), moist, hard, nonplastic, very rapid dilatancy, moderate HCl reaction, 15-20% sand-sized, very fine to fine and scattered coarse-sized, all carbonate | | |
| 10 32.3 | 10.0 | 1.9 | SS-6 | 2-1-2-4 (3) | **Silt (ML)** 6.0-6.4' - yellowish gray, (5Y 8/1), wet, hard, nonplastic, very rapid dilatancy, moderate HCl reaction, some yellowish staining, 5-10% very fine to fine sand-sized, trace coarse sand-sized, all carbonate | | |
| | 12.0 | 1.5 | SS-7 | 4-5-50/6 (55/12") | **Sandy Silt And Limestone Fragments (ML)** 8.0-8.5' - Same as 6.0-6.4' except some yellowish staining, 30-35% coarse sand to fine limestone fragments sized carbonate material, has the appearance of beds, may be extremely weak limestone | | |
| | 13.5 | | | | **Silt (ML)** 8.5-8.8' - Same as 6.0-6.4' | | |
| | 14.0 14.2 | 0.0 | SS-8 | 50/2 (50/2") | 10.0-10.6' - Same as 6.0-6.4' except soft, 5-10% very fine sand sized, all carbonate | | |
| 15 27.3 | 16.0 | | | | **Silt With Sand (ML)** 10.6-11.9' - Same as 10.0-10.6' except 10-15% fine to medium sand sized, trace fine gravel sized carbonate material, trace limestone lenses <1/2" thick | | |
| | 18.0 | 1.1 | SS-9 | 14-14-3-2 (17) | 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 HCl reaction in larger particles, all carbonate | | Driller's Remark: 16.0-18.0' is hard, cuttings are brown limestone fragments |
| 20 | | 1.7 | SS-10 | 2-3-6-3 (9) | **No Recovery 14.0-14.2'** | | Driller's Remark: Softer at 18.0' |

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# SOIL BORING 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.3 | 20.0 | 1.6 | SS-11 | 1-2-27-50 (29) | **Silt (ML)** 16.0-17.1' - yellowish gray, (5Y 8/1), wet, very stiff, nonplastic, very rapid dilatancy, moderate HCl reaction, 5-10% fine to coarse grained sand, all carbonate | | |
| | 22.0 22.2 | 0.2 | SS-12 | 50/2 (50/2") | **Sandy Silt (ML)** 18.0-19.7' - Same as 16.0-17.1' except 40% sand sized trace gravel sized to 1", voids 1/16" and fossil molds visible on larger particles, all carbonate | | Driller's Remark: 22.0-23.6' hard, becomes soft at 23.6' |
| | 24.0 | 1.1 | SS-13 | 9-26-50/2 (76/8") | **Silty Sand (SM)** 20.0-21.6' - grayish orange, (10YR 7/4), wet, medium dense, fine to coarse grained, moderate HCl reaction, 30% nonplastic fines, 20% fine gravel-sized in lenses <1/4" thick, all carbonate | | Driller's Remark: Lost circulation at 24.0' |
| 25 17.3 | 25.2 | | | | 22.0-22.2' - Same as 20.0-21.6' except silt and fine to coarse gravel sized limestone pieces | | |
| | 26.0 26.1 | 0.1 | SS-14 | 50/1 (50/1") | **Silty Sand With Limestone Fragments (SM)** 24.0-25.1' - grayish orange, (10YR 7/4), wet, very dense, fine to coarse grained, moderate to strong HCl reaction, 35% nonplastic fines, 15% fine gravel-sized to 1", trace white limestone fragments | | Still have no circulation; install 4" HW casing; heavy chatter at 15.0-20.0' Finish drilling at 16:00 on 4/25/07 Resume drilling 2/26/07 at 8:00 |
| | 28.0 | 0.6 | SS-15 | 6-50/5 (56/11") | **Silt (ML)** 26.0-26.1' - white to yellowish gray, (N9 to 5Y 8/1), silt and a 1" iron nodule, silt may be slough | | |
| | 28.9 | | | | **Sandy Silt With Limestone Fragments (ML)** 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 fragments to 2" | | |
| 30 12.3 | 30.0 | 1.3 | SS-16 | 3-7-13-6 (20) | **Limestone Fragments** 30.0-30.1' - pale yellowish brown, (10YR 6/2), mild to moderate HCl reaction, coarse gravel-sized pieces, surface covered in 1/16" voids, some fossil molds, very weak limestone | | |
| | 32.0 | 2.0 | SS-17 | 2-3-3-4 (6) | **Silty Sand (SM)** 30.1-31.3' - dark yellowish orange, (10YR 6/6), wet, medium dense, fine to coarse grained, moderate HCl reaction, 35% nonplastic fines, all carbonate | | |
| | 34.0 | | | | **Silty Sand With Limestone (SM)** 32.0-32.8' - Same as 30.1-31.3' except mild HCl reaction, intact limestone fragments to 1" in silt and sand sized matrix | | |
| | 34.6 | 0.4 | SS-18 | 45-50/1 (95/7") | **Sandy Silt (ML)** 32.8-33.5' - dark yellowish orange, (10YR 6/6), wet, very soft, moderate HCl reaction, 30-35% sand-sized fragments, very friable, trace medium sand-sized white particles, trace black streaks | | |
| 35 7.3 | 36.0 | 0.0 | SS-19 | 50/0 (50/0") | **Silty Sand With Limestone (SM)** 33.5-33.7' - Same as 32.0-32.8' | | Shut down at 10:11 2/26/07 due to hydraulic leak on autohammer |
| | 38.0 38.1 | 0.1 | SS-20 | 50/1 (50/1") | 33.7-34.0' - yellowish gray, (5Y 8/1), wet, medium dense, mild HCl reaction, intact limestone fragments to 1" in silt and sand-sized matrix, fragments have many fossil molds/casts, all carbonate | | Resume drilling 2/27/07 12:00 Driller's Remark: 38.0-40.0' hard, but no chatter |
| | | | | | **Sandy Silt (ML)** 34.0-34.2' - Same as 32.8-33.5' except medium stiff | | |
| | | | | | **Silty Sand (SM)** 34.2-34.4' - Same as 32.0-32.8' | | |
| 40 | | | | | **No Recovery 36.0'** | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-07 SHEET 3 OF 14 |

# SOIL BORING 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.3 | 40.0 | 1.9 | SS-21 | 6-8-33-50/5 (41) | **Limestone Fragments** 38.0-38.1' - dark yellowish brown, (10YR 4/2), moderate HCl reaction, fragments <1/8" thick and wafer shaped, abundant fossil casts/molds | | |
| | 41.9 | | | | **Silty Sand (SM)** 40.0-41.9' - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to 10YR 4/2), wet, dense, fine to coarse grained, moderate to strong HCl reaction, 30-40% silt-sized, limestone fragments in thin bedded appearance at 41.6-41.9', sand-sized very friable and can crush with fingers, all carbonate | | |
| | 43.4 | 1.3 | SS-22 | 21-38-50/5 (88/11") | | | Driller's Remark: Chatter starting at 43.0' |
| | 44.0 | | | | **Sandy Silt (ML)** 42.0-43.0' - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to 10YR 4/2), stiff, low plasticity, no dilatancy, strong HCl reaction, trace black streaks, 30% fine sand-sized | | |
| 45 -2.7 | | 1.4 | SS-23 | 14-15-17-24 (32) | | | |
| | 46.0 | | | | **Silty Sand With Limestone Fragments (SM)** 43.0-43.3' - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to 10YR 4/2), dense, moderate to strong HCl reaction, trace black streaks, predominately sand-sized material with 30% silt-sized, limestone fragments in last 0.3' with bedded appearance, carbonate materials | | |
| | 46.3 | 0.3 | SS-24 | 50/4 (50/4") | | | |
| | 48.0 | | | | **Sandy Silt (ML)** 44.0-45.4' - moderate yellowish brown to dark 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' | | |
| | 48.1 | 0.1 | SS-25 | 50/1 (50/1") | | | |
| 50 -7.7 | 50.0 | | | | **Silty Sand (SM)** 46.0-46.3' - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to 10YR 4/2), wet, very dense, fine to coarse grained, strong HCl reaction, 40% medium plastic silt, last 0.1' has gravel-sized limestone fragment | | |
| | 52.0 | 1.5 | SS-26 | 46-31-49-41 (80) | **Limestone Fragments** 48.0-48.1' - strong HCl reaction, 80% coverage of voids 1/16" or less on surface of fragments | | |
| | 53.3 | 0.9 | SS-27 | 4-14-50/4 (64/10") | **Sandy Silt (ML)** 50.0-51.5' - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to 10YR 4/2), moist to wet, hard, fine to coarse grained, moderate HCl reaction, 55% nonplastic fines, 3/4" to 1/2" limestone lenses | | |
| | 54.0 | | | | | | |
| | 54.1 | 0.0 | SS-28 | 50/1 (50/1") | | | |
| 55 -12.7 | | | | | **Silty Sand (SM)** 52.0-52.9' - Same as 50.0-51.5' except 40-50% low plastic fines, 1/2" poorly indurated limestone lens at 52.3' | | |
| | 56.0 | | | | **No Recovery 54.0-54.1'** | | |
| | 56.1 | 0.1 | SS-29 | 50/1 (50/1") | **Limestone Fragments** 56.0-56.1' - dark yellowish brown, (10YR 4/2), moderate HCl reaction, fragments to 1", 60% coverage of 1/16" voids on surface, black streaks | | Driller's Remark: Very hard 56.0-57.0', softer at 57.0' |
| | 58.0 | | | | | | |
| | 59.0 | 0.8 | SS-30 | 25-50/6 (75/12") | **Limestone Fragments** 58.0-58.1' - moderate yellowish brown, (10YR 5/4), moderate HCl reaction, 60% coverage of 1/16" voids on surface, fossil molds/casts, black streaks, very weak | | Driller's Remark: Very hard 59.0-60.0' |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
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# SOIL BORING 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -17.7 | 60.0–61.0 | 0.9 | SS-31 | 5-50/6 (55/12") | **Silty Sand (SM)** 58.1-58.8' - moderate yellowish brown, (10YR 5/4), wet, very dense, fine to coarse grained, moderate HCl reaction, black streaks, 35-40% low plastic fines, carbonate | | |
| | 62.0–64.0 | 0.0 | SS-32 | 50/1 (50/1") | **Silt With Sand (ML)** 60.0-60.9' - moderate yellowish brown, (10YR 5/4), 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<br>**No Recovery 62.0-62.1'** | | |
| 65 -22.7 | 64.0–64.8 | 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 carbonate material, 2 limestone lenses 1" thick, last 0.2' is coarse sand size limestone fragments, no black streaks | | |
| | 66.0–68.0 | 0.0 | SS-34 | 50/0 (50/0") | **Limestone Fragments** 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 recovered, fragments are 1/4" size | | Driller's Remark: Gets softer at 67.0' |
| | 68.0–68.7 | 0.7 | SS-35 | 17-50/2 (67/8") | **Silty Sand (SM)** 68.0-68.4' - Same as 64.0-64.8' except 2 limestone pieces to 1/2" in size, 80% coverage of voids 1/16" on surface | | |
| 70 -27.7 | 70.0–70.3 | 0.2 | SS-36 | 50/4 (50/4") | **Silt With Sand (ML)** 68.4-68.7' - grayish orange, (10YR 7/4), moist, hard, low plasticity, rapid dilatancy, moderate HCl reaction, 20% sand-sized, carbonate materials<br>**Silt With Sand (ML)** 70.0-70.2' - Same as 68.4-68.7' except 25% sand-sized | | Driller's Remark: Some chatter 70.0-71.0', softer at 71.0' faster drilling<br>Driller's Remark: Hard at 71.5' |
| | 72.0–74.0 | 0.7 | SS-37 | 14-9-50/5 (59/11") | **Sandy Silt With Limestone Fragments (ML)** 72.0-72.7' - moderate yellowish brown, (10YR 5/4), wet, hard, mild to moderate HCl reaction, 68% fines, 2" lense of limestone, scattered pieces to 3/8", 80% coverage of voids 1/16" on surface | | |
| 75 -32.7 | 74.0–75.8 | 1.8 | SS-38 | 2-3-7-50/4 (10) | **Lean Clay (CL)** 74.0-74.9' - pale yellowish brown, (10YR 6/2), moist, low to medium plasticity, no dilatancy, strong HCl reaction, stiff, 10-15% fine to medium sand-sized particles, trace black spots to 1/16", carbonate material | | Driller's Remark: Very hard at 75.0'<br>Driller's Remark: Finish drilling at 18:10 on 2/27/07, will switch to rock coring at 76.0' |
| | 75.8–76.0 | 0.0 | SS-39 | 50/0 (50/0") | **Sandy Silt (ML)** 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<br>**Limestone Fragments** 75.9-76.0' - dark yellowish brown, (10YR 7/2), moderate HCl reaction, some with voids 1/16", others without voids<br>Begin Rock Coring at 76.0 ft bgs<br>See the next sheet for the rock core log | | |
| 80 | | | | | | | |

| 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | 76.0 | | | | | **Limestone** | Install HW casing to 76.0' |
| | | | 4 | 76.2-76.3' - Mechanical break, multiple | | 76.0-81.0' - pale yellowish brown to 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% coverage of solution cavities 3/8" or less in diameter at 79.0-81.0', 1-2 perfect elongate spherical solution cavities, limestone is fine grained at 76.0-76.9' and 79.2-81.0' (very pale orange), limestone becomes silty from 77.2-77.9' | Not able to retrieve inner core last interval due to catcher not grasping inner core barrel |
| | | | 3 | 76.7' - Fracture, smooth, undulating, <3/4" silt infilling or silt seams<br>77.2' - Fracture, horizontal, smooth, planar, <1-3/16", thick clayey silt | | | Begin rock coring at 76.0' |
| | R1-HQ 5 ft 100% | 73 | 1 | 77.4' - Fracture, horizontal, smooth, planar, <3/16" fines<br>77.9' - Fracture, horizontal, smooth, planar, <3/8" silt | | | After pulling core barrel, used A rods to flush hole with water to extract slough |
| | | | 1 | 78.2' - Fracture, 1-2 deg, rough, stepped, <3/4" friable fines | | | |
| 80<br>-37.7 | | | 1 | 79.2' - Fracture, rough, stepped, <3/16" fines<br>80.3' - Fracture, 30-40 deg, rough, stepped, <3/16" fines | | | R1: 12 minutes<br>SC-1 collected at 80.0-81.0' |
| | 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 limestone, no fossils, no solution cavities | |
| | | | 2 | 82.3' - Fracture, 20-25 deg, rough, stepped, 20-30% mix of fines and sand sized grains | | 81.3-86.0' - pale yellowish brown, (10YR 6/2), moderate to strong HCl reaction, 20-30% microfossils, 50-70% silty matrix, 60-70% coverage of solution cavities 1/16" or less, 81.5-81.6' zone laminated dusky brown (5YR 2/2) organics | |
| | R2-HQ 5 ft 100% | 92 | 1 | 82.9, 83.5' - Fracture (2), horizontal and 5-10 deg, rough, stepped, 20-30% mix of fines and sand sized grains | | | |
| | | | 1 | | | | SC-2 collected at 83.7-84.7' |
| 85<br>-42.7 | | | 0 | 84.8' - Fracture, rough, undulating, 20-30% mix of fines and sand size grains | | | R2: 8 minutes |
| | 86.0 | | | | | | |
| | | | 1 | 86.4' - Fracture, 30 deg, sand to gravel size limestone grains | | 86.0-88.0' - moderate yellowish brown, (10YR 5/4), 30-50% fossil shells, molds and casts, 50-60% coverage of 3/8" or less solution cavities, 87.6' infilling of fat clay (CH) bluish gray (5B 9/1) to light bluish gray (5B 7/1), high plasticity and very moist | |
| | | | 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) | | | |
| | R3-HQ 5 ft 100% | 93 | 1 | 88.4' - Fracture, horizontal, smooth, undulating, <3/8" silty infilling | | 88.0-88.4' - pinkish gray, (5YR 8/1), dry, dense, strong HCl reaction, extremely weak to very weak (R0 to R1) | |
| | | | 0 | | | | |
| 90<br>-47.7 | | | 1 | | | 88.4-90.6' - pinkish gray, (5YR 8/1), dry, dense, strong HCl reaction, very weak (R1) | SC-3 collected at 89.6-90.6'<br>R3: 11 minutes |
| | 91.0 | | | 90.6' - Bedding plane, horizontal, smooth, undulating | | | |
| | | | 0 | | | 90.6-91.0' - pinkish gray, (5YR 8/1), strong HCl reaction, 70-90% silty matrix, no fossils observed | |
| | | | 2 | | | 91.0-94.0' - Same as 90.6-91.0' except weak to medium strong (R2 to R3), noticeable fossil (shell fragments, casts), 10-20% coverage of voids 1/8" or less | SC-4 collected at 91.7-92.6' |
| | R4-HQ 5 ft 100% | 70 | <7 | 92.5' - Fracture, horizontal, smooth, planar<br>92.8' - Fracture, horizontal, rough, undulating, infilled with 3/4" of medium plasticity clay/silt<br>93.3-93.7' - Fracture zone, rough, undulating, multiple fractures, low to high angle | | | |
| | | | 0 | | | 94.0-96.0' - moderate yellowish brown, (10YR 5/4), 30-50% fossil shells, molds and casts, 50-60% coverage of solution cavities up to 3/8" | |
| 95<br>-52.7 | | | 1 | | | | R4: 12 minutes<br>Driller's Remark: 95.0-96.0' soft |
| | 96.0 | | | | | | |

| 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R5-HQ 5 ft 40% | 0 | >10 | 95.4' - Fracture, planar, <2" thick, clays and silts<br>96.0-98.0' - Fracture zone, 0-90 deg, fractured material, most likely mechanical breaks | | **Limestone**<br>96.0-97.0' - pinkish gray, (5YR 8/1), strong HCl reaction, 70-90% silty matrix, non fossiliferous<br>**No Recovery 97.0-100.0'** | Driller's Remark: Sand lense 97.0-100.0'; core loss assumed to be from that interval<br>No recovery in core barrel but residual material appears to be very fine to fine grained sand, poorly graded, white to light brown in color |
| | | | NR | | | | |
| 100<br>-57.7 | | | >10 | | | **Limestone**<br>100.0-101.0' - medium yellowish brown, (10YR 5/4), strong HCl reaction, very weak (R1), 30-50% fossils shells, molds and casts, 50-60% solution cavities<br>101.0-105.3' - Same as 100.0-101.0' except solution cavities up to 3/4" in length (fossil molds) | Driller's Remark: Advance HW casing past sand lense to 101.0'<br>R5: 13 minutes<br>Insert and set surface casing to 101.0'<br>Stop drilling at 17:30 2/28/07<br>Resume drilling at 15:52 3/6/07<br>SC-5 collected at 102.4-103.4' |
| | 101.0 | | | | | | |
| | R6-HQ 5 ft 86% | 86 | 1 | 101.6' - Mechanical break, horizontal, rough, stepped, 3/4" of relief, open | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| 105<br>-62.7 | | | 0 | | | | R6: 8 minutes |
| | 106.0 | | NR | 105.3' - Mechanical break | | **No Recovery 105.3-106.0'** | |
| | R7-HQ 5 ft 100% | 100 | 0 | | | **Limestone**<br>106.0-111.0' - very pale orange, (10YR 8/2), strong HCl reaction, weak to medium strong (R2 to R3), 20-40% coverage of solution cavities up to 3/16", no apparent bedding, silty matrix when reduced with rock hammer, 10-20% fossil evidence | |
| | | | 1 | 107.5' - Mechanical break, 2-6 deg, rough, planar | | | |
| | | | 0 | | | | SC-6 collected at 107.9-108.9' |
| | | | 0 | | | | Driller's Remark: Softer drilling 109.0-111.0' |
| 110<br>-67.7 | | | 0 | | | | R7: 14 minutes |
| | 111.0 | | | | | | |
| | R8-HQ 5 ft 100% | 100 | 0 | | | 111.0-116.0' - Same as 106.0-111.0' except Very weak to weak (R1 to R2) at 114.0-116.0' | Very weak to weak interval identified as 109.0-111.0' on field log, it is assumed that 114.0-116.0' was intended |
| | | | 0 | | | | |
| | | | 0 | | | | SC-7 collected at 113.7-114.6' |
| | | | 0 | | | | |
| 115<br>-72.7 | | | 0 | | | | R8: 7 minutes |
| | 116.0 | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: A-07 | SHEET 7 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 on 03/07/07 START : 2/25/2007 END : 3/8/2007 LOGGER : J. Schaeffer, R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | 0 | | | **Limestone** 116.0-121.0' - very pale orange, (10YR 8/2), 60-80% coverage of broken shells, fossil molds and casts, 20-30% coverage of 3/4" diameter solution cavities from 116.0-117.5', 20-40% silty and sandy matrix, black and translucent crystals very fine to fine grained, not the typical moderate yellowish brown fossiliferous limestone encountered towards upper portion | |
| | | | 0 | | | | |
| | R9-HQ 5 ft 100% | 100 | 1 | 118.3, 119.5, 120.8' - Fractures (3), horizontal, rough, stepped | | | SC-8 collected at 118.2-119.2' |
| | | | 1 | | | | |
| 120 -77.7 | | | 1 | | | | R9: 9 minutes |
| | 121.0 | | | | | | |
| | | | 2 | 121.2, 121.6' - Mechanical break (2) | | 121.0-123.4' - light olive gray, (5GY 6/1), very fine to fine grained, strong HCl reaction, 30% coverage of 1/6" to 3/16" voids, 5% coverage of cavities 1/4" or less are dissolved fossils, fossiliferous | |
| | | | 0 | | | | |
| | R10-HQ 5 ft 100% | 96 | 2 | 123.4' - Fracture, smooth, undulating, limestone contact | | 123.4-126.0' - yellowish gray, (5Y 8/1), very fine grained, strong HCl reaction, 15% coverage of voids 1/16" or less, laminated bedding of light silts as well as undulating laminae from 124.0-125.5' | SC-9 collected at 124.8-125.8' |
| | | | 1 | 123.5' - Fracture, 60 deg<br>124.3' - Fracture, 1-2 deg, smooth, undulating | | | |
| 125 -82.7 | | | 1 | 124.6' - Fracture, 75 deg, rough, stepped, tight | | | R10: 13 minutes<br>Stop drilling at 17:58 3/6/07 |
| | 126.0 | | | 125.8' - Fracture, 0-1 deg, rough, undulating | | | |
| | | | 0 | | | 126.0-127.7' - pale yellowish brown, (10YR 6/2), strong HCl reaction, 10-20% coverage of fossil shells and casts, no solution cavities, 10-30% coverage of voids 1/6" or less, 50-60% sand-sized matrix with black grains 1/16" or less | Resume drilling at 08:03 3/7/07 |
| | | | 0 | | | | |
| | R11-HQ 5 ft 100% | 88 | 0 | | | 127.7-129.8' - very pale orange, (10YR 8/2), strong HCl reaction, very weak to weak (R1 to R2), 30-40% coverage of 3/8" or less solution cavities | |
| | | | 3 | 129.1, 129.5' - Fractures (2), 5 deg, rough, planar | | | |
| 130 -87.7 | | | 1 | 129.9, 130.1' - Fractures (2), 5 deg, smooth, planar | | 129.8-130.1' - pale yellowish brown, (10YR 6/2), fine grained, medium strong (R3), no fossils | R11: 7 minutes<br>SC-10 collected at 130.0-131.0' |
| | 131.0 | | | | | 130.1-131.0' - Same as 127.7-129.8' | |
| | | | 2 | 131.2' - Bedding plane, horizontal, smooth, planar | | 131.0-132.8' - very pale orange to pale yellowish orange, (10YR 8/2 to 10YR 8/6), strong HCl reaction, extremely weak to very weak (R0 to R1), medium to coarse quartz grains and sand-sized carbonate grains, 30-40% fossils, 20-40% coverage of 1/16" or less voids | |
| | | | | 131.99' - Fracture, rough, stepped | | | |
| | | | 3 | 132.4, 132.5, 132.7' - Fractures (3), 7-20 deg, rough, stepped, irregular, minor silt infilling, open to 1/4" | | | |
| | R12-HQ 5 ft 100% | 80 | 0 | | | | SC-11 collected at 132.8-133.8' |
| | | | 1 | 134.2' - Mechanical break, rough, stepped | | 132.8-134.4' - very pale orange, (10YR 8/2), strong HCl reaction, very weak (R1), 10-20% fossils, voids (<1/16") over 10-20% of surface | |
| 135 -92.7 | | | 3 | 135.1, 135.3, 135.6' - Bedding plane (3), 0-7 deg, smooth, planar | | | R12: 17 minutes |
| | 136.0 | | | | | | |

| 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

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

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

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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 bgs on 03/07/07 START : 2/25/2007 END : 3/8/2007 LOGGER : J. Schaeffer, R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R17-HQ 5 ft 100% | 100 | 0 | | | **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% 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 R2), 10-20% coverage of voids 1/16" or less, silty matrix 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, 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' 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') 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 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 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 HCl reaction, weak to medium strong (R2 to R3), no visible fossils, no solution cavities | |
| | | | 1 | 157.5, 160.4' - Fractures (2), 0-5 deg, smooth, undulating | | | SC-15 collected at 157.5-158.4' |
| | | | 0 | | | | |
| | | | 0 | | | | |
| 160 -117.7 | | | 1 | | | | R17: 9 minutes |
| | 161.0 | | | | | | |
| | R18-HQ 5 ft 100% | 86 | 0 | | | | |
| | | | 0 | | | | SC-16 collected at 162.5-163.4' |
| | | | 0 | | | | |
| | | | 1 | | | | |
| 165 -122.7 | | | 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 | | | Driller's remark: Feels gritty like sand |
| | 166.0 | | | | | | |
| | R19-HQ 5 ft 100% | 90 | 6 | 165.6, 165.8' - Fractures (2), horizontal, rough, planar, very fine to fine sandy infill, <3/8" thick | | | |
| | | | 0 | 166.1-166.4' - Bedding plane, 0-5 deg, rough, planar | | | |
| | | | 1 | | | | |
| 170 -127.7 | | | 0 | 168.9' - Bedding plane, horizontal, smooth, stepped, consolidated silt/clay laminae, <3/16" thick | | | 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 with apparent flow, the high energy (relatively) deposition is from 167.2-168.25', where the bedding becomes laminar to thin with very fine to fine grained laminae |
| | | | 1 | 170.15' - Bedding plane, horizontal, rough, stepped, <3/16" thick | | | |
| | 171.0 | | | | | | |
| | R20-HQ 5 ft 100% | 68 | 2 | 171.2, 171.9' - Mechanical break or bedding plane (2), 0-3 deg, planar, rough to smooth | | | |
| | | | 4 | 172.1' - Fracture, horizontal, smooth, undulating, silty infill <1/8" thick 172.2' - Fracture, horizontal, smooth, planar | | | R19: 12 minutes |
| | | | 0 | 172.5, 172.8' - Fractures (2), 10-15 deg, rough, planar | | | SC-17 collected at 170.15-171.0' |
| | | | 2 | 174.1' - Fracture, 5 deg, rough, stepped 174.6' - Fracture, 12 deg, rough, planar | | | SC-18 collected at 172.7-174.0' |
| 175 -132.7 | | | 6 | 175.1' - Fracture, 1-2 deg, rough, planar, <1/8" thick silty infill | | | R20: 8 minutes |
| | 176.0 | | | | | | |

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|---|---|
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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R21-HQ 5 ft 100% | 53 | 5 | 175.4-175.5' - Bedding plane, 0-3 deg, smooth, planar, 1/4" to 1/2" wafers | | **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 | |
| | | | 2 | 176.1-176.3' - Bedding plane, 0-3 deg, rough, planar, recrystallized carbonate on plane<br>176.8' - Fracture, horizontal, rough, stepped, enlarged solution cavity fractures at depositional contact | | | |
| | | | 2 | 177.45' - Fracture, horizontal, smooth, planar | | 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 | SC-19 collected at 178.95-180.0' |
| | | | 1 | 177.6' - Fracture, horizontal, rough, planar, very fine grain infilling<br>177.95, 178.3, 178.5' - Fractures (3), horizontal, rough, planar, lithology contact, <1/16" thick very fine sandy infill | | | |
| 180 -137.7 | | | 3 | 180.1, 180.4, 180.6' - Fractures (3), horizontal, rough, planar, <1/8" thick carbonate recrystallization infilling | | 168.5-169.8' - alternating very pale orange and pale yellowish brown, (10YR 8/2 to 10YR 6/2), thinly laminated bedding | R21: 10 minutes |
| | 181.0 | | | | | | |
| | R22-HQ 5 ft 100% | 45 | 4 | 181.1' - Fracture, horizontal, smooth, planar | | 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 | SC-20 collected at 181.8-182.95' |
| | | | 0 | 181.5, 181.7, 181.7' - Fractures (3), horizontal, planar, smooth to rough, trace infilling | | | |
| | | | 2 | 183.2' - Fracture, horizontal, rough, planar, trace silty infilling | | 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 | |
| | | | 4 | 183.5, 185.3, 185.4, 185.7, 185.8, 185.9' - Bedding plane (6), 5 deg<br>184.2, 184.5' - Fractures (2), horizontal, rough, undulating | | | |
| 185 -142.7 | | | 5 | | | 172.2-172.5' - grayish orange, (10YR 7/4), very fine to fine grained, carbonate derived silt-sized particles | R22: 8 minutes |
| | 186.0 | | | | | | |
| | R23-HQ 5 ft 100% | 66 | 5 | 186.1-186.3' - Fracture zone, horizontal, smooth, planar | | 172.5-175.0' - Same as 171.0-172.2'<br>175.0-175.5' - Same as 171.0-172.2' except fine grained, mild HCl reaction, laminated | |
| | | | 1 | 186.6' - Fracture, horizontal, rough, planar, lithology contact<br>186.9' - Fracture, 10 deg, rough, undulating | | 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 | |
| | | | 2 | 187.8' - Fracture, 8 deg, rough, undulating, silty infilling from formation matrix<br>188.3, 188.7, 189.9' - Fractures (3), horizontal, rough, planar, trace silty infilling | | 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 | SC-21 collected at 188.6-189.8' |
| | | | 1 | | | | |
| 190 -147.7 | | | 3 | 190.5, 190.7, 190.9' - Fractures (3), 5-40 deg, trace silty infilling | | | R23: 18 minutes |
| | 191.0 | | | | | | |
| | R24-HQ 5 ft 100% | 13 | >10 | 191.0-192.4' - Bedding plane, 0-10 deg, smooth, planar to undulating, numerous partings, irregular | | 176.9-177.6' - pale yellowish brown, (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 | |
| | | | >10 | 192.4-195.05' - Fracture zone, 0-90 deg, rough, multiple fracture zones, irregular, may exhibit recrystallization on the surface | | 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 | |
| | | | >10 | | | | Numerous rock fragments indicate possible cavity filling debris from at least 195.5-196.0' but probably 193.4-196.0' |
| | | | >10 | | | 181.0-183.5' - Same as 177.6-181.0' except dark brown silty organic laminae (1-3/16" thick) | |
| 195 -152.7 | | | 4 | 195.05, 195.2' - Fractures (2), horizontal and 7 deg, smooth, planar | | | R24: 6 minutes |
| | 196.0 | | | | | | |

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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 bgs on 03/07/07 START : 2/25/2007 END : 3/8/2007 LOGGER : J. Schaeffer, R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R25-HQ 5 ft 70% | 10 | 5 | 195.6, 195.8' - Fractures (2), horizontal and 15 deg, rough, undulating | | **Limestone** 183.5-185.0' - very pale orange, (10YR 8/2), strong HCl reaction, very weak to weak (R1 to R2), 40-50% fossil shells, casts and molds up to 1"x 9/16", 20-40% coverage of voids 1/16" or less | |
| | | | 4 | 196.0-196.3' - Fracture zone, random orientations, fragments 1/4" to 3/4" | | | |
| | | | 5 | 196.6' - Fracture, 30-50 deg, rough, planar | | 185.0-186.0' - very fine to medium grained, very strong HCl reaction, 15-20% coverage of voids 1/16" or less | |
| | | | >10 | 197.3, 197.4' - Fractures (2), horizontal, rough, planar, solution cavity fractures | | | |
| | | | NR | 198.05, 198.1, 198.4, 198.5' - Fractures (4), 0-7 deg, smooth, planar | | 186.0-191.0' - pale yellowish brown, (10YR 6/2), mild to moderate HCl reaction, very weak to weak (R1 to R2), 10-30% fossil casts and molds, 5-10% coverage of solution cavities 3/8" or less, 30-50% coverage of voids 1/16" or less, 189.0-190.0 alternating dark brown and pale yellow brown laminae | |
| 200 -157.7 | | | | 198.6' - Fracture, horizontal, smooth, planar, lithology contact | | | |
| | | | | 199.0-199.5' - Fracture zone, orientations are random, rock fragments range from 1/8"x1/2" to 2"x1"x1 1/2" | | | R25: 9 minutes |
| | 201.0 | | | | | | |
| | R26-HQ 5 ft 80% | 36 | >10 | 201.0-201.5' - Fracture zone, random orientation | | | Widely disseminated oxidized pyrite grains |
| | | | 5 | 201.5-202.1' - Fracture zone, 25-90 deg, rough, non separated fracture, indistinctly extends into underlaying unit | | | |
| | | | 5 | 201.5' - Fracture, 10 deg, rough, planar | | 191.0-192.4' - pale yellowish brown, (10YR 6/2), very fine to medium grained, moderate to strong HCl reaction, laminar to thin bedded, 10-20% coverage of solution cavities 3/8" or less | The unit appears as random clast orientations in variably hard matrix, it is either fluvial or infill of an undetermined void, it exhibits very low density and apparent strength |
| | | | >10 | 202.1' - Fracture, horizontal, rough, stepped, lithology contact | | | |
| | | | NR | 202.7-203.0' - Fracture zone, multiple fracture orientation | | | |
| 205 -162.7 | | | | 203.1-203.3' - Fracture zone, multiple fractures broken along fragment edges | | 192.4-193.4' - very pale orange, (10YR 8/2), strong HCl reaction, very weak to weak (R1 to R2), 20-30% coverage of voids 1/16" or less, 20-40% fossil casts and molds | |
| | | | | 203.7' - Fracture, 2 deg, rough, planar | | | R26: 7 minutes |
| | 206.0 | | | | | | |
| | R27-HQ 5 ft 50% | 10 | 4 | 206.2, 206.3, 201.7, 206.9' - Fractures (4), 0-10 deg, smooth, planar | | 193.4-196.0' - pale yellowish brown, (10YR 6/2), very fine to coarse grained, strong HCl reaction, slightly mottled, light to moderately dense rock, 10-15% coverage of voids 1/16" or less, abundant fossils, indistinct bedding, multiple lithologic fragments | |
| | | | >10 | 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" | | | |
| | | | >10 | | | | |
| | | | NR | | | 196.0-198.0' - grayish orange, (10YR 7/4), medium to coarse grained, moderate HCl reaction, very weak (R1), 30-40% fossils, 10-20% coverage of solution cavities 3/8" or less | |
| 210 -167.7 | | | | | | | R27: 11 minutes |
| | | | | | | | Stop drilling 17:28 3/7/07 |
| | 211.0 | | | | | | |
| | R28-HQ 5 ft 40% | 0 | >10 | 211.0-213.0' - Fracture zone, no distinguishable orientation | | 198.0-198.5' - 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 | Water level 2.5' below ground surface |
| | | | >10 | | | | Resume drilling 08:50 3/8/07 |
| | | | NR | | | 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 | |
| 215 -172.7 | | | | | | **No Recovery 199.5-201.0'** | R28: 23 minutes |
| | 216.0 | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: A-07 | SHEET 12 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 on 03/07/07 START : 2/25/2007 END : 3/8/2007 LOGGER : J. Schaeffer, R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | >10 | 216.0-216.4' - Fracture zone, multiple fractures, fragments range from 1/4" to 1"x1"x1" | | **Limestone**<br>201.0-202.1' - grayish orange, (10YR 7/4), strong HCl reaction, weak to medium strong (R2 to R3), carbonate derived silt-sized grains<br>202.1-205.0' - pale yellowish brown, (10YR 6/2), mild to moderate HCl reaction, extremely weak to very weak (R0 to R1), 10-20% sand-sized matrix, 5-15% fossils, 30-40% coverage of voids 3/16" of less<br>**No Recovery 205.0-206.0**<br>**Limestone**<br>206.0-207.0' - grayish orange, (10YR 7/4), strong HCl reaction, very weak (R1), thin to laminar bedding, very low density, no visible fossils, 5-15% coverage of voids 1/16" or less, no solution cavities<br>207.0-208.5' - dark yellowish orange to grayish orange, (10YR 6/6 to 10YR 7/4), moderate to strong HCl reaction, 10-20% coverage of voids 1/8" or less, slightly friable, worm burrows in very fine grained limestone 207.2-208.0'<br>**No Recovery 208.5-211.0'**<br>**Limestone**<br>211.0-213.0' - very pale orange to pale yellowish brown, (10YR 8/2 to 10YR 6/2), very fine to fine grained, very weak to weak (R1 to R2), 30-40% fossil shell fragments, casts, and molds, 20-40% coverage of voids 1/6" or less, 5-10% coverage of solution cavities 3/8" or less, low to moderate density<br>**No Recovery 213.0-216.0'**<br>**Limestone**<br>216.0-216.4' - pale yellowish brown and grayish orange, (10YR 6/2, 10YR 7/4), fine grained, strong HCl reaction, pale yellowish brown material is weak to medium strong (R2 to R3), non fossiliferous, grayish orange material is very weak to weak (R1 to R2) with 30-40% fossils<br>**No Recovery 216.4-219.7'**<br>**Limestone**<br>219.7-221.0' - grayish orange, (10YR 7/4), strong HCl reaction, very weak to weak (R1 to R2), 40-50% fossils, 20% coverage of voids 3/8" or less, trace organics, abundant fossil casts and molds, low to moderately dense, 15% coverage of 1/16" or less voids | Driller's Remark: Soft and rapid drilling at 216.5-220.0'<br>Assume loss of recovery is 216.4-219.7' based on driller's report of soft and rapid drilling at 216.5-220.0'<br>R29: 8 minutes<br>Driller's Remark: Drilling action intermittently becomes hard and soft<br>The final 0.5' recovered is an agglomeration, appears to have 60-80 deg planar features that may indicate subsidence infill<br>R30: 4 minutes<br>R31: 5 minutes<br>Discuss drilling to 265.0', conclusion continue drilling to 265.0' even though very low recovery and 0% RQD for the last 5 runs (25') in hopes that borehole stays open<br>R32: 8 minutes |
| | R29-HQ 5 ft 34% | 0 | NR | | | | |
| 220 -177.7 | | | >10 | | | | |
| | | | 5 | | | | |
| | 221.0 | | | | | | |
| | | | >10 | 221.0-222.5' - Fracture zone, 2-3 of the fractures are smooth and planar bedding plane partings | | | |
| | | | >10 | | | | |
| | R30-HQ 5 ft 30% | 0 | NR | | | | |
| 225 -182.7 | | | | | | | |
| | 226.0 | | | | | | |
| | | | >10 | 226.0-227.5' - Fracture zone, multiple fractures, no visible orientations | | | |
| | | | >10 | | | | |
| | R31-HQ 5 ft 30% | 0 | NR | | | | |
| 230 -187.7 | | | | | | | |
| | 231.0 | | | | | | |
| | | | >10 | 231.0-231.6' - Fracture zone, random orientations, fragments range from 1/4" to 1"x3/4" | | | |
| | R32-HQ 5 ft 12% | 0 | NR | | | | |
| 235 -192.7 | | | | | | | |
| | 236.0 | | | | | | |

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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 bgs on 03/07/07 START : 2/25/2007 END : 3/8/2007 LOGGER : J. Schaeffer, R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | >10 | 236.0-236.1' - Fracture zone, 3/4" fragments<br>236.4' - Fracture, horizontal, rough, planar<br>236.5' - Fracture, 60 deg, rough, planar | | **Limestone**<br>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 surface, thin to laminar bedded, silt-sized particles<br>**No Recovery 222.5-226.0'**<br>**Limestone**<br>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<br>**No Recovery 227.5-231.0'**<br>**Limestone**<br>231.0-231.6' - pale yellowish brown, (10YR 6/2), 20-40% fossils, 30-40% coverage of voids 1/16" or less<br>**No Recovery 231.6-236.0'**<br>**Limestone**<br>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 HCl reaction, 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<br>**No Recovery 238.0-241.0'**<br>**Limestone**<br>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' then thin (up to 1/4") to laminar beds that are thumbnail soft<br>**No Recovery 242.1-246.0'**<br>**Limestone**<br>246.0-247.5' - very pale orange to pale yellowish brown, (10YR 8/2 to 10YR 6/2), very fine to fine grained, strong HCl reaction, weak to medium strong (R2 to R3), fossiliferous, 5-10% coverage of voids 1/16" or less<br>**No Recovery 247.5-251.0'** | |
| | | | 5 | 237.2, 237.3, 237.5, 237.6, 237.85' - Bedding plane (5), 0-5 deg, rough | | | |
| | R33-HQ<br>5 ft<br>40% | 22 | NR | | | | |
| 240<br>-197.7 | | | | | | | R33: 4 minutes |
| | 241.0 | | | | | | |
| | | | >10 | 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" | | | |
| | R34-HQ<br>5 ft<br>22% | 0 | NR | | | | |
| 245<br>-202.7 | | | | | | | R34: 5 minutes |
| | 246.0 | | | | | | |
| | | | >10 | 246.0-247.0' - Fracture zone | | | |
| | | | 4 | 247.05, 247.2, 247.35, 247.4' - Bedding plane (4), 0-7 deg | | | |
| | R35-HQ<br>5 ft<br>30% | 0 | NR | | | | |
| 250<br>-207.7 | | | | | | | R35: 8 minutes |
| | 251.0 | | | | | | |
| | | | >10 | 251.25, 251.6' - Bedding plane (2)<br>251.6-252.3' - Fracture zone, fragments from 1/4" to 1"x1" to 1/4"x3/8" (bedding planes), fragments are generally small | | | |
| | | | >10 | | | | |
| | R36-HQ<br>5 ft<br>48% | 13 | 2 | 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 | | | |
| | | | NR | | | | |
| 255<br>-212.7 | | | | | | | R36: 7 minutes |
| | 256.0 | | | | | | |

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|---|---|
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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R37-HQ 5 ft 90% | 25 | 7 | 256.1, 256.3, 256.4, 256.6, 256.7, 256.8, 256.9' - Fractures (7), horizontal, rough, planar, fractures along laminae | | **Limestone** 251.0-253.4' - pale yellowish brown, (10YR 6/2), very fine to medium grained, moderate to strong HCl reaction, very weak to weak (R1 to R2), moderately dense, some coarse grained material, 25-40% fossil casts and molds, 30% coverage of voids 1/16" of less, 5-10% solution cavities, moderately friable at both ends of core | |
| | | | 4 | 257.15, 157.35, 157.7, 157.9' - Fractures (4), rough, planar, fractures along bedding plane partings | | | |
| | | | 4 | 258.1, 258.2, 258.4, 258.75' - Bedding plane (4), 0-10 deg, smooth, undulating | | | |
| | | | >10 | 259.1, 259.25, 259.4, 259.5, 260.0' - Fractures (5), horizontal, rough, planar, along laminae | | | |
| 260 -217.7 | | | >10 | 260.0-260.5' - Fracture zone, random orientation, fragments 1"-2" | | **No Recovery 253.4-256.0'** **Limestone** 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 (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 limestone 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 | R37: 4 minutes |
| 261.0 | | | NR | | | | |
| | R38-HQ 5 ft 40% | 8 | >10 | 261.0-263.0' - Fracture zone | | | |
| | | | >10 | 261.6, 261.99' - Fractures (2), rough, planar | | | |
| | | | NR | 262.1, 262.3, 262.6, 262.9' - Fractures (4), rough, planar, hard to distinguish | | | |
| 265 -222.7 | | | | | | **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'** | R38: 7 minutes Removed inner core barrel, driller pulled 10' of outer casing and tagged depth to 266.0', hole stayed open overnight, outer core barrel stayed at 256.0' |
| 266.0 | | | | | | Bottom of Boring at 266.0 ft bgs on 3/8/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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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 bgs on 03/22/07 START : 3/12/2007 END : 3/21/2007 LOGGER : C. Wallestad, R. Gomez, R. McComb, L. Prochaska

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.1 | 0.0 | 1.0 | SS-1 | 2-2-2-3 (4) | **Poorly Graded Sand With Organics (SP)** 0.0-0.3' - dusky brown, (5YR 2/2), moist, very loose, very fine to fine grained, 15% fine grained organics, sand is silica | | |
| | 2.0 | 1.4 | SS-2 | 3-3-2-1 (5) | **Poorly Graded Sand With Silt (SP-SM)** 0.3-1.0' - medium light gray, (N6), moist, very loose, very fine to fine grained, no HCl reaction, 5% nonplastic fines, sand is silica; **Poorly Graded Sand With Silt (SP-SM)** 2.0-3.4' - moderate brown, (5YR 4/4), wet, loose, very fine to fine grained, no HCl reaction, 10-15% nonplastic fines, sand is silica | | |
| 5 37.1 | 4.0 | 0.9 | SS-3 | 0-1-2-2 (3) | **Clayey Sand (SC)** 4.0-4.9' - medium light gray, (N6), moist, soft, very fine to fine grained, no HCl reaction, 35% medium to high plastic fines, trace organics, sand is silica | | |
| | 6.0 | 1.2 | SS-4 | 3-10-12-13 (22) | **Silt (ML)** 6.0-7.2' - grayish orange, (10YR 7/4), wet, very stiff, nonplastic, very rapid dilatancy, mild to moderate HCl reaction, 5-10% very fine sand-sized, carbonate derived | | |
| 10 32.1 | 8.0 | 0.8 | SS-5 | 16-24-5-3 (29) | **Silt (ML)** 8.0-8.8' - Same as 6.0-7.2' except very soft | | |
| | 10.0 | 0.7 | SS-6 | 0-2-1-12 (3) | **Silt (ML)** 10.0-10.7' - Same as 6.0-7.2' except soft, 10-15% very fine to fine sand-sized | | |
| | 12.0 | 0.5 | SS-7 | 5-50/5 (55/11") | **Silt With Sand (ML)** 12.0-12.5' - Same as 10.0-10.7' except 10-15% very fine to fine sand-sized, 5% coarse sand-sized | | |
| | 12.9 | | | | | | |
| | 14.0 | 0.5 | SS-8 | 50/6 (50/6") | **Sandy Silt (ML)** 14.0-14.5' - grayish orange, (10YR 7/4), wet, hard, nonplastic, very rapid dilatancy, mild to moderate HCl reaction, 35% very fine to medium sand-sized, all carbonate | | |
| 15 27.1 | 14.5 | | | | | | |
| | 16.0 | 0.1 | SS-9 | 50/3 (50/3") | **Limestone Fragments** 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 | | |
| | 16.3 | | | | | | |
| | 18.0 | 1.9 | SS-10 | 17-28-39-22 (67) | **Silty Sand (SM)** 18.0-19.9' - grayish orange to dark yellowish orange, (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 carbonate | | |
| 20 | | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: A-08 | SHEET 2 OF 15 |
|---|---|---|

# 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 bgs on 03/22/07 START : 3/12/2007 END : 3/21/2007 LOGGER : C. Wallestad, R. Gomez, R. McComb, L. Prochaska

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.1 | 20.0 | 1.5 | SS-11 | 10-15-17-16 (32) | **Silty Sand (SM)** 20.0-21.5' - Same as 18.0-19.9' except dense | | |
| | 22.0 | 1.6 | SS-12 | 17-19-49-50/1 (68) | **Silty Sand (SM)** 22.0-23.6' - Same as 18.0-19.9' except very dense | | |
| | 23.6 | | | | | | |
| | 24.0 | | | | | | |
| | 24.4 | 0.4 | SS-13 | 50/5 (50/5") | **Silty Gravel With Sand (GM)** 24.0-24.4' - Same as 22.0-23.1' except mild HCl reaction, 60% of sample is several wafer shaped limestone fragments to 1/4" thick | | |
| 25 17.1 | 26.0 | 1.6 | SS-14 | 10-11-7-11 (18) | **Silty Sand (SM)** 26.0-27.6' - dark yellowish orange, (10YR 6/6), wet, medium dense, fine to medium grained, mild to moderate HCl reaction, 35% nonplastic fines, trace of coarse sand to fine gravel-size, trace white sand-sized particles, all carbonate | | Sample SS-14 is similar to SS-12 and above, but darker in color |
| | 28.0 | 0.7 | SS-15 | 8-11-10-50/5 (21) | **Silty Sand And Limestone (SM)** 28.0-28.7' - Same as 26.0-27.6' except a few 1/4" wafer shaped limestone fragments | | Chatter at 29.0' |
| 30 12.1 | 29.0 30.0 30.3 | 0.0 | SS-16 | 50/4 (50/4") | **Limestone Fragments** 30.0' - a few coarse sand-size limestone fragments recovered | | |
| | 32.0 | 1.5 | SS-17 | 23-36-27-28 (63) | **Silty Sand With Gravel (SM)** 32.0-33.5' - dark yellowish orange, (10YR 6/6), wet, very dense, fine to coarse grained, mild to moderate HCl reaction, 15-20% fine gravel-size, 20-25% nonplastic fines, all carbonate | | |
| | 34.0 | 0.6 | SS-18 | 28-50/5 (78/11") | **Silty Sand With Gravel (SM)** 34.0-34.6' - Same as 32.0-33.5' except several coarse gravel-size limestone fragments | | |
| 35 7.1 | 34.9 36.0 36.1 | 0.0 | SS-19 | 50/1 (50/1") | **No Recovery 36.0'** | | Heavy chatter at 36-37' |
| | 38.0 38.1 | 0.0 | SS-20 | 50/0.5 (50/0.5") | **Limestone Fragments** 38.0-38.04' - light olive gray, (5Y 5/2), mild HCl reaction, fragments to 1/2" size, fragments are stronger than previously | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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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 bgs on 03/22/07 START : 3/12/2007 END : 3/21/2007 LOGGER : C. Wallestad, R. Gomez, R. McComb, L. Prochaska

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.1 | 40.0–41.3 | 1.3 | SS-21 | 24-24-50/3 (74/9") | **Silty Sand (SM)** 40.0-41.3' - light olive brown to moderate olive brown, (5Y 5/2 to 5Y 4/4), wet, very dense, fine to coarse grained, mild HCl reaction, 30% nonplastic fines, 5-10% fine gravel-size, all carbonate | | |
| | 42.0–42.5 | 0.5 | SS-22 | 50/6 (50/6") | **Silty Sand (SM)** 42.0-42.5' - Same as 40.0-41.3' except 30% size limestone pieces | | |
| | 44.0–44.3 | 0.1 | SS-23 | 50/3 (50/3") | **Silty Sand (SM)** 44.0-44.1' - Same as 42.0-42.5' | | |
| 45 -2.9 | 46.0–46.2 | 0.1 | SS-24 | 50/2 (50/2") | **Limestone Fragments** 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 | | |
| | 48.0–48.4 | 0.3 | SS-25 | 50/5 (50/5") | **Silty Sand (SM)** 48.0-48.3' - Same as 42.0-42.5' except more limestone fragments | | |
| 50 -7.9 | 50.0–50.1 | 0.0 | SS-26 | 50/1 (50/1") | **Limestone Fragments** 50.0' - recovered one 1/4" limestone fragment | | |
| | 52.0–54.0 | 1.7 | SS-27 | 14-25-24-16 (49) | **Silty Sand (SM)** 52.0-53.7' - Same as 48.0-48.3' | | Sample SS-27 and similar samples may be extremely weak limestone |
| | 54.0–54.3 | 0.2 | SS-28 | 50/4 (50/4") | **Silty Sand (SM)** 54.0-54.2' - Same as 52.0-53.7' | | |
| 55 -12.9 | 56.0–56.1 | 0.0 | SS-29 | 50/1 (50/1") | **Limestone Fragments** 56.0' - a few limestone fragments to 3/8" | | Stopped drilling for the day 3/12/07 at 17:50, at 56'<br>Surface collapse 3/13/07 at 07:45, driller rebuilding surface with dirt; will insert HW casing<br>HW casing set to 14' at 09:40<br>Resume drilling at 10:15 on 3/13/07 |
| | 58.0–58.6 | 0.4 | SS-30 | 24-50/1 (74/7") | **Silty Sand With Gravel (SM)** 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 coarse sand-size, 30% fine gravel-size, all carbonate | | |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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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 bgs on 03/22/07 START : 3/12/2007 END : 3/21/2007 LOGGER : C. Wallestad, R. Gomez, R. McComb, L. Prochaska

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -17.9 | 60.0<br>60.6 | 0.5 | SS-31 | 27-50/1<br>(77/7") | **Silty Sand With Gravel (SM)**<br>60.0-60.5' - Same as 58.0-58.4' except 20% fine to coarse sand-size, 30-35% gravel-size limestone fragments in wafer shapes | | |
| | 62.0<br>62.3 | 0.2 | SS-32 | 50/3<br>(50/3") | **Limestone Fragments**<br>62.0-62.2' - dark yellowish brown, (10YR 4/2), mild HCl reaction, 1/4" thick wafer shaped limestone fragments | | |
| | 64.0<br>64.4 | 0.2 | SS-33 | 50/5<br>(50/5") | **Limestone Fragments**<br>64.0-64.2' - Same as 62.0-62.2' | | 64-64.7' heavy chatter |
| 65<br>-22.9 | 66.0<br>66.3 | 0.3 | SS-34 | 50/5<br>(50/5") | **Silty Sand (SM)**<br>66.0-66.3' - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to 10YR 4/2), wet, fine to coarse grained, mild HCl reaction, 30-35% nonplastic fines, 20% fine size, all carbonate<br>Begin Rock Coring at 66.0 ft bgs<br>See the next sheet for the rock core log | | 65.7-66' no chatter, softer |
| 70<br>-27.9 | | | | | | | |
| 75<br>-32.9 | | | | | | | |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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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 ORIENTATION : Vertical

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | 66.0 | | | | | | |
| | R1-HQ 5 ft 92% | 65 | <10 | 66.0-66.2' - Fracture zone<br>66.3' - Fracture, horizontal, smooth, planar, open | | **Limestone**<br>66.0-70.6' - moderate yellowish brown, (10YR 5/4), very fine to fine grained, mild HCl reaction, very weak to weak (R1 to R2), <1/16" voids on 15-20% of surface | Geophysical testing performed prior to rock coring, depth tagged at 65.5' |
| | | | 3 | 66.8-67.0' - Fracture, 50-55 deg, rough, planar, tight<br>67.2' - Mechanical break | | | |
| | | | 1 | 67.3-67.9' - Fracture, 10-50 deg, rough, planar, tight<br>68.2' - Fracture, 10 deg, rough, planar, open | | | |
| | | | 3 | 68.4-68.55' - Mechanical break, 30 deg, smooth, planar, open <1/16" | | | SC-1 collected at 69.4-70.5' |
| 70<br>-27.9 | | | 0 | 68.95-69.0' - Fracture, 30 deg, smooth, planar, silt and/or clay sized infilling, <3/16" thick, open | | | R1: 8 minutes |
| | 71.0 | | NR | 69.4, 69.5' - Fractures (2), horizontal, smooth, planar, silt infilling, open | | **No Recovery 70.6-71.0'** | |
| | R2-HQ 5 ft 96% | 73 | 0 | 70.5' - Fracture, horizontal, smooth, undulating, open | | **Limestone**<br>71.0-75.2' - Same as 66.0-70.6' except 5-10% solution cavities up to 3/8" at 72.6-75.2', weak to medium strong (R2 to R3) at 74.0-75.0' | |
| | | | 2 | 71.4' - Fracture, 20 deg, rough, undulating, trace red laminated staining, open<br>72.35' - Fracture, horizontal, rough, planar | | | SC-2 collected at 71.4-72.85' |
| | | | 3 | 72.75, 72.9' - Fractures (2), 30 deg, rough, planar, tight<br>73.0' - Fracture, horizontal, rough, stepped, trace silt and/or clay infilling | | | |
| | | | 0 | 73.3-73.6' - Fracture, 80 deg, rough, undulating, tight | | | |
| 75<br>-32.9 | | | 2 | 73.6' - Fracture, horizontal, rough, undulating, tight | | | R2: 7 minutes |
| | 76.0 | | NR | 73.6-74.25' - Fracture, 60 deg, rough, undulating, tight | | 75.2-75.8' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, extremely weak to very weak (R0 to R1), trace voids to 1/8", trace casts/ cavities up to 3/8"x9/16" | |
| | R3-HQ 5 ft 64% | 23 | >10 | 75.3, 75.5' - Fractures (2), horizontal, rough, stepped, <3/16" silt infilling, open 1/8" | | **No Recovery 75.8-76.0'** | |
| | | | 3 | 75.5-75.8' - Fracture, 75 deg, rough, undulating, tight<br>76.0-76.05' - Clay seam, dark organic rich clay | | **Limestone**<br>76.0-78.9' - light gray to very pale orange, (N7 to 10YR 7/2), very fine to fine grained, moderate HCl reaction, weak (R2), trace voids to 1/16", trace casts/cavities to 3/4"x3/8" | SC-3 collected at 76.9-77.8' |
| | | | 7 | 76.05-76.6' - Fracture zone<br>76.8-76.9' - Mechanical break or fracture, 15 deg, rough, undulating, open | | | |
| 80<br>-37.9 | | | NR | 77.7' - Fractures, multiple vertical fractures<br>77.8-78.2' - Fracture, 75 deg, smooth, undulating, tight<br>77.8-78.2' - Fracture, rough, planar, orthogonal to above, tight | | **Clay (CL)**<br>78.9-79.2' - grayish brown, (5YR 3/2), mild HCl reaction, organic, laminated<br>**No Recovery 79.2-81.0'** | R3: 8 minutes |
| | 81.0 | | | 78.2-78.9' - Fracture, vertical, rough, undulating, trace black powdery staining, tight | | | |
| | R4-HQ 5 ft 100% | 88 | 1 | 78.9-79.2' - Bedding plane, horizontal, smooth, undulating, 1/4"-1/2" thick, open 1/8" | | **Limestone**<br>81.0-83.3' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, weak (R2), 15% voids <1/16", 5-10% solution cavities up to 3/8", 10-15% fine sand with limestone, weak (R2), same color, 20-25% voids<br>83.3-83.6' - transition zone as rock from 81.0-83.3' grades into material at 83.6-86.4' | |
| | | | 1 | 81.7' - Fracture, 15 deg, rough, planar, <1/16" thick silt or/and clay sized infilling, 1/4" open | | | SC-4 collected at 82.4-83.3' |
| | | | 3 | 82.4' - Fracture, 15 deg, rough, undulating, open<br>83.3, 83.6, 84.3' - Fractures (3), horizontal, rough, planar, silt and/or clay sized infilling, open | | | |
| 85<br>-42.9 | | | 1 | 83.6-83.7' - Fracture zone | | | |
| | | | 0 | 84.8' - Mechanical break | | | R4: 7 minutes |
| | 86.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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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 ORIENTATION : Vertical

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R5-HQ 5 ft 100% | 71 | 0 | 86.2' - Fracture, 10 deg, rough, undulating, open | | **Limestone** 83.6-86.4' - pale yellowish brown, (10YR 6/2), fine grained, moderate HCl reaction, weak (R2), 20-25% coverage of voids up to 1/16", 25% casts/ cavities up to 3-1/8"x1-9/16" at 83.6-84.8', trace casts/cavities (up to 3/4"x3/8") throughout, single large (2-3/4"x3/4") cavity at 86.0' 86.4-91.0' - moderate yellowish brown, (10YR 5/4), fine grained, strong HCl reaction, very weak to weak (R1 to R2), fossil casts and molds, 3/16" voids on 15% of surface, 10% solution cavities up to 3-1/8"x3/4" 91.0-92.9' - moderate yellowish brown mottled very pale orange, (10YR 5/4 mottled 10YR 6/2), fine grained, moderate HCl reaction, very weak to weak (R1 to R2), 10-20% voids <1/8", 5-10% solution cavities up to 1-3/16"- 1-9/16", partially to completely infilled with white to yellowish gray (5Y 5/1) carbonate, extremely weak (R0) material 92.9-96.0' - yellowish gray to very pale orange, (5Y 8/1 to 10YR 8/2), fine grained, strong HCl reaction, weak to medium strong (R2 to R3), 5% voids, 2-5% solution cavities 96.0-101.0' - very pale orange to yellowish gray, (10YR 8/2 to 5Y 7/2), fine grained, strong HCl reaction, very weak (R1), 10-15% voids up to 1/16", trace casts/cavities up to 3/8" diameter, 10% irregular black laminae/inclusions at 96.5-97.5' | SC-5 collected at 88.6-89.5' |
| | | | 4 | 87.35' - Fracture, horizontal, smooth, undulating, 1/4" hard infill, tight | | | |
| | | | 2 | 87.6' - Fracture, horizontal, smooth, undulating, silt and/or clay sized infilling, 1" thick infilling, tight | | | |
| | | | 1 | 87.75' - Fracture, horizontal, smooth, undulating, 1/2" silt infill, tight to 1/2" open | | | |
| 90 -47.9 | | | 1 | 88.0' - Fracture, horizontal, smooth, undulating, silt and/or clay sized infilling, tight, 1/2" silt infill, 1/4" open | | | R5: 7 minutes |
| | 91.0 | | | 88.35' - Fracture, horizontal, smooth, stepped, tight | | | |
| | R6-HQ 5 ft 100% | 93 | 0 | 88.6' - Fracture, horizontal, smooth, undulating, 1/8"-1/2" open | | | |
| | | | | 89.8' - Mechanical break | | | |
| | | | 1 | 90.5' - Fracture, 2-4 deg, smooth, undulating, tight | | | SC-6 collected at 94.0-94.9' |
| | | | 3 | 92.6' - Fracture, 5-7 deg, rough, planar, <3/8" thick infilling, carbonate silt, open | | | |
| | | | | 93.0' - Fracture or mechanical break, horizontal, rough, undulating, white infilling 1/16" thick, tight | | | |
| | | | 2 | 93.2, 93.6' - Mechanical break (2) | | | |
| 95 -52.9 | | | 2 | 94.0, 94.9' - Fractures (2), horizontal, rough, undulating, open | | | R6: 15 minutes |
| | 96.0 | | | 95.2' - Fracture, horizontal, smooth, planar, dark brown clay infilling 3/4" thick | | | |
| | R7-HQ 5 ft 100% | 58 | 2 | 95.9-96.0' - Fracture or mechanical break, 30 deg, rough, planar, tight | | | |
| | | | 3 | 96.25-96.35' - Fracture, 45 deg, rough, planar, open | | | SC-7 collected at 98.15-98.9' |
| | | | | 96.95' - Fracture, horizontal, smooth, planar, fractured along contact | | | |
| | | | 1 | 97.05' - Fracture, horizontal, rough, planar, tight | | | |
| | | | 2 | 97.4, 97.6, 98.9' - Fractures (3), 0-5 deg, rough, undulating, up to 1/8" open | | | |
| | | | | 99.3' - Mechanical break | | | |
| 100 -57.9 | | | 2 | 99.6' - Fracture, 0-30 deg, rough, undulating, tight | | | R7: 6 minutes |
| | 101.0 | | | 100.0' - Mechanical break | | | |
| | R8-HQ 5 ft 100% | 46 | NA | 100.5-101.05' - Fracture, 70 deg, rough, undulating, open 1/8"-1/4" | | **Poorly Graded Sand (SP)** 101.0-101.4' - grayish orange, (10YR 7/4), very fine to fine grained, strong HCl reaction, 80% carbonate, 20% silicate | |
| | | | 1 | 101.4' - Fracture, 30 deg, rough, undulating, sand/rock contact | | | |
| | | | 3 | 102.25' - Fracture, horizontal, rough, planar, tight | | | SC-8 collected at 103.05-103.95' |
| | | | 2 | 102.8' - Fracture, 10 deg, rough, undulating, open | | **Limestone** 101.4-106.0' - very pale orange to grayish orange, (10YR 8/2 to 10YR 7/4), fine grained, strong HCl reaction, extremely weak to very weak (R0 to R1), trace voids up to 1/16", no visible casts/cavities | |
| | | | | 102.85-103.05' - Fracture, 60 deg, rough, undulating | | | |
| | | | >10 | 103.95' - Fracture, 20-25 deg, rough, planar, open | | | |
| 105 -62.9 | | | >10 | 103.95-104.2' - Fractures (3), rough, undulating, open | | | R8: 10 minutes |
| | 106.0 | | | 104.5' - Mechanical break | | | |

| PROJECT NUMBER: | BORING NUMBER: |
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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 ORIENTATION : Vertical

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

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

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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

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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R13-HQ 5 ft 70% | 0 | >10 | 122.25-122.6' - Fracture, 60 deg, rough, stepped, tight | | **Limestone** 126.0-129.5' - fine grained, strong HCl reaction, very weak to weak (R1 to R2), voids <1/16" on 3-5% of surface, trace fossils (molds/casts), rare intraclasts | |
| | | | 10 | 122.6-122.7' - Fracture, 25 deg, rough, undulating<br>123.3-123.6' - Fracture, 75 deg, rough, undulating, tight | | | |
| | | | 10 | 124.5' - Fracture, 35 deg, smooth, planar<br>124.8-126.0' - Fracture zone | | | |
| | | | 10 | 126.0-127.0' - Fracture zone, 0-60 deg, rough, undulating to stepped, open | | | |
| 130 -87.9 | 131.0 | | NR | 127.0, 127.25' - Fractures (2), <5 deg, rough, stepped, open<br>127.45' - Fracture, 60 deg, smooth, undulating, open<br>127.7-128.0' - Fracture, 60-90 deg, smooth, stepped, tight, vertical from 128.0' to 128.3' | | **No Recovery 129.5-131.0'** | R13: 6 minutes |
| | R14-HQ 5 ft 56% | 15 | 10 | 128.3' - Fracture, horizontal, rough, stepped, open | | **Limestone** 131.0-131.5' - pale yellowish brown, (10YR 6/2), medium to coarse grained, strong HCl reaction, very weak (R1), 50-60% voids up to 3/8", fossils (molds/casts) common<br>131.5-133.8' - grayish orange, (10YR 7/4), fine to very fine grained, strong HCl reaction, weak to medium strong (R2 to R3), chalk like | |
| | | | 5 | 128.75' - Fracture, 60 deg, rough, stepped, open<br>129.0-129.25' - Fracture zone, horizontal, smooth, undulating to stepped, tight to open | | | |
| | | | >10 | 131.2' - Fracture, <5 deg, rough, undulating<br>131.45' - Fracture, <5-30 deg, rough, stepped, open | | | |
| 135 -92.9 | 136.0 | | NR | 131.45-131.65' - Fracture zone, various orientations, rounded gravely limestone<br>131.65-132.0' - Fracture, <5-90 deg, rough, undulating, open | | **No Recovery 133.8-136.0'** | R14: 4 minutes |
| | R15-HQ 5 ft 76% | 0 | >10 | 132.0-132.3' - Fracture zone, 60 deg, rough, stepped, intersected by 40 deg inclined fracture, tight<br>132.5' - Mechanical break | | **Limestone** 136.0-137.3' - pale yellowish brown alternating with very pale orange laminae, (10YR 6/2 alternating with 10YR 8/2), fine grained, weak to medium strong (R2 to R3), 15-20% silty matrix, voids <1/16" on 10-15% of core surface, trace fossils (echinoderms)<br>137.3-139.8' - Same as 136.0-137.3' except densely fractured, laminated to massive bedding, fossils rare to absent, incipient fractures common, "chalky" appearance | |
| | | | >10 | 132.75-133.0' - Fracture, 70 deg, rough, undulating, tight | | | |
| | | | >10 | 133.0-133.2' - Fractures (2), vertical, rough, undulating, vertical and horizontal intersecting fractures | | | |
| | | | >10 | 133.25, 133.35, 133.4' - Bedding plane (3), horizontal, smooth, open | | | |
| 140 -97.9 | 141.0 | | NR | 133.4-133.6' - Fracture zone, various orientations, gravel sized limestone rock fragments, angular<br>136.0-139.8' - Fracture zone, multiple fractures ranging from horizontal to vertical, stepped to undulating, rough, tight to open | | **No Recovery 139.8-141.0'** | R15: 5 minutes |
| | R16-HQ 5 ft 100% | 48 | 5 | 141.0-141.1' - Fracture zone, various orientations, producing limestone rock fragments | | **Limestone** 141.0-143.8' - light gray, (N7), fine to very fine grained, mild HCl reaction, medium strong to strong (R3 to R4), 5-10% voids <1/16", 15-20% solution cavities up to 1-3/6" heavily bioturbated especially in upper section, fossil casts/molds common | |
| | | | 1 | 141.5, 142.8, 143.4' - Fractures (3), horizontal, rough, undulating | | | SC-13 collected at 141.4-142.8' |
| | | | 5 | 143.7-143.9' - Fracture zone, 0-90 deg, rough, undulating to stepped | | 143.8-145.0' - fine to medium grained, mild HCl reaction, very weak to weak (R1 to R2), brecciated appearance, fossils rare to absent, 1-2% voids to <1/16", occasional thin black organic laminae | |
| | | | >10 | 144.0' - Fracture, <5 deg, rough, open | | | |
| 145 -102.9 | 146.0 | | 10 | 144.3' - Fracture, <5 deg, rough, stepped, open | | | R16: 16 minutes |

| PROJECT NUMBER: | BORING NUMBER: |
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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 ORIENTATION : Vertical

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R17-HQ 5 ft 100% | 90 | 2 | 144.3-145.2' - Fracture zone, rough to smooth, various orientations, open to tight, limestone rock fragments | | **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 | |
| | | | 0 | 145.2' - Bedding plane, horizontal, smooth, open | | | SC-14 collected at 146.8-147.9' |
| | | | 1 | 145.4' - Fracture, <5 deg, smooth, undulating, tight, black crystalline-like grains over 10-15% of surface | | | |
| | | | 0 | 146.1' - Fracture, <5 deg, rough, stepped to undulating, open<br>146.35' - Fracture, 10 deg and vertical, rough, planar, tight | | 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 solution cavities, 5-10% voids up to 1/16", rare macro fossils | |
| 150 -107.9 | | | 1 | 148.3' - Fracture or mechanical break, horizontal, rough, undulating | | | R17: 5 minutes |
| | 151.0 | | | 150.6' - Fracture, horizontal, rough, planar, tight | | | |
| | R18-HQ 5 ft 100% | 80 | 1 | 151.0-152.3' - Fracture, vertical, rough, undulating, tight, tiny black crystalline-like grains | | 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 | |
| | | | 2 | | | | SC-15 collected at 155.05-156.0' |
| | | | >10 | 152.74' - Fracture, <10 deg, rough, stepped, black tiny crystals over 2% of surface, open<br>153.3, 153.6' - Fractures (2), <10-40 deg, rough, planar to stepped, open | | | |
| | | | >10 | 153.7-154.1' - Fracture zone, stepped to planar, horizontal to slightly inclined, bedding laminae, open | | 153.3-153.8' - Same as 151.0-153.5' except with cavities and voids on 20-25% of surface, few thin laminae | |
| 155 -112.9 | | | 1 | 154.25' - Fracture, 20 deg, smooth, undulating, tight | | 153.8-156.0' - mottled yellowish gray to yellowish gray, (5Y 7/2 to 5Y 8/1), fine grained, strong HCl reaction, 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 | R18: 8 minutes |
| | 156.0 | | | 154.64' - Fracture, horizontal, rough, stepped, tight | | | |
| | R19-HQ 5 ft 100% | 100 | 0 | 155.05' - Fracture, horizontal, rough, planar, open, silty infilling | | | |
| | | | 1 | | | | SC-16 collected at 158.4-150.3' |
| | | | 2 | 157.8' - Fracture, 5 deg, smooth, planar, tight<br>158.4, 158.8' - Fractures (2), 2 deg, rough, stepped, tight | | 156.0-161.0' - very pale orange to grayish orange, (10YR 7/4 to 10YR 8/2), very fine grained, strong HCl 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' | |
| | | | 0 | | | | |
| 160 -117.9 | | | 0 | | | | R19: 7 minutes |
| | 161.0 | | | | | | |
| | R20-HQ 5 ft 94% | 68 | 5 | | | 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 | |
| | | | 3 | 161.7-162.0' - Fracture zone, horizontal and vertical, smooth, planar to undulating, open<br>162.0-162.5' - Fracture, 80 deg and vertical, rough, planar to undulating, open | | | SC-17 collected at 163.85-164.9' |
| | | | 0 | 162.55-163.0' - Fracture, 70 deg, rough, undulating, open | | | |
| | | | 1 | | | | |
| 165 -122.9 | | | 3 | 164.9' - Fracture, horizontal, smooth, planar, 3/16" thick silt and/or clay sized infilling, open | | | R20: 8 minutes |
| | 166.0 | | NR | | | **No Recovery 165.7-166.0'** | |

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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

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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R21-HQ 5 ft 100% | 52 | 3 | 165.4, 165.72, 165.78' - Bedding plane (3), horizontal, smooth to undulating, rough to loose | | **Limestone** 166.0-166.8' - very pale orange, (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 15-20% of surface | |
| | | | >10 | 166.2, 166.8, 166.9' - Fractures (3), horizontal, smooth, planar, fractured along laminated bedding, open | | | SC-18 collected at 168.3-169.65' |
| | | | 2 | 167.0-168.0' - Fracture zone, horizontal, smooth, planar, fractured along laminated bedding, open | | 166.8-169.2' - moderate yellowish brown, (10YR 5/4), fine grained, mild to moderate HCl reaction, very weak (R1), 15-20% voids, 1-2% solution cavities up to 3/8", gradational contact with interval below | |
| | | | 1 | 168.1, 168.4, 169.95' - Fractures (3), 1-2 deg, smooth to rough, trace of silt | | | |
| 170 -127.9 | | | 2 | | | 169.2-171.0' - Same as 166.0-166.8' | R21: 7 minutes |
| | 171.0 | | | 170.65' - Fracture, 5-10 deg, rough, undulating, trace silt, open | | | End of shift; stop drilling 3/15/07 at 10:00 |
| | R22-HQ 5 ft 100% | 66 | 1 | 170.8' - Fracture, 1-2 deg, rough, stepped, open | | 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" cavities | Bottom of hole tagged at 171' |
| | | | 4 | 171.25, 171.4, 171.8' - Fracture zone (3), 70 deg, rough, planar, cobble size fragments | | | Resume drilling 3/20/07 at 12:22 |
| | | | 3 | 172.75' - Fracture, 20 deg, rough, undulating, open | | | R. McComb begins logging hole |
| | | | 1 | 173.05, 173.7' - Fractures (2), horizontal, rough, planar to stepped, open | | 173.6-173.9' - Same as 171.0-173.6 except no voids, no cavities, finely laminated | SC-19 collected at 171.45-172.75' |
| 175 -132.9 | | | 3 | 173.55' - Fracture, <5 deg, smooth, undulating, brown silty clay over 60% of surface | | 173.9-177.75' - Same as 171.0-173.6' | R22: 10 minutes |
| | 176.0 | | | 174.0-174.3' - Fracture, 70 deg, planar to undulating, tight | | | |
| | R23-HQ 5 ft 100% | 52 | 5 | 174.3' - Fracture, horizontal, smooth, planar, open | | | |
| | | | 3 | 174.6' - Fracture, 70 deg, rough, planar, tight | | | |
| | | | 1 | 174.73' - Fracture, horizontal, smooth, planar, tight | | | SC-20 collected at 178.65-179.45' |
| | | | 3 | 175.85' - Fracture, <5 deg, smooth, undulating, clay infilling, silty clay infilling | | 177.75-178.1' - moderate olive brown, (5Y 4/4), fine grained, no to mild HCl reaction, extremely weak (R0), 1/16" voids over 10-15% of surface, 3/8"- 1-3/16" cavities, friable | |
| | | | 5 | 176.3' - Fracture, <5 deg, rough, undulating | | | |
| 180 -137.9 | | | 3 | 176.6-176.85' - Fracture zone, horizontal, smooth, planar, open | | 178.1-179.45' - yellowish gray, (5Y 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 | |
| | | | 5 | 177.03' - Fracture, horizontal, smooth, planar, open | | | R23: 4 minutes |
| | 181.0 | | | 177.45, 177.6' - Fractures (2), horizontal, smooth, planar, open | | | |
| | R24-HQ 5 ft 100% | 66 | 3 | 178.4' - Fracture, <5 deg, rough, stepped, 3/8"-3/4" open | | 179.45-180.4' - pale yellowish brown, (10YR 6/2), fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), voids over 1-2% of surface | |
| | | | 5 | 179.0' - Fracture, <5 deg, smooth, stepped, brown silty clay infilling, 3/4"-1-3/16" open | | | SC-21 collected at 184.8-185.7' |
| | | | 3 | 179.25-179.43' - Fracture zone, <10 deg, smooth, stepped, zone of soft friable rock fragments, inclined to horizontal, clay over 10-15% | | 180.4-184.80' - dusky yellow, (5Y 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% of surface below 183.5', thinly laminated at 182.2-182.4', trace voids from 184.65-184.8' | |
| | | | 2 | 179.85' - Fracture, <5 deg, smooth, stepped | | | |
| 185 -142.9 | | | 1 | 180.0-180.3, 180.55-181.6' - Fractures (2), horizontal, smooth, planar | | | R24: 5 minutes |
| | 186.0 | | | 181.5' - Fracture, 70 deg, smooth, planar, tight | | | |
| | | | | 181.8, 181.95' - Fractures (2), horizontal, smooth, planar, open | | | |
| | | | | 182.1' - Fracture, <5 deg, smooth, stepped, open | | | |

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|---|---|---|
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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 ORIENTATION : Vertical

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R25-HQ 5 ft 100% | 56 | 7 | 182.5' - Fracture, horizontal, rough, planar, open<br>182.7-183.02' - Fracture zone, horizontal, smooth, planar, open | | **Limestone**<br>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 | SC-22 collected at 187.0-188.5' |
| | | | 4 | 183.3' - Fracture, horizontal, smooth, planar, open to tight | | | |
| | | | 1 | 184.55' - Fracture, <5 deg, rough, undulating, rock fragments with dark brown clay filling | | | |
| | | | 4 | 184.7' - Fracture, horizontal, rough, planar, open<br>185.5-185.7' - Fracture zone, <5 deg, rough, undulating, 1-3/16"-2" open | | 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' | |
| 190<br>-147.9 | | | 1 | 186.2, 186.35, 186.45' - Fractures (3), 0-<5 deg, rough, open to tight | | | R25: 9 minutes |
| | 191.0 | | | 186.64' - Fracture, horizontal, smooth, planar, open | | | |
| | R26-HQ 5 ft 100% | 36 | 1 | 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 | | 187.7-187.73' - Same as 186.5-187.7' except 20-30% voids, 10-15% cavities | |
| | | | 3 | 187.8' - Fracture, 70 deg, smooth, planar, tight | | 187.73-187.93' - light olive gray, (5Y 6/1), fine grained, thinly laminated | SC-23 collected at 191.0-191.9' |
| | | | 3 | 189.05' - Fracture, <5 deg, rough, planar, light brown sandy clay infilling, open | | 187.93-190.2' - yellowish gray, (5Y 5/2), fine grained, mild to moderate HCl reaction, weak (R2), voids over 60-70% of surface with discontinuous laminae with less voids | |
| | | | 6 | 189.6, 189.7' - Fractures (2), horizontal, smooth, planar, open | | | |
| 195<br>-152.9 | | | >10 | 189.9' - Fracture, <5 deg, rough, stepped to undulating<br>190.6' - Fracture, horizontal, rough, stepped to undulating, black organics over 90% of surface | | 190.2-190.6' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine grained, mild to moderate HCl reaction, very weak to weak (R1 to R2), dark wispy laminae, voids over 40-60% of surface | R26: 6 minutes |
| | 196.0 | | | | | | |
| | R27-HQ 5 ft 100% | 50 | 1 | 191.0' - Fracture, horizontal, smooth, planar, black coating over 100% of surface | | 190.6-193.5' - yellowish gray to dark yellow, (5Y 7/2 to 5Y 6/4), fine grained, mild to moderate HCl 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 | |
| | | | 2 | 191.6-191.9' - Fracture, 80 deg, rough, planar, open<br>191.9' - Fracture, <5 deg, rough, open, with stains | | | SC-24 collected at 197.5-198.5' |
| | | | 2 | 192.3, 192.4, 192.7' - Fractures (3), <5 deg, rough, undulating to stepped, open | | | |
| | | | 10 | 193.25' - Fracture, <10 deg, smooth, planar to stepped, open<br>193.25-195.6' - Fracture zone, with low to high angle fractures, rock fragments | | 193.5-196.0' - grayish yellow, (5Y 8/4), fine to very fine grained, mild to moderate HCl reaction, very weak (R1), voids over 20-30% of surface, 3-5% cavities, trace fossils, trace black organics | |
| 200<br>-157.9 | | | 10 | 196.1' - Fracture, <5 deg, rough, stepped, open | | | R27: 10 minutes |
| | 201.0 | | | | | | |
| | R28-HQ 5 ft 100% | 54 | 2 | 198.5' - Fracture, horizontal, rough, stepped, open<br>198.9' - Fracture, <5 deg, rough, stepped, open | | 196.0-199.3' - yellowish gray, (5Y 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 | |
| | | | 3 | 199.3-201.0' - Fracture zone, horizontal, smooth, open, becoming stepped and rough with depth | | | SC-25 collected at 202.5-203.5' |
| | | | 1 | 201.35' - Fracture, horizontal, rough, stepped, open | | 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 | |
| | | | 4 | 201.95' - Fracture, horizontal, smooth, planar, open<br>202.25' - Fracture, horizontal, rough, planar, open | | | |
| 205<br>-162.9 | | | 2 | 202.35-202.5' - Fractures (2), horizontal, rough to smooth, stepped, open | | | R28: 8 minutes |
| | 206.0 | | | | | | |

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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

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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R29-HQ 5 ft 76% | 25 | >10 | 203.9' - Fracture, horizontal, rough, undulating, open | | 201.0-203.0' - Same as 199.3-201.0' except with void/ cavity zone from 201.3-201.6' covering 20-30% of surface, very thin dark laminae at 201.8' | |
| | | | 3 | 204.1, 204.25, 204.4, 204.5' - Fractures (4), horizontal, rough, stepped, open | | **Limestone** | |
| | | | 2 | 205.5' - Fracture, horizontal, rough, planar, open | | 203.0-207.65' - dusky yellow to moderate yellow, (5Y 6/4 to 5Y 7/6), fine to medium grained, mild to moderate HCl reaction, very weak to extremely weak (R1 to R0), voids over 100% of surface except rare cavities from 205.1' to 205.5', some cavities are 3/8" to 3/4" deep | |
| | | | >10 | 205.8' - Fracture, <5 deg, rough, stepped, open | | | |
| | | | NR | 206.0-207.0' - Fracture zone, horizontal and vertical, rough, abundant horizontal to vertical fractures, open | | | |
| 210 -167.9 | | | | 207.3, 207.75, 207.65' - Fractures (3), horizontal, rough, planar | | | R29: No runtime recorded |
| | 211.0 | | | 208.25, 208.7' - Fractures (2), horizontal, smooth, planar, open | | 207.65-208.8' - yellowish gray, (5Y 7/2), very fine grained, mild HCl reaction, very weak (R1), voids/cavities rare to absent | |
| | R30-HQ 5 ft 26% | 0 | >10 | 208.7-209.8' - Fracture zone | | 208.8-209.2' - fine grained, mild HCl reaction, extremely weak (R0) | |
| | | | >10 | 211.0-212.3' - Fracture zone | | 209.2-209.8' - light gray, (N7), fine grained, mild to moderate HCl reaction, very weak to weak (R1 to R2), only small gravel sized fragments, voids/cavities over 15-20% of surface up to 3/4" - 1-3/16" length, 3/16" deep | |
| | | | NR | | | **No Recovery 209.8-211.0'** | |
| 215 -172.9 | | | | | | **Limestone** | R30: 6 minutes |
| | 216.0 | | | | | 211.0-212.3' - yellowish gray, (5Y 7/2), mild to moderate HCl reaction, very weak (R1), voids/cavities over 30-40% of surface | |
| | | | >10 | 216.0-218.45' - Fracture zone | | **No Recovery 212.3-216.0'** | |
| | | | >10 | | | **Limestone** | |
| | R31-HQ 5 ft 49% | 13 | | | | 216.0-218.45' - yellowish gray, (5Y 7/2), fine to medium grained, mild to moderate HCl reaction, extremely weak (R0), voids/cavities over 20-30% of surface, trace fossils casts interbedded with soft friable limestone at 217.0-218.0' | |
| | | | NR | 218.45' - Fracture, horizontal, rough, planar, open | | **No Recovery 218.45-221.0'** | |
| 220 -177.9 | | | | | | | R31: 7 minutes |
| | 221.0 | | | | | | |
| | | | >10 | 221.0-223.5' - Fracture zone | | **Limestone** | |
| | | | >10 | 221.7' - Fracture, horizontal, rough, stepped, open | | 221.0-222.7' - yellowish gray, (5Y 7/2), mild to moderate HCl reaction, very weak (R1), friable along thin laminae, voids/cavities over 10-30% of surface, trace fossils (casts/molds) | |
| | R32-HQ 5 ft 50% | 8 | | 222.1' - Fracture, fractured gravel sized limestone | | 222.7-223.5' - yellowish gray, (5Y 7/2), mild to moderate HCl reaction, extremely weak to very weak (R0 to R1), voids on 1-3% of surface or absent | |
| | | | NR | | | **No Recovery 223.5-226.0'** | |
| 225 -182.9 | | | | | | | R32: 4 minutes |
| | 226.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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

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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R33-HQ 5 ft 40% | 9 | >10 | 226.0-228.0' - Fracture zone, with some discernible fracture planes<br>226.3' - Fracture, <5 deg, rough, stepped, open | | **Limestone**<br>226.0-228.0' - pale greenish yellow, (10Y 8/2), fine to very fine grained, mild to moderate HCl reaction, very weak to weak (R1 to R2), voids over 10-15% of surface, voids absent from 227.35-227.50'<br>**No Recovery 228.0-231.0'** | Stop drilling for the day 3/20/07<br>Resume drilling at 08:40 on 3/21/07 |
| | | | >10 | 226.75, 226.95' - Fractures (2), horizontal, smooth, undulating, open | | | |
| | | | NR | 226.95' - Fracture, zone of rock fragments<br>227.35' - Fracture, horizontal, smooth, planar, open<br>227.5, 227.60' - Fractures (2), horizontal, rough, planar, open<br>227.52' - Fracture, zone of rock fragments<br>227.9' - Fracture, horizontal, smooth, planar, open | | | |
| 230<br>-187.9 | | | | | | | R33: 5 minutes |
| | 231.0 | | | | | | |
| | R34-HQ 5 ft 40% | 20 | 3 | 231.2' - Fracture, <5 deg, rough, undulating, open | | **Limestone**<br>231.0-233.0' - yellowish gray to pale greenish yellow, (5Y 7/2 to 10Y 8/2), fine grained, mild HCl reaction, very weak to extremely weak (R1 to R0), voids over 90% of rock<br>**No Recovery 233.0-236.0'** | |
| | | | 3 | 231.9' - Fracture, horizontal, rough, stepped, open<br>232.0' - Fracture, 40 deg, rough, undulating, open | | | |
| | | | NR | 232.4' - Fracture, <5 deg, rough, undulating, tight<br>232.65' - Fracture, 25 deg, rough, undulating, tight<br>232.8' - Fracture, <5 deg, rough, undulating, open 1-3/16"-1-9/16" | | | |
| 235<br>-192.9 | | | | | | | R34: 5 minutes |
| | 236.0 | | | | | | |
| | R35-HQ 5 ft 32% | 0 | >10 | 236.0-237.6' - Fracture zone, no bedding/fracture plane apparent, gravel sized limestone fragments up to 1-2" length | | **Limestone**<br>236.0-237.6' - Same as 231.0-233.0' | |
| | | | >10 | | | **No Recovery 237.6-241.0'** | |
| | | | NR | | | | |
| 240<br>-197.9 | | | | | | | R35: 6 minutes |
| | 241.0 | | | | | | |
| | R36-HQ 5 ft 32% | 0 | >10 | 241.0-242.6' - Fracture zone, gravel sized rock fragments, fracture plane uncertain | | **Limestone**<br>241.0-242.6' - yellowish gray, (5Y 7/2), fine to very fine grained, mild HCl reaction, extremely weak to very weak (R0 to R1), voids over 40% of rock, trace clay, trace fossil casts<br>**No Recovery 242.6-246.0'** | |
| | | | NR | | | | |
| 245<br>-202.9 | | | | | | | R36: 8 minutes |
| | 246.0 | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: A-08 | SHEET 14 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

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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R37-HQ 5 ft 32% | 7 | >10 | 246.0-246.8' - Fracture zone, rock fragments | | **Limestone** 246.0-247.6' - yellowish gray, (5Y 7/2), fine grained, mild to moderate HCl reaction, very weak (R1), friable, thin laminae present in upper 0.5' of interval, voids over 10-15% of surface, cavities up to 3/8" rare **No Recovery 247.6-251.0'** | |
| | | | 10 | 246.8' - Fracture, horizontal, rough, stepped, open | | | |
| | | | NR | 247.1' - Fracture, horizontal, rough, stepped, tight<br>247.45' - Fracture, horizontal, rough, stepped, open<br>247.55' - Fracture, horizontal, smooth, planar | | | |
| 250 -207.9 | | | | 251.0-251.7' - Fracture zone, rock fragments | | | R37: 7 minutes |
| | 251.0 | | | 251.7' - Fracture, 60 deg, smooth, planar, open | | | |
| | R38-HQ 5 ft 100% | 45 | >10 | 252.2, 252.45' - Fractures (2), horizontal, rough, planar, open | | **Limestone** 251.0-252.4' - yellowish gray, (5Y 7/2), fine to medium grained, mild to moderate HCl reaction, very weak (R1), friable | |
| | | | 4 | 252.7, 252.75' - Fractures (2), <5 deg, rough, stepped to planar, open | | | |
| | | | 4 | 252.95' - Fracture, <5 deg, rough, undulating, tight<br>253.2' - Fracture, horizontal, smooth, stepped, open | | 252.4-253.5' - yellowish gray, (5Y 7/2), very weak to weak (R1 to R2), very thinly laminated with lenses up to 1/2", voids over 100% of surface, slightly fossiliferous from 252.4-252.7, cavities up to 3/8" over 10-20% | |
| | | | 3 | 253.6' - Fracture, horizontal, smooth, planar, open | | | |
| 255 -212.9 | | | 3 | 253.75' - Fracture, <5 deg, stepped to planar, open<br>254.05' - Fracture, <5 deg, smooth, undulating, tight | | 253.5-256.4' - yellowish gray, (5Y 7/2), fine grained, very weak (R1), voids over 50-75% of surface, cavities over 30% | R38: 8 minutes |
| | 256.0 | | | | | | |
| | R39-HQ 5 ft 36% | 0 | >10 | 254.5' - Fracture, horizontal, rough, planar, open<br>254.55' - Fracture, horizontal, smooth, planar, open | | 256.4-257.8' - Same as 253.5-256.4' except laminated, cavities over 50-60% of surface, fossiliferous | |
| | | | 10 | 254.95' - Fracture, rough, planar to undulating, tight | | | |
| | | | NR | 255.5' - Fracture, 70 deg, rough, planar, open<br>255.7' - Fracture, rough, planar, open<br>256.0-257.8' - Fracture zone, rough, planar, fracture/joints horizontal to subhorizontal<br>261.0-261.4' - Fracture zone, rock fragments | | **No Recovery 257.8-261.0'** | |
| 260 -217.9 | | | | 261.4, 261.5' - Fractures (2), horizontal, smooth, undulating, open | | | R39: 6 minutes |
| | 261.0 | | | 261.6' - Fracture, horizontal, rough, undulating, open | | | |
| | R40-HQ 5 ft 56% | 8 | >10 | 261.8' - Fracture, <5 deg, stepped, sand sized limestone infilling, open 3/4"-13/16"<br>262.0' - Fracture, <5 deg, rough, undulating, rough | | **Limestone** 261.0-263.8' - yellowish gray, (5Y 7/2), fine grained, mild to moderate HCl reaction, very weak (R1), voids over 50% of surface, very thinly laminated at 263.3' (black organics), some thin laminae at 261.4- 261.5' | |
| | | | 10 | 262.3' - Fracture, horizontal, rough, planar, open | | | |
| | | | 2 | 262.3-262.6' - Fracture zone, rock fragments<br>262.65' - Fracture, <5 deg, rough, stepped, open | | | |
| | | | NR | 263.0' - Fracture, <5 deg, smooth, planar, open<br>263.5' - Fracture, <5 deg, rough, stepped, open | | **No Recovery 263.8-266.0'** | |
| 265 -222.9 | | | | | | | R40: 6 minutes |
| | 266.0 | | | | | | |
| | | | | | | Bottom of Boring at 266.0 ft bgs on 3/21/2007 | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: A-08 SHEET 15 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

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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | | | | End drilling on 3/21/07, total depth 266'<br><br>Borehole collapsed to 38' overnight; unable to re-open hole<br>Water level at 3.4' below ground surface |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-09 SHEET 1 OF 11 |

# SOIL BORING 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

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 bgs on 3/13/07 START : 3/13/2007 END : 3/22/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 41.9 | | | | | | | Cathead Operator - Matthew Griffin<br>14:17 Water level at about 2' below ground surface<br>SS-1 (5.0-6.5') totally saturated (wet) |
| 5 | 5.0 | | | | | | |
| 36.9 | 6.5 | 0.5 | SS-1 | 12-8-12 (20) | **Sand With Clay And Gravel (SP-SC)**<br>5.0-5.5' - light olive gray, (5Y 6/1), wet, medium dense, fine to medium grained, no HCl reaction, silica sand, 9% medium plastic fines, 20% fine to coarse gravel | | Driller's Remarks: Drill time: 4 minutes (6.5-10.0') |
| 10 | 10.0 | | | | | | |
| 31.9 | 11.5 | 0.7 | SS-2 | 4-3-5 (8) | **Silt (ML)**<br>10.0-10.7' - grayish orange, (10YR 7/4), wet, medium stiff, nonplastic, rapid dilatancy, moderate HCl reaction, 5-10% very fine sand, trace fine sand-sized white particles, trace very fine brilliant green (5G 6/6) sand-sized particles | | Driller's Remarks: Hard drilling at 13', continued circulation loss<br>Driller's Remarks: Drill time: 4 minutes (10.0-15.0') |
| 15 | 15.0 | | | | | | |
| 26.9 | 15.4 | 0.1 | SS-3 | 50/5 (50/5") | **Limestone Fragments**<br>15.0-15.1' - grayish orange, (10YR 7/4), mild to moderate HCl reaction, friable with hand, 1/4-1/2" sized discs; remainder are yellowish gray (5Y 5/1) angular fragments to 1/2", mild to moderate HCl reaction | | 14:37 Driller's Remarks: Will insert 15' of 3" NW casing to seal off hole<br>Driller's Remarks: Now using a 4.5" tricone roller drill bit with NW rod to open up the hole for 10' of 6" diameter casing<br>15:45 Driller's Remarks: Hole is crooked with 19' NWJ in ground; Adding 10' of 6" surface casing to straighten hole<br>17:17 End of drilling for the day on 3/13/07 with 20' of 6" in place |
| | 18.5 | 1.5 | SS-4 | 47-36-46 (82) | | | |
| 20 | 20.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

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 bgs on 3/13/07 START : 3/13/2007 END : 3/22/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 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' |
| | 23.5 | | | | | | Driller's Remarks: Drill time: 20 minutes (20.0-23.5') |
| | | 1.2 | SS-5 | 40-35-37 (72) | **Silty Sand (SM)** 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 particles (5G 6/6); 23.75-24.0' limestone fragment, all carbonates | | 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 |
| 25 16.9 | 25.0 | | | | | | |
| | 28.5 | | | | | | Driller's Remarks: Drill time: 19 minutes (25.0-28.5') |
| | 29.4 | 0.8 | SS-6 | 36-50/4.5 (86/10.5") | **Silty Sand With Gravel (SM)** 28.5-29.3' - dusky yellow, (5Y 6/4), wet, very dense, very fine to medium grained, moderate to strong HCl reaction, 20-30% nonplastic fines, 10-15% gravel-sized, poorly fossiliferous (casts) limestone fragments; trace fine black particles | | |
| 30 11.9 | | | | | | | |
| | 33.5 | | | | | | Driller's Remarks: Drill time: 6 minutes (30.0-33.5') |
| | 33.9 | 0.4 | SS-7 | 50/5 (50/5") | **Silty Sand With Gravel (SM)** 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, fragments), trace black inclusions, all carbonate | | |
| 35 6.9 | | | | | | | 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 | | | | | | |
| | 38.7 | 0.2 | SS-8 | 50/2 (50/2") | **Limestone Fragments** 38.5-38.7' - light olive gray, (5Y 5/2), moderate HCl reaction, coarse sand to fine gravel-sized fragments, poorly fossiliferous (casts), 15-20% fine black organic particles | | 14:24 Driller's Remarks: Switch to rock coring, end of soil sampling at SS-8; approximately 38.5' below ground surface |
| | | | | | Begin Rock Coring at 38.5 ft bgs See the next sheet for the rock core log | | |
| 40 | | | | | | | |

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

WATER LEVELS : 2.0 ft bgs on 3/13/07 START : 3/13/2007 END : 3/22/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 38.5 | | 1 | | | **Limestone**<br>38.5-41.1' - light olive gray, (5Y 5/2), fine grained, strong HCl reaction, very weak (R1), no fossils, moderate olive gray bedding (organics) across entire run up to 1/4-1/8" in thickness, trace of 1/16" voids | Start R1 at 15:50; 3 foot run to set stroke<br>Driller's Remarks: 20' of 6" HW casing and 40' of 3" NW casing is set |
| 40<br>1.9 | R1-NQ<br>3 ft<br>87% | 54 | >10 | 39.5' - Bedding plane, horizontal, rough, undulating, tight<br>39.6' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | | R1: 8 minutes |
| | | | 1 | 40.2-40.45' - Fracture zone, rock fragments up to 2-1/4" | | | |
| | 41.5 | | NR | | | **No Recovery 41.1-41.5'** | |
| | | | 2 | 40.75' - Fracture, horizontal, rough, undulating, tight<br>41.5' - Bedding plane, horizontal, rough, planar, fine infill 1/8", tight | | **Limestone**<br>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") over 25-40% of surface, poorly fossiliferous (casts), 25% of fine grained black inclusions (organics) | Start R2 at 16:11 |
| | | | 1 | 42.05, 42.25' - Mechanical break (2)<br>42.65' - Fracture, 45 deg, rough, planar, tight | | | |
| | R2-NQ<br>5 ft<br>94% | 62 | 0 | 44.0' - Fracture, horizontal, smooth, planar, tight | | | Driller's Remarks: Very easy drilling over last 1/2'<br>New NQ core barrel: product shipping #370005154 new NQ drill bit is a hard rock formation drill bit serial #/product #: C36501 |
| 45<br>-3.1 | | | >10 | 44.2' - Bedding plane, horizontal, rough, undulating, top of extremely weak rock | | | |
| | | | 1 | 44.95' - Bedding plane, horizontal, rough, undulating | | | |
| | 46.5 | | NR | 45.75' - Bedding plane or mechanical break, 5 deg, rough, undulating, tight | | **No Recovery 46.2-49.0'** | R2: 7 minutes<br>Start R3 at 16:27 |
| | | | NR | 46.5' - Bedding plane, horizontal, smooth, planar, fines on surface, open | | | |
| | R3-NQ<br>5 ft<br>50% | 27 | >10 | | | **Limestone**<br>49.0-51.5' - Same as 41.5-46.2' except 49.0-49.1', 49.35-49.7' extremely weak rock (R0), the rest of the interval is medium strong (R3) rock, fossil casts up to 3/8-1/4" | |
| 50<br>-8.1 | | | 0 | | | | |
| | | | 2 | | | | R3: 7 minutes |
| | 51.5 | | | 51.2' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | | 17:40 Driller's Remarks: Bottom of hole is 51.5' |
| | | | 0 | 51.4' - Bedding plane or mechanical break, horizontal, rough, undulating, open with 1/4" infill of fines | | 51.5-56.5' - light olive gray, (5Y 5/2), strong HCl reaction, extremely weak to medium strong (R0 to R3), voids up to 3/16"x3/16" over 30-40% of surface, poorly fossiliferous (casts molds), organic laminae predominant from 52.7-53.1', 20%-30% fined grain black organic particles | Driller's Remarks: Core loss probably from top (sandy interval)<br>Start R4 at 16:45 |
| | | | 1 | 52.7' - Bedding plane, horizontal, smooth, undulating, tight | | | Last core run for 3/14/07<br>Mottling in slightly darker hue over last 2', bioturbated zones, horizontally aligned over last 2.0-2.5' of run R4-NQ |
| | R4-NQ<br>5 ft<br>100% | 83 | >10 | | | | |
| 55<br>-13.1 | | | 0 | | | | |
| | | | 1 | | | | R4: 10 minutes |
| | 56.5 | | | | | | Driller's Remarks: Bottom at 56.3' below ground surface<br>20' of 6" casing<br>40' of 3" NW casing |
| | | | 3 | 56.4' - Bedding plane, horizontal, rough, undulating, fines on surface<br>56.8' - Bedding plane, horizontal, smooth, undulating | | | |
| | | | 3 | 57.0' - Bedding plane, <10 deg, smooth, undulating | | | |

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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

WATER LEVELS : 2.0 ft bgs on 3/13/07 START : 3/13/2007 END : 3/22/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R5-NQ 5 ft 82% | 60 | 3 | 57.2' - Bedding plane, horizontal, rough, undulating, base of weakly indurated material<br>57.65' - Fracture, 40 deg, rough, undulating, open 1/4 - 3/4" | | **Limestone**<br>56.5-57.95' - light olive gray, (5Y 5/2), strong HCl reaction, extremely weak to weak (R0 to R2), tiny voids up to 3/16"x3/16" covering 30-40% of surface, poorly fossiliferous (cast, molds) contains several inches of rock that can be indented with thumb, sharp bedding plane at 57.95' | 3/15/07 09:03<br>Water Level = 1.15' below ground surface<br>09:15 Start R5-NQ |
| 60<br>-18.1 | | | 1 | 57.85' - Fracture, horizontal, rough, undulating, open 1/4-1/2" | | | Driller's Remarks: Maintained full circulation<br>R5: 12 minutes |
| | | | NR | 57.95' - Bedding plane, horizontal, smooth, planar, open 1/4"<br>58.65, 59.0, 59.2' - Mechanical break (3) | | | |
| | 61.5 | | | | | | |
| | R6-NQ 5 ft 78% | 52 | NR | 59.65' - Fracture, 45 deg, smooth, undulating, tight | | 57.95-60.6' - light olive gray, (5Y 5/2), strong HCl reaction, weak to medium strong (R2 to R3), tiny (<1/16") voids over 10-15% of surface, trace cavities with secondary mineral infill up to 3/4"x1/2" elliptical shape, entire section mottled, trace black fine to medium particles<br>**No Recovery 60.6-62.6'** | Start R6 at10:04<br>Driller's Remarks: Probably loss of core at beginning of run |
| | | | 3 | 62.75' - Fracture, horizontal, smooth, undulating, base of weakly indurated section, tight | | | |
| | | | 4 | 62.85' - Bedding plane or mechanical break, horizontal, rough, planar | | | |
| 65<br>-23.1 | | | 1 | 63.4' - Bedding plane or mechanical break, <10 deg, rough, planar | | **Limestone**<br>62.6-63.5' - light olive gray, (5Y 5/2), fine to medium grained, moderate to strong HCl reaction, extremely weak to very weak (R0 to R1), crumbles under thumb pressure, silt with organic laminations | |
| | | | 1 | 63.8' - Bedding plane or mechanical break, horizontal, rough, undulating, black staining, tight to open 1/4" | | | R6: 6 minutes |
| | 66.5 | | | 64.0' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1/4-1/2" | | | |
| | R7-NQ 5 ft 80% | 72 | 3 | 64.4' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | 63.5-64.5' - light olive gray, (5Y 5/2), fine to medium grained, moderate to strong HCl reaction, extremely weak to very weak (R0 to R1), up to 20% of rock has cavities up to 4" long | Start run R7-NQ at 10:26 |
| | | | 2 | 64.55' - Bedding plane or mechanical break, horizontal, rough, planar, tight<br>65.1' - Mechanical break | | | |
| | | | 1 | 65.4' - Bedding plane, horizontal, rough, planar, tight<br>65.95' - Fracture, 15 deg, rough, undulating, open 1/4" | | 64.5-66.5' - light olive gray, (5Y 5/2), fine to medium grained, moderate to strong HCl reaction, extremely weak to very weak (R0 to R1), tiny voids up to 1/16"x1/8" over 25% of surface, 15-20% medium coarse sized grayish black inclusions, grayish staining on surface | |
| 70<br>-28.1 | | | 0 | 66.6' - Mechanical break<br>66.95' - Fracture, 25 deg, rough, undulating, tight | | | |
| | | | NR | 67.7, 67.95' - Fractures or mechanical break (2), horizontal, rough, planar, open 1/4-1/2" | | | R7: 13 minutes<br>Last core run on 3/15/07<br>20' of 6" diameter casing<br>40' of 3" diameter NW casing<br>Bottom hole depth at 71.6'<br>13:20 3/20/07 Measured water level at 0.2' below ground surface; bottom of hole at 71.5'<br>Driller's Remarks: Soft drilling from 72.5-75.0' |
| | 71.5 | | | | | | |
| | R8-NQ 5 ft 66% | 38 | 2 | 69.0' - Bedding plane, horizontal, smooth, planar, 1/4" fine infill<br>69.5, 70.1' - Mechanical break (2) | | 66.5-70.5' - light olive gray, (5Y 5/2), moderate to strong HCl reaction, weak to medium strong (R2 to R3), poorly fossiliferous (casts), tiny voids up to 3/16"x3/16" covering 20-30% of surface, trace cavities with secondary mineral infill up to 2-1/2"-3/4", 1" thick carbonate silt layer at 67.5', gradual change from very fine to fine grained, medium to fine grained from 62.3-68.0', 67.3' has black wavy staining<br>**No Recovery 70.5-71.5'** | |
| | | | >10 | 72.1' - Fracture or mechanical break, 50 deg, smooth, undulating, tight | | | |
| | | | NR | 72.4' - Fracture, 90-80 deg, rough, undulating, gray staining, tight<br>72.75' - Mechanical break or fracture, 70 deg, rough, undulating, open 1/4-3/4" | | | |
| 75<br>-33.1 | | | 2 | 74.7' - Bedding plane, <10 deg, bottom of core loss zone | | | 13:45 Start run R8-NQ; 100% circulation loss over core run<br>End run at approximately 14:10<br>Driller's Remarks: Running in 3rd gear, will mix a denser mud for next run<br>R8: 22 minutes<br>14:25 Start run |
| | | | 1 | 74.85' - Bedding plane or mechanical break, smooth, planar, tight | | | |
| | 76.5 | | | 76.2' - Fracture, 70 deg, slickensided, undulating, black staining, tight | | | |
| | | | 3 | 76.55, 76.7' - Bedding plane or mechanical break, horizontal, slickensided, planar, open 1/4-1/8" | | | |
| | | | >10 | 76.85' - Fracture, 70 deg, rough, undulating, tight | | | |

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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

WATER LEVELS : 2.0 ft bgs on 3/13/07 START : 3/13/2007 END : 3/22/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R9-NQ 5 ft 94% | 63 | 1 | 78.0' - Bedding plane, horizontal, sharp contact also showing mottling of rock | | **Limestone** 71.5-73.0' - yellowish gray to light olive brown, (5Y 2/2 to 5Y 5/6), strong HCl reaction, very weak to medium strong (R1 to R3), elongated voids up to 3/16"x1/16" over 25-30% of surface, very irregular shaped cavities up to 3/4"x1-1/4" filled with carbonate silt bearing medium to coarse grained, gray inclusions or infill, poorly fossiliferous (molds) | |
| 80 -38.1 | | | 1 | 78.2-75.5' - Fracture zone, irregular shaped cavities infilled with medium coarse grained infill, infill of medium gray (N5) | | | |
| | | | >10 | 79.05' - Bedding plane, horizontal, rough, undulating, open up to 3/4" | | | R9: 16 minutes |
| | 81.5 | | NR | 80.35' - Bedding plane or mechanical break, rough, undulating, tight, open up to 1/8" | | | 14:42 End run |
| | R10-NQ 5 ft 92% | 67 | >10 | 80.8-81.2' - Fracture zone, 1-1/4"-1/4" limestone fragments | | **No Recovery 73.0-74.7'** 74.7-76.5' - Same as 71.5-73.0' except very weak (R1) rock and yellowish gray (5Y 7/2) from 74.7-74.85', more dense and more fossiliferous from 74.85-76.5' | Driller's Remarks: Soft near bottom of run at 81', will advance 3" NW casing to 80' due to continued circulation loss |
| | | | | 81.5-82.2' - Fracture zone | | | Assumed core loss from end of run |
| | | | 1 | 82.7' - Fracture, 50 deg, rough, undulating, tight, brownish black staining | | | SC 1 collected at 81.6-82.45' |
| | | | 0 | | | **Limestone** 76.5-81.2' - moderate yellowish brown to dusky yellow, (10YR 5/4 to 5Y 6/4), moderate to strong HCl reaction, medium strong (R3), mottled very pale orange (10YR 8/2) and medium gray (N5) over 78.2-78.7', tiny (1/16"x1/16") voids on 25-35% of surface, irregular shaped cavities 15-20% with secondary mineral infill, poorly fossiliferous (molds), trace organics as 1/2" long horizontally aligned inclusions, 10-15 deg bedding plane at 78.0', wavy carbonate silt and organic laminae at 80.0', gray staining from 80.4-81.2' | Driller's Remarks: Continued circulation loss during 3" NW casing advancement, soft at 81.5-84' |
| 85 -43.1 | | | 1 | | | | |
| | | | 1 | 85.3-85.6' - Fracture zone | | | R10: 9 minutes |
| | 86.5 | | NR | | | | 09:12 Start R11-NQ |
| | R11-NQ 4.5 ft 40% | 0 | >10 | 86.8-87.4' - Fracture zone, yellowish gray carbonate silts and up to 1-1/2" subrounded limestone fragments | | | |
| | | | >10 | | | | |
| | | | NR | | | | Core loss assumed from 88.1 to 90.8' (2.7 ft core loss) |
| 90 -48.1 | | | | | | **No Recovery 81.2-81.5'** **Limestone** 81.5-86.1' - moderate yellowish brown, (10YR 5/4), fine to medium grained, strong HCl reaction, medium strong (R3), voids up to 3/16"x3/16" over 35-45% of surface, elliptical 1/2"x1/2" shaped cavities, moderately fossiliferous (casts), subangular to subrounded inclusions of yellowish gray (5Y 8/1) carbonate silt clasts from 1/8"-2"x2" | R11: 14 minutes |
| | 91.0 | | | | | | |
| | 91.5 R12-NQ 0.5 ft 100% | 100 | 1 | 91.2' - Fracture, vertical, smooth, undulating, black staining, tight (runs from 90.8-91.5') | | | Driller's Remarks: Very hard drilling at 91.0', driller pulled out of hole because he thought the core barrell was not spinning; another core run will be made to get the remaining 1/2 foot The 6" core run will be R12-NQ |
| | | | 2 | 92.1' - Fracture, horizontal, smooth, stepped, tight | | | |
| | | | 3 | 92.35' - Bedding plane, horizontal, smooth, undulating, 1/2" thick organic infill | | | |
| | R13-NQ 5 ft 100% | 0 | 3 | 92.55' - Fracture, 80 deg, rough, undulating, tight | | **No Recovery 86.1-86.5'** **Limestone** 86.5-88.3' - medium olive brown, (5Y 4/4), strong HCl reaction, very weak to medium strong (R1 to R3), voids up to 1/16" over 35-40% of surface; carbonate silts (yellowish gray) at 87.0'; at 87.8' medium olive brown, moderately fossiliferous (casts), black medium grained inclusions | |
| | | | | 92.85' - Fracture, 70-80 deg, rough, undulating, tight | | | R12: 3 minutes Start R13 at 09:52 |
| 95 -53.1 | | | 2 | 93.0' - Fracture, 70-80 deg, rough, undulating, tight | | | |
| | | | 1 | 93.2' - Bedding plane or mechanical break, horizontal, rough, undulating | | | R13: 14 minutes |
| | 96.5 | | | 93.4, 93.5, 93.6' - Fractures (3), horizontal, rough, undulating, tight | | | |
| | | | 1 | 93.5' - Fracture, 60-75 deg, rough, undulating | | **No Recovery 88.3-91.0'** **Limestone** 91.0-91.5' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, medium strong (R3), trace voids, trace black wavy laminations (>1/16") | |
| | | | | 93.75' - Bedding plane, horizontal, smooth, planar, <1/8" organic infill | | | |
| | | | 1 | 94.5' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | | |

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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

WATER LEVELS : 2.0 ft bgs on 3/13/07 START : 3/13/2007 END : 3/22/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R14-NQ 5 ft 100% | 100 | 0 | 95.1' - Fracture, 40-50 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' | |
| | | | | 95.5' - Fracture, 40-50 deg, rough, undulating, tight | | | |
| 100 -58.1 | | | 1 | 97.85' - Fracture, 45-55 deg, rough, undulating, tight | | 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 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 | |
| | | | 1 | 98.9' - Fracture, 55-65 deg, rough, undulating, tight | | | R14: 8 minutes Continued circulation loss SC-2 collected at 100.55-101.5' |
| | 101.5 | | | 100.55' - Fracture or mechanical break, rough, undulating, tight | | | |
| | | | 2 | 101.7' - Fracture, 40-50 deg, rough, undulating, tight | | | |
| | | | 1 | 102.1' - Fracture, 40-50 deg, rough, undulating, tight | | | |
| | R15-NQ 5 ft 100% | 53 | 1 | | | 96.5-101.5' - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, very weak (R1), highly 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 | |
| 105 -63.1 | | | 1 | 104.35' - Fracture, 40-50 deg, rough, undulating, tight | | | |
| | | | | 104.8' - Fracture or mechanical break, horizontal, rough, undulating, tight | | | R15: 8 minutes |
| | | | >10 | 105.4-106.5' - Fracture zone | | | |
| | 106.5 | | | | | 101.5-106.5' - Same as 96.5-101.5' except densely bedded | |
| | | | 1 | 106.7' - Bedding plane or mechanical break, horizontal, rough, undulating, tight to open 1/8" | | 106.5-111.5' - yellowish gray, (5Y 7/2), fine to medium grained, strong HCl 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 |
| | | | 1 | 107.75' - Fracture, 70-80 deg, rough, undulating, tight | | | |
| | R16-NQ 5 ft 100% | 93 | 0 | | | | |
| 110 -68.1 | | | 0 | | | | |
| | | | 1 | | | | R16: 10 minutes |
| | 111.5 | | | | | | |
| | | | 0 | 111.4' - Fracture or mechanical break, 40-50 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 |
| | | | 0 | | | | |
| | R17-NQ 5 ft 98% | 97 | 0 | | | | |
| 115 -73.1 | | | 2 | 114.75' - Fracture or mechanical break, 50-60 deg, rough, undulating, open 1/8-1/4" | | | SC 3 collected at 114.0-114.8' |
| | | | 0 | 115.0' - Bedding plane or mechanical break, horizontal, slickensided, undulating, open 1/4" | | | R17: 6 minutes |
| | 116.5 | | NR | | | **No Recovery 116.4-116.5'** | 13:55 Start run R18 |
| | | | 3 | 116.65' - Fracture or mechanical break, rough, undulating, open 1/8-1/4" | | | Driller's Remarks: Soft drilling from 116.5-119.5'; medium drilling at 119.5-121.5' |
| | | | 2 | 117.45' - Fracture or mechanical break, 20-30 deg, rough, undulating, open 1/4" | | | |

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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

WATER LEVELS : 2.0 ft bgs on 3/13/07 START : 3/13/2007 END : 3/22/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R18-NQ 5 ft 100% | 82 | 3 | 118.55' - Fracture, <10 deg, rough, undulating, tight<br>119.0' - Mechanical break | | **Limestone**<br>116.5-121.5' - very pale orange (10YR 8/2) from 116.5-119.8' and yellowish gray (5Y 8/1) from 119.8-121.5', fine to medium grained, strong HCl reaction, weak (R2), very fine well rounded grains, moderately to highly fossiliferous (casts, molds), gray staining from 116.5-117.0', trace elliptical cavities (1/2"x1/8") rimmed with opaque secondary mineralization in center, coarse appearance of rock due to micro fossils, rock has a "chalk like" feel<br>121.5-126.3' - yellowish gray, (5Y 8/1), fine grained, strong HCl reaction, weak (R2), tiny voids (<1/16") up to 20% of surface, trace elliptical cavities rimmed with white secondary mineralization, poorly fossiliferous (casts, few molds), trace organics as very fine discontinuous laminations (<1/16"), 5-15% fine to medium grained, medium gray (N5) particles | SC 4 collected at 117.5-118.6' |
| 120<br>-78.1 | | | 3 | 119.2' - Fracture or mechanical break, horizontal, rough, planar, tight<br>119.35' - Bedding plane or mechanical break, horizontal, rough, planar, open 1/8-1/4" | | | |
| | | | 3 | 121.05, 121.2' - Bedding plane or mechanical break (2), horizontal, rough, undulating, open 1/4-1/8" | | | R18: 5 minutes |
| | 121.5 | | | | | | |
| | R19-NQ 5 ft 96% | 43 | 1 | 121.45' - Fracture, 40-50 deg, black staining, tight | | | |
| | | | 1 | 121.6' - Fracture or mechanical break, rough, planar, tight | | | |
| | | | 3 | 122.2' - Fracture, 30 deg, rough, planar, brownish black staining, open 1/8"<br>122.5' - Fracture or bedding plane, 20 deg, open 1/8-1/4" | | | |
| 125<br>-83.1 | | | 1 | 122.55, 123.5' - Fracture (2), horizontal, rough, planar, tight | | | |
| | | | 3 | 123.9' - Fracture, horizontal, rough, undulating, open 1/8"<br>124.2' - Bedding plane or mechanical break, horizontal, smooth, planar, open 1/8" | | | R19: 7 minutes |
| | 126.5 | | NR | | | **No Recovery 126.3-126.5'** | 100% loss of circulation continues |
| | R20-NQ 5 ft 96% | 53 | 3 | 124.55, 124.65' - Bedding plane or mechanical break (2), horizontal, smooth, undulating, open 1/8" | | **Limestone**<br>126.5-131.3' - yellowish gray (5Y 7/2) from 126.5-129.7' and yellowish gray (5Y 8/1) from 129.7-131.25', strong HCl reaction, weak (R2), moderately to highly fossiliferous (casts, molds, microforams), black staining on rock surface, 15-20% fine grained medium gray (N5) particles, very thinly bedded from 128.5-129.5' | |
| | | | 2 | 125.25' - Bedding plane or mechanical break, horizontal, smooth, planar, open 1/8" | | | |
| | | | 2 | 125.55' - Bedding plane or mechanical break, horizontal, smooth, undulating, open 1/8-1/4"<br>125.8, 125.95' - Bedding plane or mechanical break (2), horizontal, rough, undulating, open 1/8-1/4" | | | |
| 130<br>-88.1 | | | >10 | 126.65' - Mechanical break or bedding plane, horizontal, smooth, planar, tight | | | |
| | | | 2 | 127.2' - Bedding plane, <10 deg, rough, undulating, tight | | | R20: 8 minutes |
| | 131.5 | | NR | | | **No Recovery 131.3-131.5'** | |
| | R21-NQ 5 ft 100% | 63 | 5 | 127.45' - Bedding plane or mechanical break, horizontal, rough, undulating, brown staining, open 1/2" | | **Limestone**<br>131.5-134.1' - fine to medium grained, strong HCl reaction, very weak (R1), bedding up to 1/2" thick, 20% fine grained medium gray inclusions | Start R21 at 14:42<br>SC-5 collected at 135.70-136.50' |
| | | | 5 | 127.95' - Fracture, <10 deg, rough, undulating, open 1/4"<br>128.15' - Mechanical break or fracture, horizontal, smooth, planar, tight | | | |
| | | | 4 | 128.8' - Bedding plane, horizontal, rough, planar, tight<br>129.1, 129.13' - Bedding plane (2), horizontal, rough, planar, tight | | 134.1-136.5' - fine to medium grained, strong HCl reaction, very weak (R1), moderately fossiliferous (molds, casts), disconformity at 134.25'; 136.3-136.5' beds dipping at 7 deg, trace voids with calcite infill up to 1/6"x1/16" (white infill color), rock color is alternating, laminated to thinly bedded yellowish gray (5Y 7/2) to light olive gray (5Y 5/2) from 131.5-134.25', then yellowish gray (5Y 7/2) to the end of core run | |
| 135<br>-93.1 | | | 0 | 129.65' - Bedding plane, horizontal, rough, planar, open 1/4" | | | |
| | | | 0 | 129.8' - Bedding plane, horizontal, rough, undulating, open 1/2-3/4" | | | R21: 10 minutes |
| | 136.5 | | | 130.15' - Bedding plane, horizontal, rough, planar, open 1/2-3/4" | | | Continued circulation loss |
| | | | 3 | 130.15-130.4' - Fracture zone, up to 1/2" core fragments, brownish black staining on fracture surface | | | |
| | | | >10 | 130.75, 130.9' - Bedding plane or mechanical break, rough, undulating, open 1/4-3/8" | | | |

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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

WATER LEVELS : 2.0 ft bgs on 3/13/07 START : 3/13/2007 END : 3/22/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 140<br>-98.1 | R22-NQ<br>5 ft<br>90%<br>141.5 | 57 | >10<br>4<br>1<br>NR | 131.55' - Bedding plane, horizontal, smooth, undulating, tight<br>131.75, 131.8' - Bedding plane or mechanical break, horizontal, smooth, planar, tight<br>132.15, 132.25, 132.55, 133.1' - Bedding plane or mechanical break (4), horizontal, rough, smooth, planar, tight<br>133.3-133.4' - Fracture zone | | **Limestone**<br>136.5-138.3' - dusky yellow, (5Y 6/4), fine grained, strong HCl reaction, tiny voids up to 1/16" (spheroidal) over 10% of surface, cavities up to 1/2"x1" elongated and infilled with white minerals and medium gray secondary minerals, up to 15% medium grained, medium gray particles, dipping wavy laminations near 138.0' | R22: 12 minutes |
| 145<br>-103.1 | R23-NQ<br>5 ft<br>92%<br>146.5 | 82 | >10<br>0<br>2<br>0<br>0<br>NR | 133.45, 133.65, 133.75, 134.0, 134.1' - Bedding plane or mechanical break (5), horizontal, rough to smooth, planar, tight<br>136.6, 136.7' - Bedding plane or mechanical break, horizontal, rough, planar, tight<br>137.2' - Fracture, horizontal, rough, planar, open 1/4"<br>137.65' - Fracture, horizontal, rough, undulating, open 1/8"<br>138.3-138.85' - Fracture zone, 1"-1-1/2" subrounded fragments<br>139.4' - Fracture or mechanical break, horizontal, rough, undulating, tight, (R5)<br>139.6' - Fracture, horizontal, rough, undulating, open 1/2-3/4", orange staining<br>140.0' - Fracture, horizontal, rough, undulating, black staining, open 1/8" | | 138.3-139.6' - yellowish gray, (5Y 7/2), very fine grained, strong HCl reaction, strong (R4), moderately fossiliferous (casts, molds), trace tiny voids, reflective very fine grains inside cavities and on broken surfaces, fossils up to 3/4"<br>139.6-141.0' - light olive gray, (5Y 5/2), strong HCl reaction, strong (R4), short (about 3/8") discontinuous vertical stress fractures, orange staining, irregular shaped cavities up to 1-1/2"<br>**No Recovery 141.0-141.5'** | R23: 9 minutes<br>Circulation loss (100%) has continues<br>About 75-100% water loss during run, 1/4 bag, quick gel in bentonite added to mud |
| 150<br>-108.1 | R24-NQ<br>5 ft<br>88%<br>151.5 | 68 | 2<br>2<br>0<br>>10<br>>10<br>NR | 140.3' - Fracture or mechanical break, horizontal, rough, planar, open 1/8"<br>140.4' - Fracture, 20-30 deg, rough, undulating, open 1/4-1/2"<br>140.9' - Fracture, horizontal, rough, undulating, open 1/2-1"<br>141.5-141.65' - Fracture zone, subangular fragments up to 3/4"<br>141.85' - Bedding plane or mechanical break, horizontal<br>143.85' - Bedding plane or mechanical break, horizontal, rough, planar, open 1/4"<br>143.95' - Fracture, 60-70 deg, rough, undulating, black staining, open | | **Limestone**<br>141.5-144.0' - very light gray, (N8), mild to strong HCl reaction, weak to medium strong (R2 to R3), thinly bedded to laminated, voids up to 1/16" diameter over 10% of surface, with very weak (R1) zones that are fractured, trace cavities up to 1/2" diameter, organic content in very weak zones of rock 143.96-144.0', organic odor<br>144.0-146.1' - yellowish gray, (5Y 8/1), strong HCl reaction, chalk like/powdery feel, horizontally bedded, white and yellowish gray matrix, texture gradually changes from medium to fine grained downward with depth<br>**No Recovery 146.1-146.5'** | Powdery, "chalk like" feel over upper interval, translucent secondary mineralization in center, coarse appearance of rock due to microfossils<br>R24: 6 minutes |
| 155<br>-113.1 | R25-NQ<br>5 ft<br>80%<br>156.5 | 73 | 2<br>3<br>1<br>1<br>NR | 146.65, 146.8, 148.4, 148.35' - Bedding plane or mechanical break (4), horizontal, rough, planar, tight<br>149' - Mechanical break<br>150.1' - Fracture, 80 deg, rough, undulating, tight<br>150.25' - Mechanical break or fracture, horizontal, open 1/4"<br>150.45-150.9' - Fracture zone, 1-1/2" fragments<br>151.55, 151.65' - Bedding plane (2), horizontal, rough, undulating, tight, organics on fracture surfaces<br>152.75, 152.85' - Fracture (2), horizontal, rough, undulating, open 1/8-1/4"<br>152.85' - Fracture, horizontal, rough, undulating, open 1/4" | | **Limestone**<br>146.5-148.6' - yellowish gray, (5Y 1/2), mottled in Hue 5Y colors, thinly bedded<br>148.6-150.9' - light olive gray, (5Y 5/2), very fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), powdery/"chalk like" feel over upper interval, dense limestone mottled with gray stains over lower interval, elongated cavity 2" long at 150.0', no infill<br>**No Recovery 150.9-151.5'** | Start at 16:05 added more quick gel.<br>Circulation loss (mud was mixed as above)<br>R25: 7 minutes |
| | | | 1<br>1 | 154.1' - Bedding plane or mechanical break<br>155.05' - Bedding plane, 7 deg, smooth, planar, open 1/4"<br>156.8' - Bedding plane, horizontal | | | |

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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

WATER LEVELS : 2.0 ft bgs on 3/13/07 START : 3/13/2007 END : 3/22/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R26-NQ 5 ft 28% | 10 | NR | 157.8' - Fracture, 70-80 deg, rough, undulating, black staining, tight | | **Limestone** 151.5-155.5' - Same as 148.6-150.9' except thinly bedded to laminated | Last core run of 3/21/07 80' of 3" NW in hole 20' of 6" casing in hole Driller's Remarks: Expects to be in void space from approximately 158.0' down (possible karst/cavity) Rock has "chalk like" texture |
| 160 -118.1 | | | | | | 151.5-152.8' and 154.0-155.0' light olive gray, (5Y 5/2), moderate to strong HCl reaction, organic laminations, gray staining of rock at 152.8', 5-10% cavities up to 3/4" spherical and infilled with white minerals, trace up to 10% shell fragments, black wavy laminae (organic) at base of core, gradually changes texture twice from coarse to fine grained with depth | R26: 2 minutes 08:16 Begin drilling on 3/22/07- water level 1.5' below ground surface 08:44 Start R27-NQ; bottom of hole at 160.7' |
| | 161.5 | | | | | **No Recovery 155.5-156.5'** | Driller's Remarks: Still no circulation |
| | R27-NQ 4.5 ft 73% | 7 | NR | | | **Limestone** 156.5-157.9' - yellowish gray, (5Y 8/1), fine grained, strong HCl reaction, weak (R2), tiny spherical voids (micro forams) up to 20-30%, trace of elongated cavities, rimmed with secondary mineralization, up to 10% fine grained orange and black particles | Driller's Remarks: Run is 0.5' short, he can feel the loose material from the above void that is apparently lodged at top of run and is not allowing for further advancement |
| | | | N/A | | | **No Recovery 157.9-162.7'** | R27-NQ is a 4.5' run. Sand is observed around the pulled core; hole tagged bottom at 166.0' |
| | | | >10 | | | **Carbonate Silty Sand With Gravel (SM)** 162.7-163.4' - medium gray to medium dark gray, (N5 to N4), wet, nonplastic, strong HCl reaction, 30-40% very fine to fine black particles, gravel-sized fossil fragments up to 1/2" diameter | Driller's Remarks: Mixes a thick batch of mud R27: 13 minutes |
| 165 -123.1 | | | >10 | | | **Limestone Fragments** 163.4-164.0' - angular limestone fragments | Driller's Remarks: Steady drilling through run, continued circulation loss (100%), mix 1/4 bag bentonite to mud tub |
| | 166.0 | | 0 | | | **Limestone** 164.0-166.0' - medium gray to medium dark gray, (N5 to N4), fine grained, strong HCl reaction, weak (R2), bedded limestone, trace voids up to 1/16"x1/16" | R28: 5 minutes |
| | R28-NQ 5 ft 100% | 50 | 3 | 166.3, 166.4, 166.65' - Bedding plane (3), horizontal, rough, undulating, organic infill 1/16" thick | | | |
| | | | 4 | 167.1, 167.5, 167.7, 167.93' - Bedding plane (4), horizontal, smooth, planar, tight | | | |
| | | | >10 | | | | |
| | | | 0 | 168.98-169.33' - Fracture zone | | | |
| 170 -128.1 | | | >10 | 170.02' - Bedding plane, horizontal, rough, undulating, organic infill 1/16" | | **Limestone** 166.0-171.0' - light olive gray, (5Y 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 laminations from 166.0-166.6' | |
| | 171.0 | | | 170.07-170.4' - Fracture zone, organic laminated rock | | | |
| | R29-NQ 5 ft 98% | 42 | 2 | 170.6' - Fracture, vertical, rough, undulating, tight | | | |
| | | | 4 | 170.78' - Bedding plane, horizontal, rough, undulating, tight | | | |
| | | | 5 | 170.93' - Bedding plane or mechanical break, <10 deg, rough, undulating, tight 171.27, 171.9' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | | |
| | | | 5 | 172.1' - Fracture, 70-80 deg, rough, undulating, tight | | | |
| 175 -133.1 | | | 3 | 172.32' - Fracture, 70-80 deg, rough, undulating, tight 172.4' - Fracture or mechanical break, horizontal, rough, undulating, tight | | | R29: 10 minutes |
| | 176.0 | | NR | 172.55' - Bedding plane, <10 deg, rough, planar, open 1/8" | | 171.0-175.9' - Same as 166.0-171.0' except without wavy bedding **No Recovery 175.9-176.0'** | |
| | | | >10 | 173.08' - Bedding plane, horizontal, rough, undulating, open 1/8" | | | 100% circulation loss, mix 1/4 bag bentonite to mud tub |
| | | | 0 | 173.35' - Bedding plane, horizontal, rough, undulating, open 1/8" | | | SC-6 collected at 177.0-178.2' |
| | R30-NQ | | | | | | |

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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

WATER LEVELS : 2.0 ft bgs on 3/13/07 START : 3/13/2007 END : 3/22/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | 5 ft 84% | 40 | >10 | 173.60, 173.65, 173.8' - Bedding plane (3), <10 deg, rough, undulating, organic infill, open 1/8" | | **Limestone** 176.0-180.2' - light olive gray, (5Y 5/2), moderate to strong HCl reaction, weak to medium strong (R2 to R3), trace cavities up to 3/8" 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' | |
| | | | 5 | 174.12' - Bedding plane, <10 deg, rough, planar, open 1/16-1/8" | | | |
| 180 -138.1 | | | | | | | R30: 9 minutes |
| | | | NR | 174.22, 174.5, 174.9, 174.97, 175.2' - Bedding plane (5), horizontal, rough, undulating, open 1/2" | | | |
| | 181.0 | | | | | **No Recovery 180.2-181.0'** | |
| | | | 5 | 175.75, 175.8' - Bedding plane (2), horizontal, rough, planar, open 1/8" | | **Limestone** 181.0-185.9' - yellowish gray, (5Y 7/2), moderate to strong HCl 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' | |
| | | | 4 | 177.0' - Fracture or mechanical break, horizontal, rough, undulating, brownish black staining, open 1/4" | | | |
| | R31-NQ 5 ft 98% | 20 | 3 | 178.2' - Bedding plane or mechanical break, horizontal, rough, planar, top of fractured zone | | | |
| | | | 5 | 178.7' - Bedding plane or mechanical break, <10 deg, rough, planar, organic infill 1/16" | | | |
| 185 -143.1 | | | | 179.0, 179.2' - Bedding plane (2), 8-10 deg, rough, planar, organic infill 1/16" | | | R31: 10 minutes |
| | | | 4 | 179.45, 179.55' - Bedding plane (2), 8-10 deg, rough, planar, open 1/16-1/8" | | | |
| | 186.0 | | NR | 179.75' - Bedding plane or mechanical break, 5-10 deg, rough, undulating, open 1/4", bedding contact brown, more organic layered unit underneath | | **No Recovery 185.9-186.0'** | |
| | | | >10 | 181.25' - Bedding plane, 5-10 deg, rough, undulating, organic infill 1/16" | | **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) | |
| | | | >10 | 181.65, 181.75' - Bedding plane (2), horizontal, rough, undulating, tight | | | |
| | R32-NQ 5 ft 86% | 13 | >10 | 181.85' - Fracture or mechanical break, 80-90 deg, rough, undulating, tight | | | |
| | | | >10 | 181.95' - Fracture or mechanical break, 40-50 deg, rough, undulating, tight | | | |
| 190 -148.1 | | | | 182.2' - Fracture, 75-85 deg, rough, undulating, tight | | | R32: 8 minutes |
| | 191.0 | | NR | 182.4' - Fracture or mechanical break, horizontal, rough, undulating, open 1/2-3/4" | | **No Recovery 190.3-191.0'** | |
| | | | >10 | 182.75' - Fracture, horizontal, rough, undulating, tight to open 1/4" | | **Limestone** 191.0-192.3' - yellowish gray, (5Y 7/2), very fine grained, strong HCl 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' | Appearance is "chalk like" |
| | | | >10 | 182.9' - Fracture or mechanical break, 10-20 deg, rough, planar, tight | | | |
| | | | | 183.25' - Fracture or mechanical break, 10-15 deg, rough, planar, open 1/16" | | | |
| | R33-NQ 5 ft 36% | 0 | NR | 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 | | | |
| | | | | 184.1' - Bedding plane, horizontal, rough, undulating, tight | | | |
| 195 -153.1 | | | | 184.4' - Bedding plane, 5-10 deg, smooth, undulating, open 1/8" | | | R33: 4 minutes |
| | | | | 184.55' - Bedding plane or mechanical break, 5-10 deg, rough, undulating, tight | | | |
| | 196.0 | | | | | **No Recovery 192.8-196.0'** | |
| | | | >10 | 184.8, 184.81' - Bedding plane or mechanical break (2), 0-5 deg, smooth, undulating, tight | | **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 | |
| | | | | 184.9' - Bedding plane or mechanical break, 5-10 deg, rough, planar, tight | | | |
| | | | >10 | 185.2' - Bedding plane or mechanical break, 20-30 deg, rough, undulating, open 1/4-1/8" | | | |
| | R34-NQ | | | 185.3' - Bedding plane or mechanical break, 60-70 deg, rough, undulating, tight | | | |

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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

WATER LEVELS : 2.0 ft bgs on 3/13/07 START : 3/13/2007 END : 3/22/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 200<br>-158.1 | 5 ft<br>80%<br>201.0 | 15 | >10<br>1<br>NR | 185.5' - Bedding plane or mechanical break, rough, undulating, open 1/2-3/4"<br>185.6' - Bedding plane or mechanical break, rough, undulating, tight to open 1/16"<br>186.0' - Bedding plane or mechanical break, <10 deg, black staining or organic bedding planes<br>190.0' - Fracture zone<br>196.35, 196.45, 196.7' - Bedding plane or mechanical break (3), rough, planar, tight<br>198.85' - Bedding plane, 5-10 deg, smooth, planar, organics on surface<br>199.8' - Fracture or mechanical break, horizontal, rough, undulating, open 1/2" | | **Limestone**<br>198.85-200.0' - dusky yellow, (5Y 6/4), mild to moderate HCl reaction, weak (R2), 60-70% tiny voids up to 1/8" (spherical), poorly fossiliferous (molds), 20% fine to medium grained black particles, brownish black staining near bottom<br>**No Recovery 200.0-201.0'**<br>Bottom of Boring at 201.0 ft bgs on 3/22/2007 | SC-7 collected at 198.85-199.8'<br>R34: 8 minutes<br>Final core run end at 12:19<br>Ending borehole construction 20' of 6" diameter casing, 80' of 3" diameter NW casing 203.0' NQ coring assembly<br>Measured total depth at 200.0' below ground surface<br>3/22/07 15:03 depth measured at 177.0' then 148.0' after abandonment<br>3/23/07 08:13 Water level at 0.75' below ground surface<br>Abandonment completion on 3/23/07 at 15:50<br>47 bags of Portland cement type I/II, 92 bags of Type Gel, 2 bags of Sure Plug bentonite, one 50lb bag of 3/8" bentonite chips, one 50lb bag of Quick Gel used for borehole abandonment |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-10 SHEET 1 OF 12 |

# SOIL BORING 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.2 | | | | | | | C. Sump and T. Stewart also logged part of boring A-10 |
| 5 | 5.0 | | | | | | |
| 37.2 | 6.5 | 0.8 | SS-1 | 3-36-50/2 (86/8") | **Poorly Graded Sand With Silt (SP-SM)** 5.0-5.5' - dusky yellow, (5Y 6/4), moist, very dense, very fine to fine grained, no HCl reaction, 10% nonplastic fines<br>**Limestone Fragments** 5.5-5.8' - very light gray, (N8), moist, very fine grained, mild HCl reaction, some orange staining | | Driller's Remark: Hard 5-13.5' |
| 10 | 10.0 | | | | | | |
| 32.2 | 11.4 | 1.4 | SS-2 | 8-18-50/5 (68/11") | **Silt (ML)** 10.0-11.4' - grayish yellow, (5Y 8/4), wet, very dense, very fine grained, nonplastic, very rapid dilatancy, moderate to strong HCl reaction, 10-15% sand material, slightly indurated 1" layers throughout | | Driller's Remark: Softened at 13.5-15' |
| 15 | 15.0 | | | | | | |
| 27.2 | 16.5 | 1.5 | SS-3 | 18-29-35 (64) | **Silt With Sand And Limestone Fragments (ML)** 15.0-16.5' - grayish yellow, (5Y 8/4), wet, fine to coarse grained, nonplastic, very rapid dilatancy, moderate HCl reaction, 20-25% fine to coarse sand-sized, 10% fine gravel-sized carbonate material | | |
| 20 | | | | | | | |

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

# SOIL BORING 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.2 | 20.0 – 21.5 | 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. | | |
| 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 – 30.3 | 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 | | Sample SS-6 has the appearance of extremely weak limestone. |
| 35 / 7.2 | 35.0 – 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 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.2 | 40.0 – 41.5 | 1.3 | SS-8 | 31-47-45 (92) | **Sandy Silt (SM)** 40.0-41.3' - moderate yellowish brown, (10YR 5/4), moist to wet, hard, mild to moderate HCl reaction, 49% sand and gravel, 10-15% fines, carbonate materials | | |
| 45 -2.8 | 45.0 – 45.8 | 0.8 | SS-9 | 40-50/3 (90/9") | **Silty Sand (SM)** 45.0-45.75' - Same as 40.0-41.3' except trace gravel-sized rock fragments | | |
| 50 -7.8 | 50.0 – 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 to moderate HCl reaction, silty sand (SM) cuttings, silty sand is same as 45.0-45.75', fossiliferous | | |
| 55 -12.8 | 55.0 – 55.3 | 0.1 | SS-11 | 50/3 (50/3") | **Limestone Fragments** 55.0-55.1' - Same as 50.0-50.1' | | |
| 60 | | | | | | | |

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

# SOIL BORING 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -17.8 | 60.0 | 0.1 | SS-12 | 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 62', switch to rock coring, see rock core log |
| | 62.0 | | | | | | |
| | 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 | | |
| 65 -22.8 | | | | | | | |
| 70 -27.8 | | | | | | | |
| 75 -32.8 | | | | | | | |
| 80 | | | | | | | |

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 62.0 | | NA | 62.0-62.5' - Fracture zone or mechanical break, rough, rock fragments, irregular fractures | | **Silt (ML)**<br>62.0-62.5' - moderate yellowish brown, (10YR 5/4), moderate to strong HCl reaction, silt with very fine sand, (20-25%) carbonate material | C. Sump begins logging at 62.0' |
| | | | >10 | 62.9' - Fracture, rough, undulating | | | |
| | | | >10 | 63.4' - Fracture, rough, undulating | | | |
| | R1-NQ 5 ft 68% | 36 | 1 | 63.4-64.0' - Fracture zone, rough, irregular fractures<br>64.0' - Fracture, horizontal, smooth, planar | | **Limestone**<br>62.5-63.5' - light olive gray, (5Y 5/2), moderate HCl reaction, weak to medium strong (R2 to R3), voids to 1/16" over 10-15% of surface | |
| 65<br>-22.8 | | | 1 | 65.0' - Fracture, horizontal, rough, undulating<br>65.1' - Fracture, 70 deg, rough, undulating | | 63.5-64.0' - Same as 62.5-63.5' except except weaker and friable | Driller's remark: Soft 65.0-66.0' |
| | | | NR | 65.4' - Fracture, horizontal, rough, undulating | | 64.0-65.4' - Same as 62.5-63.5' except weak (R2), except voids 1/4"-3/8" over 1-2% of surface (fossil molds), some infilling | R1: 3 minutes |
| | 67.0 | | | | | **No Recovery 65.4-67.0'** | |
| | | | 3 | 67.0, 67.1, 67.9, 68.6, 68.8, 68.9' - Fractures (6), horizontal, rough, undulating to planar | | **Limestone**<br>67.0-68.6' - dusky yellow, (5Y 6/4), 15-25% voids (1/16"-1/8") over surface, few larger voids (fossil molds), trace dark gray crystals trace clear recrystallized calcite, subhedral to euhedral in voids | |
| | | | 3 | | | | |
| | R2-NQ 5 ft 94% | 62 | 2 | 69.0-69.1' - Fracture zone, rock fragments<br>69.1' - Bedding plane, horizontal, smooth to rough, stepped | | | SC-1 collected at 69.35-70.22' |
| 70<br>-27.8 | | | 2 | 69.3' - Bedding plane, horizontal, smooth to rough, undulating to stepped<br>70.2, 70.6' - Mechanical break (2), 10 deg, rough, undulating to planar | | 68.6-69.3' - grayish yellow, (5Y 8/4), moderate to strong HCl reaction, extremely weak to very weak (R0 to R1), finely laminated | R2: 5 minutes |
| | 72.0 | | NR | 71.4, 71.7' - Fractures (2), horizontal, rough, stepped | | 69.3-71.7' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), moderate HCl reaction, weak to medium strong (R2 to R3), 10-15% voids (up to 1/16") over surface, few variably spaced larger voids/cavities (fossil molds up to 3/8"), fine (1/16") clear subhedral to euhedral carbonate crystals in few void spaces | |
| | | | 3 | 72.3' - Fracture, 10 deg, rough, undulating, irregular fractures | | | |
| | | | 3 | 72.4-73.6' - Fracture zone, 70-85 deg, rough, undulating, intersecting high angle fracture set, few surface pyrite coatings | | | |
| | R3-NQ 5 ft 94% | 52 | 3 | 73.9' - Fracture or mechanical break, horizontal, rough, undulating | | **No Recovery 71.7-72.0'** | |
| 75<br>-32.8 | | | NA | 74.4' - Fracture, horizontal, rough, stepped, undulating parting, black finely laminated organic layer<br>74.41' - Fracture, rough, clay infilling, fractures with light olive gray (5Y 5/2) silty clay infilling on surface | | **Limestone**<br>72.0-74.4' - dusky yellow, (5Y 6/4), very fine to fine grained, strong HCl reaction, weak to medium strong (R2 to R3), voids (1/32"-1/16") variable density across surface ranging from 15-25% in zones, few larger void/cavities, (fossil molds), very fine, black, wavy laminations | R3: 8 minutes |
| | | | 2 | | | | |
| | 77.0 | | NR | 74.9' - Fracture, rough, dark brown/black coating on surface, organics- pyrite | | | |
| | | | NA | 76.3-76.7' - Fractures (2), smooth | | | |
| | | | 2 | 77.0-77.5' - Fracture zone | | **Silt (ML)**<br>74.4-76.3' - very light gray, (N8), strong HCl reaction, very weak (R1), 5% limestone clasts up to 3/8", sub rounded to rounded, light olive gray (5Y5/2), laminated zone with light gray consolidated silt fragments up to 9/16" | |
| | | | 3 | 77.5, 77.55' - Fractures (2), horizontal, rough, irregular fractures | | | |
| | R4-NQ 5 ft 94% | 15 | >10 | 78.3-78.6' - Fractures (2), 60 deg, rough, undulating, tight, partially healed fractures, fine black speckled staining | | | |
| 80<br>-37.8 | | | 3 | 78.8-79.3' - Fracture zone, 60-90 deg, rough, undulating, multiple high angle fractures, open to tight, dark gray-black speckled staining | | **Limestone**<br>76.3-76.7' - Same as 72.0-74.4'<br>**No Recovery 76.7-77.0'** | |
| | | | 2 | 79.3-79.4' - Fracture zone, rock fragments<br>80.4, 80.6, 80.8, 81.1' - Fractures (4), rough, planar, irregular | | | R4: 9 minutes |
| | 82.0 | | NR | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-10 SHEET 6 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 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 85<br>-42.8 | R5-NQ<br>5 ft<br>60%<br>87.0 | 58 | 2<br>1<br>3<br>NR | 81.1-81.3' - Clay seam, poorly to moderately indurated laminated silt (ML)<br>81.3' - Fracture, horizontal, rough, undulating<br>82.2' - Fracture, rough, stepped<br>82.6' - Fracture, rough, stepped, fine sand sized particles on surface<br>83.7' - Fracture, horizontal, rough, undulating<br>84.0' - Fracture, 45 deg, rough, undulating to planar, tight, dark black/gray fine grained coating<br>84.6' - Fracture, horizontal, rough, undulating<br>84.7' - Fracture, 45 deg, rough, planar, some fine grained pyrite coating | | **Sand (SW)**<br>77.0-77.5' - strong HCl reaction, well graded fine sand sized carbonate derived grains, loose, friable, 10-15% fine clear crystals, (secondary calcite), possible fine silica grains (<5%)<br>**Limestone**<br>77.5-81.1' - yellowish gray, (5Y 7/2), fine grained, moderate to strong HCl reaction, medium strong (R3), few larger voids irregular shaped up to 3/4" in size with dark olive gray staining,<br>**Silt (ML)**<br>81.1-81.4' - consolidated carbonate silt | SC-2 collected at 85.06-86.06'<br>R5: 4 minutes |
| 90<br>-47.8 | R6-NQ<br>5 ft<br>82%<br>92.0 | 60 | 2<br>1<br>4<br>1<br>1<br>NR | 87.0' - Mechanical break, horizontal, rough, undulating<br>87.7-88.2' - Fracture zone, discontinuity with weak limestone interbedded<br>88.8' - Fracture, 10 deg, rough, undulating, iron staining<br>89.3, 89.5' - Fractures (2), rough, black to dark brown staining, irregular fractures associated with larger voids/solution cavities<br>89.6' - Fracture, horizontal, contact with silty material<br>89.8' - Fracture, 30-45 deg, rough, multiple tight healed fractures<br>90.3' - Mechanical break, horizontal | | **Limestone**<br>81.4-81.7' - Same as 77.5-81.1'<br>**No Recovery 81.7-82.0'**<br>**Limestone**<br>82.0-85.0' - grayish orange, (10YR 7/4), moderate to strong HCl 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 staining, few fossil molds infilled with very pale orange (10YR 8/2) soft material<br>**No Recovery 85.0-87.0'** | R6: run time not recorded |
| 95<br>-52.8 | R7-NQ<br>5 ft<br>80%<br>97.0 | 48 | 4<br>2<br>NA<br>>10<br>NR | 91.0' - Fracture, rough, break associated with large cavity<br>92.0' - Mechanical break, horizontal, planar<br>92.2' - Fracture, 45 deg, rough, planar<br>92.21' - Fracture, horizontal, black coating on fracture edge, (pyrite-organics)<br>92.8, 93.2, 93.8' - Fractures (3), horizontal, rough, stepped, loose, silty sand material on faces<br>94.5' - Fracture, horizontal, smooth, undulating, parting along fine lamination, dark brown color, friable zone<br>95.1' - Fracture, 60 deg, planar, loose sand material, fine grained pyrite on surface<br>95.1-96.0' - Fracture zone, limestone fragments | | **Limestone**<br>87.0-87.7' - yellowish gray, (5Y 7/2), moderate to strong HCl 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)<br>87.7-88.2' - white to yellowish gray, (N9 to 5Y 8/1), strong HCl reaction, very weak (R1), fossiliferous (molds & casts)<br>88.2-89.6' - pale yellowish brown, (10YR 6/2), moderate to strong HCl reaction, 15-20% voids (1/16"-1/8"), 2% larger voids/cavities, laminated black organic infilling at 89.4'<br>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 (1"-2")<br>**No Recovery 91.1-92.0'** | R7: run time not recorded |
| 100<br>-57.8 | R8-NQ<br>5 ft<br>60%<br>102.0 | 22 | 2<br>2<br>3<br>NR | 97.1' - Fracture or mechanical break, 60 deg, rough, undulating<br>97.6' - Fracture or mechanical break, horizontal, rough, planar<br>98.3' - Fracture, 45 deg, rough, undulating, irregular<br>98.6' - Mechanical break, rough, undulating, near vertical<br>99.2' - Fracture, 60 deg, planar<br>99.4' - Fracture, 15 deg, rough, undulating<br>99.8' - Fracture, 50-60 deg, rough, planar | | | R8: run time not recorded |

| 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)

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 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 105 -62.8 | R9-NQ 5 ft 65% | 38 | >10 | 102.1, 102.7' - Fractures or mechanical break (2), horizontal, rough, undulating | | **Limestone** 92.0-93.2' - yellowish gray, (5Y 8/1), strong HCl reaction, weak (R2), black organic/pyrite mottling and castings on fracture/void surfaces, voids (1/16") over 10-15% of surface, fossiliferous (molds/casts) | |
| | | | >10 | 102.3' - Fracture, 60-70 deg, smooth, thin coating of loose silt sized material on fracture surface | | | |
| | | | 0 | 102.7-103.3' - Fracture zone, limestone fragments | | **Silt (ML)** 93.2-95.2' - moderate HCl reaction, 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") | |
| | | | 0 | | | | |
| | | | NR | | | | R9: 4 minutes |
| | 107.0 | | | | | | |
| 110 -67.8 | R10-NQ 5 ft 100% | 54 | 1 | 107.1' - Fracture, 45-60 deg | | **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 crystals on surface | | **No Recovery 96.0-97.0'** | SC-3 collected at 107.3-108.35' |
| | | | 2 | 109.4' - Fracture or mechanical break, horizontal | | **Limestone** 97.0-100.0' - yellowish gray, (5Y 8/1), strong HCl reaction, weak (R2), 10-15% voids (1/16-1/8") over surface, fossil molds/casts, cavities and molds up to 3/8" over 1-2% of surface. | |
| | | | 2 | 109.5' - Fracture, 45 deg, rough, stepped, trace very fine black pyrite crystals | | **No Recovery 100.0-102.0'** | |
| | | | 6 | 110.8' - Fracture or mechanical break, horizontal, rough<br>110.9, 111.0, 111.2, 111.5, 111.6, 111.8, | | **Limestone** 102.0-105.25' - yellowish gray, (5Y 8/1), strong HCl reaction, weak (R2), percent voids vary from 5-15%, large fossil molds/cavities up to 3/8" (mollusks) | R10: 4 minutes |
| | 112.0 | | | | | | |
| 115 -72.8 | R11-NQ 5 ft 96% | 86 | 1 | 112.0' - Fractures (7), horizontal, rough, planar to undulating, open, fine "chalky" material on surface | | **No Recovery 105.25-107.0'** | |
| | | | 3 | 112.0' - Fracture or mechanical break, horizontal, smooth, planar | | **Limestone** 107.0-114.6' - yellowish gray, (5Y 8/1), fine grained, strong HCl 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 and texture | |
| | | | 1 | 113.7' - Fracture, horizontal, iron oxide staining<br>113.71-113.8' - Mechanical break or fracture zone, horizontal, (drill pin) | | | |
| | | | 2 | 114.4, 115.2, 115.7, 116.1, 116.3, 116.8' - Fractures or mechanical break (6), horizontal, undulating | | 114.6-116.8' - yellowish gray, (5Y 8/1), strong HCl reaction, weak (R2), highly fossiliferous( molds and casts) up to 30-40%, somewhat friable | R11: 5 minutes |
| | 117.0 | | NR | | | **No Recovery 116.8-117.0'** | |
| 120 -77.8 | R12-NQ 5 ft 100% | 70 | 5 | 117.0-117.3' - Fracture zone, loose carbonate fine sand | | **Sand (SP)** 117.0-117.3' - strong HCl reaction, well sorted carbonate sand, 5% fine clear subhedral calcite crystals, possible trace silica grains, possibly slough | |
| | | | 3 | 117.3, 117.5, 117.9' - Fractures (3), horizontal, rough, undulating, fine carbonate sand on surface | | | |
| | | | 3 | 118.5' - Fracture, 45 deg, rough, undulating to planar<br>118.8, 118.7, 119.1, 120.1' - Bedding plane (4), horizontal, smooth to rough, planar | | | |
| | | | 3 | 120.1, 120.6, 121.1' - Fractures or mechanical break (3), 0-10 deg, rough, undulating | | | |
| | | | >10 | 121.1-122.0' - Fracture zone, irregular fracture surfaces, limestone fragments | | | R12: run time not recorded |
| | 122.0 | | | | | | |

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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 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R13-NQ 5 ft 78% | 15 | 3 | 122.1, 122.5, 123.25, 123.5, 123.8, 124.1, 124.3, 124.35, 124.55, 124.75, 124.95, 125.1, 125.25, 125.4, 125.5, 125.6, 125.7, 125.8, 122.8' - Mechanical break (19), horizontal, smooth, planar | | **Limestone** 117.3-117.9' - pale yellowish gray, (5Y 8/1), coarse grained, very weak to weak (R1 to R2), fossiliferous mold and casts up to 3/16", friable into coarse sand particles, 10-15% argillaceous sand, iron staining on all sand sized inclusions | NQ rod stuck at 117.0' after completing R-12, hole abandoned and replacement hole drilled to obtain information below 122' |
| | | | 3 | 122.95' - Fracture, 40 deg, smooth, undulating, open, black particles (1/5"-1/3") in matrix on surface | | | T. Stewart begins logging at 122' |
| 125 -82.8 | | | 6 | | | 117.9-122.0' - very pale yellowish gray, (5Y 8/1), strong HCl reaction, very weak to weak (R1 to R2), increasing percentage of large fossil molds/casts up to 3/8", few cavities infilled with very fine grained silty material | NW casing at 120' below ground surface, water level 1.0' below ground surface |
| | | | 7 | | | | R13: 19 minutes |
| | 127.0 | | NR | | | | |
| | R14-NQ 5 ft 64% | 0 | >10 | | | 122.0-124.65' - yellowish gray, (5Y 7/2), fine to medium grained, strong HCl reaction, very weak (R1), voids <1/16" over 10-15% of surface, with four 3/16"x3/16" trace ellipsoid shaped cavities , 30% fine to medium grained black particles, 15% fine grained white particles (fossil fragments), color change to yellowish gray (5Y 8/1) at 128.65' | |
| | | | 5 | 127.8' - Fracture, vertical, smooth, undulating, tight, black staining 128.1, 128.2,128.4, 128.75' - Mechanical break (4), horizontal, smooth, planar | | | |
| 130 -87.8 | | | >10 | | | | |
| | | | 0 | | | | |
| | | | NR | | | 124.65-125.9' - Same as 122.0-124.65' except medium grained, moderately fossiliferous, medium gray (N5) lense at 125.5' | R14: 24 minutes Driller's Remark: 50% circulation loss near top of R14-NQ |
| | 132.0 | | | | | **No Recovery 125.9-127.0** | |
| | R15-NQ 5 ft 88% | 23 | 7 | 132.35' - Fracture, 50 deg, smooth, stepped, tight | | **Limestone** 127.0-128.95' - yellowish gray, (5Y 7/2), medium grained, strong HCl reaction, weak (R2), 15% fine grained black particles, moderately fossiliferous (fossil fragments, casts), voids over 45% of surface, trace short black laminations <1/16" thick near 128.8' | |
| | | | >10 | 132.4, 132.55, 132.65, 132.75, 132.9, 133.1, 133.23, 133.35, 133.55, 133.65, 133.75, 134.55' - Mechanical break (12), horizontal, smooth, planar | | | |
| 135 -92.8 | | | >10 | | | | |
| | | | 4 | 134.85' - Fracture, 5 deg, rough, undulating, open 2/5" 135.05, 135.15' - Mechanical break (2) | | 128.95-130.2' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, weak (R2), trace voids, few fossil casts up to 3/16"x1/8", 1" weak zone at 129.95' | |
| | | | 0 | 135.53' - Fracture, horizontal, smooth, undulating, tight to open 1/10" | | | R15: 13 minutes Driller's Remark: Return of circulation at approximately 135.0' below ground surface |
| | 137.0 | | NR | 135.77' - Fracture, 5 deg, rough, undulating, open 3/4", 2/5" thick infilling | | **No Recovery 130.2-132.0** | |
| | R16-NQ 5 ft 56% | 7 | >10 | | | **Limestone** 132.0-135.8' - yellowish gray, (5Y 8/1), fine grained, strong HCl reaction, weak (R2), 10-15% voids up to 1/16", trace to many ellipsoidal cavities up to 1-1/10", infilled with medium gray color, cavity size increase with depth, up to 40% very fine to fine grained fossil fragments in matrix, medium grained from 135.15-135.7', laminated from 132.0-132.35' (moderate olive brown - 5Y 4/4) with medium grained particles, organic laminations <1/16" at 134.0' | |
| | | | >10 | 138.05' - Fracture, vertical, tight, healed 138.1-138.3' - Fracture zone | | | |
| | | | 2 | 138.7' - Fracture, 70 deg, tight, healed, 1/16" thick infilling 138.95, 139.15' - Fractures (2), 50 deg, rough, undulating, tight | | | |
| 140 -97.8 | | | NR | 139.55' - Fracture, vertical, tight, vertical, black staining, 1/16" thick infilling | | | R16: 22 minutes |
| | 142.0 | | | | | | |

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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 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | >10 | 142.0-143.8' - Fracture zone | | 135.8-136.4' - light olive gray, (5Y 6/1), strong HCl reaction, weak to medium strong (R2 to R3), trace voids up to 1/16", many irregularly shaped cavities up to 2-2/5" long x 2/5" wide, infilled with moderate olive brown (5Y 4/4) medium to coarse grained material | |
| | | | 1 | | | | |
| | R17-NQ 5 ft 80% | 37 | 1 | 143.8' - Fracture, horizontal, rough, planar, open<br>144.1, 145.0' - Fractures (2), horizontal, rough, planar, tight | | **No Recovery 136.4-137.0'** | SC-4 collected at 144.1-145.05' |
| 145 -102.8 | | | 0 | | | **Limestone**<br>137.0-139.8' - light olive gray, (5Y 6/1), very fine grained, strong HCl reaction, medium strong (R3), 75% voids up to 1/8"x3/16", cavities over 15-20% of surface (near top of run), infilled with coarse grained material, brownish black laminations <1/16" containing sub rounded clasts up to 3/16" in size at 138.4-138.6', series of 70-90 degree fractures (healed tight) over 138.6 to 139.8' interval with black mottled appearance | R17: 17 minutes |
| | 147.0 | | NR | | | | Last core run on 3/10/07<br>Resume drilling 07:55 on 3/11/07 |
| | | | 0 | | | | |
| | | | 5 | 148.1, 148.2, 148.3, 148.32' - Bedding plane (4), horizontal, rough, planar, tight to open 1/10" | | | SC-5 collected at 147.0-148.1' |
| | R18-NQ 5 ft 75% | 58 | 2 | 148.93' - Bedding plane, horizontal, rough, planar, silty infilling | | **No Recovery 139.8-142.0'** | |
| 150 -107.8 | | | 0 | 149.4, 150.0, 152.05, 152.1' - Mechanical break (4) | | **Limestone**<br>142.0-143.8' - yellowish gray, (5Y 7/2), medium to coarse grained, strong HCl reaction, very weak to weak (R1 to R2), matrix grain colors are white (N9) (33%), yellowish gray (5Y 8/1) (33%), and gray (33%) | |
| | 152.0 | | NR | | | | R18: 22 minutes |
| | | | 2 | | | 143.8-144.1' - Same as 142.0-143.8' except brown and white laminations with trace cavities infilled with white material | Driller's Remark: Continued loss of circulation |
| | | | 5 | 153.3' - Bedding plane, horizontal, smooth, undulating, open 1/8"-1/4" | | 144.1-145.05' - Same as 143.8-144.1' except light olive gray (5Y 5/2), 15-20% coarse grained gray particles | |
| | R19-NQ 5 ft 86% | 39 | >10 | 153.43' - Bedding plane, horizontal, smooth, undulating, tight<br>153.48, 153.55, 153.63' - Bedding plane (3), horizontal, smooth, planar, tight | | 145.05-146.0' - Same as 143.8-144.1' except fine grained, no gray particles | |
| 155 -112.8 | | | 6 | 153.6' - Fracture, vertical, rough, undulating, tight, black particles in matrix<br>153.8' - Bedding plane or mechanical break, horizontal, smooth, planar, tight | | **No Recovery 146.0-147.0'** | |
| | 157.0 | | NR | 154.05' - Bedding plane or mechanical break, <10 deg, smooth, undulating, open 1/4" | | **Limestone**<br>147.0-148.37' - dark yellowish orange, (10YR 6/6), fine to medium grained, moderate HCl reaction, weak (R2), 3/16"x1/8" voids over 15% of surface, fossiliferous (trace molds), bedding plane at 147.9' at 40 degrees | R19: 14 minutes |
| | | | 4 | 154.05-155.5' - Fracture zone | | | |
| | | | 4 | 157.25, 157.4' - Bedding plane or mechanical break (2), <10 deg, smooth, undulating, open 1/4" | | | |
| | R20-NQ 5 ft 92% | 42 | 1 | 157.45' - Bedding plane or mechanical break, <10 deg, smooth, undulating, open 1/2"<br>157.8' - Bedding plane or mechanical break, horizontal, smooth, undulating, open 1/8" | | 148.37-148.93' - yellowish gray, (5Y 8/1), medium grained, strong HCl reaction, extremely weak (R0) | |
| 160 -117.8 | | | >10 | 158.05' - Bedding plane or mechanical break, smooth, undulating, open 1/8"-1/4"<br>158.47, 158.95' - Bedding plane or mechanical break (2), horizontal, open 1/8"-1/2" | | 148.93-150.74' - dark yellowish orange, (10YR 6/6), fine to coarse grained, strong HCl reaction, weak (R2), trace voids to 1/16" over <5% surface, some infill of white material, trace fine to medium grained black particles | R20: 19 minutes |
| | 162.0 | | NR | | | **No Recovery 150.74-152.0** | |

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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 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 165<br>-122.8 | R21-NQ<br>5 ft<br>88%<br>167.0 | 18 | 9<br>2<br>6<br>>10<br>NR | 159.1' - Bedding plane or mechanical break, horizontal, smooth, planar, open 1/4"-1/2"<br>159.3, 159.4' - Mechanical break (2)<br>160.05-161.3' - Fracture zone or mechanical break, horizontal, smooth, planar<br>162.27, 162.3, 162.4, 162.6, 162.7, 162.75, 162.82, 162.9, 162.98' - Bedding plane or mechanical break (9), smooth, planar, tight to open 1/8"<br>163.9' - Bedding plane, horizontal, smooth, undulating, open 1/8"-1/4", dark staining<br>163.98' - Bedding plane or mechanical break, <10 deg, rough, undulating, black staining<br>164.1, 169.25, 164.4, 164.5, 164.85, 164.95' - Bedding plane or mechanical break (6), horizontal, smooth, planar to undulating, tight to open 1/8"-1/4" | | **Limestone**<br>152.0-156.3' - very pale orange, (10YR 8/2), strong HCl reaction, weak (R2), voids to 1/8" covering 25-30% of surface, moderately fossiliferous, (mold and casts) 5-10% white inclusions up to 1-1/4" ( irregular shape), fine brownish black laminations (<1/16") at 153.48-153.63', contains vertical fracture across interval, up to 20% fine black particles<br>**No Recovery 156.3-157.0'** | R21: 19 minutes |
| 170<br>-127.8 | R22-NQ<br>5 ft<br>84%<br>172.0 | 31 | 2<br>3<br>3<br>4<br>0<br>NR | 166.0' - Mechanical break<br>166.1' - Bedding plane or mechanical break, horizontal, smooth, planar, tight to open 1/8"<br>166.25-166.3' - Fracture (2), 80 deg, rough, undulating, tight, reddish brown staining<br>167.05' - Mechanical break or bedding plane, horizontal, smooth, planar, tight<br>167.75-167.9' - Fracture zone<br>168.1' - Bedding plane or mechanical break, horizontal, smooth, planar, open 1/8"-1/4"<br>168.2' - Bedding plane or mechanical break, <10 deg, rough, undulating, tight to open 1/4"-3/4" | | **Limestone**<br>157.0-161.6' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine to medium grained, strong HCl reaction, very weak to weak (R1 to R2), trace voids up to 1/8" elliptical, poorly fossiliferous (few molds,casts), 3/8"x3/16", bedding plane laminations <1/16" from 160.2-161.6'<br>**No Recovery 161.6-162.0'**<br>**Limestone**<br>162.0-166.4' - yellowish gray to moderate olive brown, (5Y 7/2 to 5Y 5/4), fine grained, strong HCl reaction, weak to medium strong (R2 to R3), voids up to 1/16" over 40% of surface, 163.0-163.09 ' interval has voids to 3/16" covering 90% of surface, moderately fossiliferous from 163.0-163.9' (some molds), 2"x1/4" inclusions up to 5%, from 163.0-163.1', irregular shaped inclusions, medium gray in color.<br>**No Recovery 166.4-167.0'** | SC-6 collected at 168.4-169.3'<br>R22: 23 minutes |
| 175<br>-132.8 | R23-NQ<br>5 ft<br>84%<br>177.0 | 35 | 3<br>6<br>4<br>6<br>1<br>NR | 168.4' - Bedding plane, smooth, undulating, open 1/4"<br>169.3' - Bedding plane, horizontal, smooth, undulating, open 1/8"-1/4"<br>169.55-169.7' - Fracture zone<br>169.8' - Bedding plane, horizontal, smooth, undulating, 1/8"-1/4" open<br>170.1' - Bedding plane or mechanical break, <10 deg, smooth, undulating, 1/8"-1/4" open<br>170.3-170.5' - Fracture zone<br>170.7-170.8' - Bedding plane (2), <10 deg, tight, dark staining<br>172.05' - Bedding plane, horizontal, smooth, undulating, crystal traces on surface, open 1/4" | | **Limestone**<br>167.0-171.2' - moderate olive brown, (5Y 4/4), fine grained, strong HCl reaction, weak to medium strong (R2 to R3), voids up to 1/8" over 15-20% of surface, cavities (1/4"x1") from 168.05-168.04' poorly fossiliferous (trace molds), horizontal wavy laminations (<1/16") at 170.5<br>**No Recovery 171.2-172.0'** | R23: 22 minutes |
| 180<br>-137.8 | R24-NQ<br>5 ft<br>78%<br>182.0 | 40 | 6<br>0<br>2<br>>10<br>NR | 172.15' - Bedding plane, horizontal, smooth, planar, open 1/8"-1/4"<br>172.3-172.55' - Fracture zone<br>173.2' - Bedding plane, horizontal, smooth, undulating, crystals on surface of fracture, open 1/8"<br>173.3' - Bedding plane, <10 deg, smooth, undulating, crystals covering 30% of surface, open 1/4"to 1/2"<br>173.45, 173.75, 173.87, 173.9, 174.0, 174.03,' - Bedding plane (6), horizontal, smooth, planar, crystals covering surface, tight to open 1/8"<br>174.1' - Bedding plane, horizontal, smooth, undulating, crystals, open 1/8"-1/4"<br>174.2-174.35' - Fracture zone, 3/4" fragments | | **Limestone**<br>172.0-176.2' - 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 1/8"x3/16" over 10-15% of surface, cavities up to 1"x1/2" over 5% of surface, poorly fossiliferous (few casts), mottling of slightly darker hue up to 20%<br>**No Recovery 176.2-177.0'** | R24: 20 minutes |

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|---|---|
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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 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 185<br>-142.8 | R25-NQ<br>5 ft<br>92% | 40 | 4<br>4<br>6<br>3<br>1<br>NR | 175.45, 175.6, 175.8, 175.85, 175.95, 175.98, 176.05' - Bedding plane (7), horizontal, smooth, undulating, crystals on surface, tight to open 1/4"<br>177.0-177.05' - Fracture zone<br>177.25, 177.5, 177.55' - Bedding plane (3), horizontal, smooth, undulating, crystals on surface, tight to 1/8"<br>177.65' - Bedding plane, <10 deg, smooth, undulating, open 1/4"-1/2"<br>177.8' - Bedding plane, horizontal, smooth, planar, tight to open 3/4"<br>179.0' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1/2"-1"<br>179.85' - Fracture or mechanical break, horizontal, rough, undulating, tight to open 1/2" | | **Limestone**<br>177.0-177.95' - yellowish gray to moderate olive brown, (5Y 7/2 to 5Y 4/4), fine grained, strong HCl reaction, weak to medium strong (R2 to R3), voids up to 1/8" covering 15-20% of surface, wavy dark brown laminations at 177.8' to sharp contact (bedding plane) at 117.95', 25 degree bedding plane<br>177.95-180.9' - yellowish gray, (5Y 7/2), very fine to medium grained, strong HCl reaction, weak to medium 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) wavy beds up to 1"1/2" from 179.65-180.35' and 180.5-180.68'<br>**No Recovery 180.9-182.0'**<br>**Limestone**<br>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, cavities (irregular shaped) up to 3/8"x3/16" over 10-20% of surface, moderately fossiliferous (molds and casts)<br>**No Recovery 186.6-187.0'**<br>**Limestone**<br>187.0-188.15' - Same as 182.0-186.6'<br>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 no infill, poorly fossiliferous, (mostly casts, molds), trace organics<br>**No Recovery 191.8-192.0'**<br>**Limestone**<br>192.0-193.25' - Same as 182.0-186.6'<br>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<br>**No Recovery 194.2-197.0'**<br>**Limestone**<br>197.0-197.15' - Same as 193.25-194.2'<br>**No Recovery 197.15-202.5'** | Driller's Remark: 183.0-184.5' was hard drilling, had to increase pump pressure<br>R25: 28 minutes<br>SC-7 rejected due to size requirements, total of six (6) special cores taken from boring A-10/A-10R<br>R26: 11 minutes<br>Driller's Remark: Circulation regained<br>R27: 12 minutes<br>R28: 10 minutes<br>End of coring at 15:21 on 3/11/07, boring grouted to surface with Portland cement type I/II, type GU on 3/13/07 |
| | 187.0 | | | | | | |
| 190<br>-147.8 | R26-NQ<br>5 ft<br>96% | 31 | 3<br>3<br>3<br>2<br>4<br>NR | 180.05-180.15' - Fracture zone, up to 1" fragments<br>180.2-180.3' - Bedding plane (2), horizontal, smooth, planar, tight to open 1/8"<br>180.25' - Fracture or mechanical break, vertical, smooth, undulating, tight<br>180.45' - Bedding plane, <10 deg, rough, undulating, open 1/4"-3/4"<br>180.6, 180.8' - Bedding plane (2), <10 deg, rough, undulating, open 1/4-1/2"<br>182.15, 182.5, 182.6, 182.85,' - Bedding plane (4), horizontal, smooth, undulating, tight to open 1/8"<br>183.25-183.35' - Fracture zone, rock fragments up to 1" | | | |
| | 192.0 | | | | | | |
| 195<br>-152.8 | R27-NQ<br>5 ft<br>44% | 12 | >10<br>>10<br>0<br>NR | 183.7, 183.77, 183.9' - Bedding plane (3), horizontal, smooth, planar, open 1/4"-1/2"<br>184.10-184.20' - Fracture zone, rock fragments up to 1-1/2" fractures<br>184.4' - Bedding plane, horizontal, smooth, planar, open 1/8"-1/4"<br>184.45' - Bedding plane, <10 deg, smooth, undulating, open 1/8"<br>184.65' - Bedding plane, horizontal, smooth, planar, open 1/8"-1/4", dark staining<br>184.9-185.05' - Fracture zone, rock fragments up to 2"<br>185.2' - Bedding plane or mechanical break, <10 deg, smooth, undulating, open 1/8"-1/4" | | | |
| | 197.0 | | | | | | |
| 200<br>-157.8 | R28-NQ<br>5.5 ft<br>0% | 0 | 0<br>NR | 185.6' - Fracture or mechanical break, 20 deg, rough, undulating, tight<br>185.61' - Fracture or mechanical break, 70 deg, rough, undulating, tight<br>187.3-187.5' - Fracture zone, rock fragments to 1-1/2"x1-1/5"<br>187.55, 187.8, 187.9, 188.05' - Bedding plane (4), <10 deg, smooth, undulating, 188.05' has black stains, open 1/4"<br>188.8, 188.95' - Fractures or mechanical break (2), 40 deg, rough, undulating, tight<br>189.25' - Bedding plane or mechanical break, <10 deg, rough, undulating, tight<br>189.35' - Bedding plane, <10 deg, smooth, planar, tight | | | |

| 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 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES | | | SYMBOLIC LOG | LITHOLOGY | COMMENTS |
|---|---|---|---|---|---|---|---|
| | | R Q D (%) | FRACTURES PER FOOT | DESCRIPTION<br>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. |
| | 202.5 | | | 189.95' - Bedding plane, horizontal, smooth, planar, tight<br>190.0' - Fracture zone, 60 deg, smooth, undulating, tight<br>190.3-190.45, 190.6-190.8' - Fracture zone (2), up to 2" rock fragments<br>191.1' - Fracture or mechanical break, 60 deg, rough, undulating, open 7/8"-1"<br>191.35, 191.45, 191.55' - Bedding plane (3), horizontal, smooth, undulating, open 1/8"-1/4"<br>192.0-193.35' - Fracture zone, well graded pieces of limestone fragments 1/4"-2" subangular shapes and several 3/8"-1/2" discs<br>193.1-193.4' - Fracture zone, pieces 1/4"-2" sub angular shapes and several 3/8"-1/2" discs<br>193.95-194.2' - Fracture zone, poorly graded limestone, 1" subangular rock fragments | | Bottom of Boring at 202.5 ft bgs on 3/11/2007 | |

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

# SOIL BORING 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.5 | 0.0 | 1.3 | SS-1 | 2-2-2 (4) | **Topsoil** 0.0-0.3' - grayish black, (N2), moist, roots up to 3/8" diameter, organics | | |
| | 1.5 | | | | **Poorly Graded Sand With Silt (SP-SM)** 0.3-0.9' - pale yellowish brown, (10YR 6/2), moist, very loose, very fine to fine grained, silica sand, rounded grains, 5% nonplastic fines, trace of very fine sand-sized black particles 0.9-1.25' - moderate yellowish brown, (10YR 5/4), moist, very loose, very fine to fine grained, silica sand, 15% nonplastic fines, trace very fine grained particles of a dark yellowish orange and very fine grained black particles | | 5' sections of NW rod, 24" split spoon (SS), 50 lb bags of Quik Gel brand bentonite 10:36 1/4 bag bentonite added to full mud vat using 3-7/8" tricone roller bit |
| 5 | 5.0 | | | | | | |
| 37.5 | | 1.0 | SS-2 | 6-6-4 (10) | **Clayey Sand (SC)** 5.0-6.0' - pale blue green, (5BG 7/2), wet, loose, 16% medium plastic fines, silica sand, trace very fine sand-sized black particles, brownish black staining around roots, trace of coarse sand-sized yellowish gray (5Y 8/1) particles, trace 1/8" rootlets, brownish black staining around rootlets | | |
| | 6.5 | | | | | | |
| | | | | | | | Driller's Remark: 8.5' below ground surface change in drilling |
| | | | | | | | 9.5' stiffened up (harder drilling) |
| 10 | 10.0 | | | | | | |
| 32.5 | 10.3 | 0.3 | SS-3 | 50/3 (50/3") | **Lean Clay With Silt (CL-ML)** 10.0-10.25' - Same as 5.0-6.0' except hard, no organics | | |
| | | | | | | | Driller's Remark: 12.5' started losing water |
| | | | | | | | Hard at 14.0', approximately 40-50% circulation loss, add 1/2 bag bentonite then added another 1/8 bag to mud vat |
| 15 | 15.0 | | | | | | |
| 27.5 | 15.3 | 0.1 | SS-4 | 50/4 (50/4") | **Limestone Fragments** 15.0-15.3' - grayish to dusky yellow, (5Y 8/4 to 5Y 7/4), mild to moderate HCl reaction, 20-30% voids <1/8" in size, spherical to elongated in shape, trace brilliant green very fine grained particles, voids are possible microfossils | | |
| 20 | | | | | | | |

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

# SOIL BORING 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.5 | 20.0 | 0.3 | SS-5 | 50/5 (50/5") | **Silty Sand With Gravel (SM)** 20.0-20.25' - grayish to dusky yellow, (5Y 8/4 to 5Y 6/4), wet, very dense, fine to coarse grained, moderate HCl reaction, 20% nonplastic fines, 15-20% fine gravel-sized to 3/4", all carbonate | | Driller's Remark: Hard at 22.5' then very soft drilling from 23.0-25.0' |
| 25 | 25.0 | | | | | | |
| 17.5 | 26.5 | 1.1 | SS-6 | 35-34-20 (54) | **Silt With Sand (ML)** 25.0-26.1' - dusky yellow, (5Y 6/4), trace white mottling, moist to wet, dense, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 15% very fine sand-sized, 5-10% fine to medium sand-sized, trace fine sand-sized brilliant green particles, all carbonate | | Driller's Remark: Hard at 27.0' |
| 30 | 30.0 | | | | | | Driller's Remark: Soft again at 29.0' |
| 12.5 | 31.5 | 1.2 | SS-7 | 40-30-34 (64) | **Silt With Sand (ML)** 30.0-31.15' - Same as 25.00-26.1' except lenses of very fine grain sized limestone | | Driller's Remark: Hard at 33.5' |
| 35 | 35.0 | | | | | | Driller's Remark: Last foot of run 34.0-35.0' is drilling at 2.5 minutes per inch with 400 psi pressure applied |
| 7.5 | 35.1 | 0.1 | SS-8 | 50/1 (50/1") | **Limestone Fragments** 35.0-35.05' - light olive gray to moderate olive brown, (5Y 5/2 to 5Y 4/4), coarse grained, mild HCl reaction, very poor recovery<br>Begin Rock Coring at 35.5 ft bgs<br>See the next sheet for the rock core log | | Driller's Remark: Approximately 20 minutes to drill 34.0-35.0'<br>Driller's Remark: Will switch over to NQ coring assembly |
| 40 | | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: 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 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | RQD (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| 35.5 | R1-NQ 5 ft 96% | 93 | 0 | | | **Limestone** 35.5-40.3' - light olive gray to moderate olive brown with yellowish gray mottling, (5Y 5/2 to 5Y 4/4 with 5Y 7/2), mild to moderate HCl reaction, very weak (R1), strength decreasing with depth, 35.5 to 37.0' medium strong (R3), poorly fossiliferous (casts), trace black particles and short 3/8" discontinuous laminations, 1/8" voids over 20-30% of surface, fossiliferous up to 3/4" long | 3" NW set to 35.5' below ground surface using casing advancer<br>Start R1 at 15:56<br>Added 1/4 bag bentonite to full mud vat |
| | | | 0 | 36.75, 38.0' - Mechanical break (2) | | | |
| | | | 1 | 38.35' - Fracture, 50 deg, rough, undulating, tight | | | Driller's Remark: Soft at 38.0' |
| | | | 2 | 38.8, 39.2' - Fracture (2), 50 deg, rough, undulating, tight | | | |
| 40<br>2.5 | | | 1 | | | | R1: 5 minutes |
| 40.5 | R2-NQ 5 ft 58% | 35 | NR | 40.2' - Fracture, 60 deg, rough, undulating, tight | | **No Recovery 40.3-40.5'** | |
| | | | >10 | 40.5-40.75' - Fracture zone | | **Limestone** 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 | | | |
| | | | 3 | 42.85' - Fracture, 60-70 deg, rough, undulating, tight | | | |
| | | | NR | 42.95' - Mechanical break, horizontal, rough, undulating, tight<br>43.0, 43.1' - Fracture (2), horizontal, rough, undulating, tight | | **No Recovery 43.4-45.5'** | |
| 45<br>-2.5 | | | | | | | R2: 3 minutes |
| 45.5 | R3-NQ 5 ft 60% | 23 | >10 | 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, 45.5-45.8' carbonate silts 46.0-46.7' extremely weak rock (R0), crumbles under thumb pressure 47.9-48.2' fractured zone, spherical 1/16" voids up to 35% of surface, poorly fossiliferous (casts up to 3/4"), 1/2" elongate trace cavities with no infill, trace medium grained black particles (organics), similar to 35.5-45.5' | |
| | | | >10 | 47.15' - Mechanical break, <1/32" soft silt infill over 25-35% of surface | | | 47.5' Started losing water<br>Driller's Remark: Will set 5' more 3" NW casing |
| | | | >10 | 47.9-48.2' - Fracture zone, 2-1/2"-3" crumbled core fragments | | | |
| | | | NR | | | | R3: 3 minutes |
| 50<br>-7.5 | | | | | | | |
| 50.5 | R4-NQ 5 ft 81% | 75 | | | | **No Recovery 48.5-50.5'** | |
| | | | 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 1-1/2" | | **Limestone** 50.5-54.55' - light olive gray to moderate olive brown, (5Y 5/2 to 5Y 4/4), mild to moderate HCl reaction, medium strong (R3), extremely weak rock (R0) at 53.9', 1/16" voids (90% are under 1/16", 10% are 1/8" spheroidal) up to 25-30% of surface, moderately fossiliferous (casts up to 1/2" in size) | |
| | | | 2 | | | | |
| | | | 1 | 52.5' - Mechanical break, tight | | | |
| | | | 1 | 53.25' - Bedding plane or mechanical break, 0-10 deg, rough, undulating, tight | | | |
| 55<br>-12.5 | | | NR | | | **No Recovery 54.55-55.5'** | R4: 5 minutes |
| 55.5 | | | | | | | |

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R5-NQ 5 ft 100% | 87 | 2 | 55.5' - Bedding plane or mechanical break, horizontal, rough, planar, tight | | **Limestone** 55.5-60.5' - light olive gray to moderate olive brown, (5Y 5/2 to 5Y 4/4), mild to moderate HCl reaction, very weak (R1), 1/16" spheroidal voids up to 30% of surface, moderately fossiliferous (cast up to 3/8"), trace black particles (possibly organics) | Approximately 1.0' below ground surface water level, core run ended at 8:07, first core run on 4/22/07 T. Stewart/A. Bonilla are the loggers. |
| | | | 1 | 56.35, 57.15, 57.6, 58.3, 59.25' - Bedding plane or mechanical break (5), horizontal, rough, undulating, tight to 1" open | | | |
| | | | 2 | | | | |
| | | | 1 | | | | |
| 60 -17.5 | | | 0 | | | | R5: 6 minutes |
| | 60.5 | | | | | | |
| | R6-NQ 5 ft 100% | 100 | 1 | 61.1, 62.0, 63.45' - Mechanical break or bedding plane (3), horizontal, rough, undulating, tight | | 60.5-65.5' - light olive gray to moderate olive brown, (5Y 5/2 to 5Y 4/4), mild to moderate HCl reaction, very weak (R1), voids (<1/16") 20-25% of surface, poorly fossiliferous (casts up to 1/16" elongated), trace black particles, 10%-15% organics as medium grain particles and laminations under 1/16" thick horizontally aligned, medium strong rock (R3), stress joints over 61.0-62.0' vertically oriented | SC-1 collected at 61.1-62' |
| | | | 1 | | | | |
| | | | 1 | 62.4, 62.7, 63.0, 65.1, 65.4' - Mechanical break (5), tight | | | |
| | | | 0 | | | | |
| 65 -22.5 | | | 0 | | | | R6: 9 minutes |
| | 65.5 | | | | | | |
| | R7-NQ 5 ft 96% | 93 | 0 | | | **Limestone** 65.5-70.3' - light olive gray to moderate olive brown, (5Y 5/2 to 5Y 4/4), mild HCl reaction, medium strong (R3), 1/8" voids on 15-20% of surface, some voids filled with hard, medium gray (N5) mineralization, poorly fossiliferous (casts up to 1/8" elongated) | T. Stewart is the logger. |
| | | | 2 | 66.7' - Fracture, 40 deg, rough, undulating, tight | | | |
| | | | 1 | 67.35' - Mechanical break or bedding plane, horizontal, rough, undulating, open up to 1/2" | | | |
| | | | 1 | 68.3' - Fracture, vertical, rough, undulating, tight 68.65' - Fracture, 55-60 deg, rough, undulating, tight | | | |
| 70 -27.5 | | | 1 | 69.4' - Mechanical break, horizontal, rough, undulating, tight | | | R7: 10 minutes |
| | 70.5 | | NR | 70.05' - Fracture, 50-60 deg, rough, undulating, tight | | **No Recovery 70.3-70.5'** | |
| | R8-NQ 5 ft 72% | 40 | 5 | 70.6, 70.7, 70.8, 70.85, 71.5' - Mechanical break or bedding plane, horizontal, rough, undulating, tight 10 1/8" open | | **Limestone** 70.5-74.1' - light olive gray mottled with olive gray, (5Y 5/2 with 5Y 3/2), mild to moderate HCl reaction, strong (R4), extremely weak rock at top of sample, 1/16" voids on 10-15% of surface, poorly fossiliferous, casts up to 1/2" | |
| | | | 2 | 71.2' - Fracture, 50 deg, rough, undulating, tight | | | |
| | | | 2 | 71.7' - Fracture, 30-40 deg, rough, undulating, carbonate silt infill over 100% surface 1/16" thick | | | |
| | | | 1 | 72.1' - Fracture or mechanical break, horizontal, up to 3/8" open | | | 73.5' Got soft, hard again at 75.0' |
| 75 -32.5 | | | NR | 72.8' - Fracture or mechanical break, horizontal, rough, undulating, open 1/4" 73.1' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1/4" | | **No Recovery 74.1-75.5'** | R8: 12 minutes |
| | 75.5 | | | | | | |

| 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 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R9-NQ 5 ft 80% | 62 | >10 | 73.9' - Fracture, 70-80 deg, rough, undulating, tight | | **Limestone** 75.5-79.5' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), black mottling, strong HCl reaction, strong (R4), 1/8" spheroidal voids on 10-15% of surface, poorly fossiliferous (casts up to 5/16"), trace cavities up to 1" elongate and horizontally aligned, no infill in voids or cavities, black 1/16" horizontal laminations, vertical stress joints near 79', fractures with secondary black mineralization infill near 77.2' | T. Stewart/A. Bonilla are the loggers |
| | | | 1 | 75.5-75.85' - Fracture zone, rock fragments 3/4", sub-angular, some granular mineralization on surface | | | |
| | | | 3 | 77.1' - Fracture, 15-20 deg, rough, undulating, tight, black stains on 90% of surface | | | |
| | | | 2 | 77.6, 77.7, 77.9' - Fracture, horizontal, rough, undulating, open up to 1/4" | | | SC-2 collected at 78.5-79.5' |
| | | | NR | 78.4-78.5' - Fracture zone, rough, undulating, 1/16"-1/32" thick infill of very soft carbonate fines | | **No Recovery 79.5-80.5'** | R9: 15 minutes |
| 80 -37.5 | 80.5 | | | | | | Driller's Remark: Will set 3" NW casing from 45.5-75.5' below ground surface Start R-10 at 11:36, observed 50-60% core loss |
| | R10-NQ 5 ft 100% | 82 | 2 | 80.85' - Bedding plane or fracture, 0-5 deg, rough, undulating, brownish black stains over 100% surface, open 1/4" | | **Limestone** 80.5-85.5' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), mild HCl reaction, medium strong (R3), weathered, spheroidal 1/8" voids up to 30% of surface, poorly fossiliferous (casts up to 1/2"), some secondary mineral infill (yellowish gray 5Y 8/1 in color), trace coarse grained sized black particles (organics) | |
| | | | 4 | 81.35, 81.55, 81.65, 81.8' - Bedding plane or mechanical break, horizontal, rough, planar, open up to 1/8" | | | |
| | | | 2 | 82.0, 82.95' - Bedding plane or mechanical break (2), horizontal, rough, undulating, tight to 1/4" open | | | |
| | | | 0 | 82.8' - Bedding plane or mechanical break, horizontal, rough, undulating, organic layers <1/16" thick, apparent weathering | | | |
| 85 -42.5 | 85.5 | | 1 | 83.2' - Mechanical break, tight | | | R10: 8 minutes Add 1/4 bag bentonite to mud vat |
| | R11-NQ 5 ft 100% | 85 | 0 | 84.4' - Fracture, 80-90 deg, rough, undulating, tight | | 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 fossiliferous (mostly casts of echinoderma up to 5/8", white whole fossils and fragments up to 3/4" in size over bottom 89.5-90.5', 3-7% medium to coarse grained black fragments (organics) also as 3/8" long discontinuous laminations less than 3/8" thick, also spiral and conical shaped casts up to 3/16" | |
| | | | 0 | 85.45, 85.6' - Fracture (2), 50-60 deg, rough, undulating | | | |
| | | | 3 | 87.6' - Bedding plane, horizontal, rough, undulating, brownish black infill 1/16" thick over 85% of surface | | | |
| | | | 0 | 87.75' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1/16"-1/8" | | | |
| 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 | | | R11: 6 minutes SC-3 collected at 89.5-90.5' |
| | R12-NQ 5 ft 100% | 87 | 0 | | | 90.5-95.5' - yellowish gray with yellowish gray bedding, (5Y 8/1 with 5Y 7/2), silt-sized black particles, 1/16" voids on 20-25% of surface, highly fossiliferous toward bottom 1/3 of sample (casts and whole fossils) microforams and fossil fragments range from medium to coarse sand-sized particles, oval shaped fossils approximately 1/8", spiral shaped fossils | 14:12 Mix 1/8 bag mud to vat |
| | | | 1 | 91.65' - Bedding plane or mechanical break, rough, undulating, tight | | | |
| | | | 1 | 92.55' - Mechanical break, 3-5 deg, rough, undulating, tight | | | |
| | | | 3 | 93.0' - Bedding plane, horizontal, smooth, planar, tight, possibly organic layer 93.6' - Fracture, 10-20 deg, rough, undulating, 1/8" open | | | |
| 95 -52.5 | 95.5 | | >10 | 93.85, 94.3' - Fracture, 50-60 deg, rough, undulating, tight | | | R12: 15 minutes |

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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 on 4/22/07 START : 4/21/2007 END : 5/9/2007 LOGGER : T. Stewart, R. McComb, A. Bonilla

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R13-NQ 5 ft 100% | 43 | 3 | 94.45' - Fracture, 80-90 deg, rough, undulating, tight<br>94.8-95.2' - Fracture zone | | **Limestone**<br>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 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 (N4) particles in rock matrix<br>95.5-98.4' friable in places due to fossils, majority of fossil content at 98.4-100.5' voids 5-10% up to 1/16", interval from 96.5-98.5' extremely weak rock (R0) | T. Stewart is the logger. |
| | | | >10 | 95.55, 95.7, 96.75' - Bedding plane or mechanical break, horizontal, rough, undulating | | | |
| | | | >10 | 97.5-98.2' - Fracture zone, vertical | | | |
| | | | 2 | 98.55' - Fracture, 5-10 deg, rough, undulating, tight<br>98.65, 98.8' - Mechanical break (2), tight | | | |
| 100<br>-57.5 | 100.5 | | 0 | 99.0' - Bedding plane or mechanical break, horizontal, rough, undulating, 1/8" open | | | R13: 6 minutes |
| | R14-NQ 5 ft 94% | 82 | 0 | | | 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 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 | Driller's Remark: Will set 3" NW casing (25' more)<br>Last core run on 4/22/07 |
| | | | 2 | 102.0, 102.35' - Mechanical break or bedding plane (2), 3-5 deg, rough, undulating, open up to 1/8" | | | |
| | | | 1 | 102.6' - Bedding plane or mechanical break, horizontal, rough, undulating | | | |
| | | | 0 | | | | |
| 105<br>-62.5 | 105.5 | | 0 | | | | R14: 8 minutes |
| | | | NR | | | **No Recovery 105.2-105.5'** | |
| | R15-NQ 5 ft 98% | 82 | >10 | 105.5-106.1' - Fracture zone, fragments up to 2" | | **Limestone**<br>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 first 2.5', rest of sample is 5-10% voids, trace irregular shaped casts up to 1/2" over first 2.5', no cavities below 107.9'; 15-20% medium grained medium dark gray particles in rock matrix, microforams up to 1/32", oval and spherical shaped molds/casts and very fine to fine grained (shell fragments) angular white particles | 8:05 Start first core run of 4/23/07<br>Unable to get water level before coring start due to coring barrel being hung over night |
| | | | 2 | 106.85' - Fracture, 60-70 deg, rough, undulating, tight | | | |
| | | | 1 | 106.95' - Fracture, 20-30 deg, rough, undulating, tight<br>107.9, 109.05, 109.15' - Mechanical break or bedding plane (3), horizontal, rough, planar to undulating, open to 1/16" | | | |
| | | | 2 | | | | |
| 110<br>-67.5 | 110.5 | | 0 | | | | R15: 10 minutes |
| | | | NR | | | **No Recovery 110.4-110.5'** | |
| | R16-NQ 5 ft 100% | 97 | 0 | | | **Limestone**<br>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 horizontally aligned in a 1/2" bed at 114.0' | |
| | | | 2 | 112.15, 112.3' - Mechanical break or bedding plane (2), horizontal, rough, undulating, tight | | | |
| | | | 1 | 113.0' - Mechanical break, tight<br>113.25' - Mechanical break or bedding plane, horizontal, rough, planar, open to 1/16" | | | |
| | | | 0 | | | | |
| 115<br>-72.5 | 115.5 | | 0 | | | | R16: 10 minutes |

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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 on 4/22/07 START : 4/21/2007 END : 5/9/2007 LOGGER : T. Stewart, R. McComb, A. Bonilla

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | 0 | | | **Limestone**<br>115.5-120.5' - yellowish gray, (5Y 7/2), strong HCl reaction, very weak to extremely weak (R1 to R0), very fossiliferous (casts, molds, microforams), trace cavities with medium dark gray infill up to 1-1/4", 25-35% medium to coarse grained medium dark gray particles in rock matrix, gray mottling in matrix at 119.0' | SC-4 collected at 115.5-116.55' |
| | | | >10 | 116.55, 116.7' - Bedding plane or mechanical break, horizontal, rough, undulating, tight to open 1/4" | | | |
| | R17-NQ<br>5 ft<br>100% | 40 | >10 | 116.55-117.3' - Fracture zone<br>118.15-118.45' - Fracture zone | | | |
| | | | 7 | 118.5, 118.65, 118.8, 188.95, 119.2' - Bedding plane or mechanical break (5), horizontal, rough, undulating, tight to open 1/4" | | | |
| 120<br>-77.5 | 120.5 | | 2 | 119.45' - Fractures (2), horizontal and vertical, rough, undulating, perpendicular, tight | | | R17: 9 minutes |
| | | | NR | | | **No Recovery 120.5-121.0'** | 9:25 Add 1/4 bag bentonite after emptying mud vat and refilling |
| | | | 1 | 119.6, 119.8' - Bedding plane or mechanical break (2), 0-5 deg, rough, planar, tight | | **Carbonate Silt With Silica Sand (ML)**<br>121.0-121.2' - grayish yellow, (5Y 7/2), wet, strong HCl reaction, 15-25% very fine to fine grained, clear, subrounded, silica sands, 3-7% very fine to fine grained dark yellowish orange (10YR 6/6) and light brown (5YR 5/6) particles | |
| | | | 1 | 121.2' - Bedding plane, horizontal, cohesive silt infill on surface, 1/4" thick<br>121.8, 122.8' - Mechanical break (2), tight | | | |
| | R18-NQ<br>5 ft<br>90% | 70 | 1 | 123.2' - Bedding plane or mechanical break, horizontal, rough, undulating, open 3/8" | | **Limestone**<br>121.2-125.5' - yellowish gray, (5Y 7/2), strong HCl reaction, very fossiliferous (microforams, fossil casts and molds), thinly bedded near 123.5-124.0' with olive gray staining, organic odor from crumbled rock, friable from 121.2' to 123.0', trace cavities up to 3/4" some with white mineralization as 50% infill (rimmed), medium dark gray medium to coarse grained on 25-35% of rock matrix<br>125.5-130.5' - yellowish gray, (5Y 7/2), strong HCl reaction, very weak (R1), voids (<1/16") over 15-20% (mostly over top 3'), 1/16"x3/16" elongated trace cavities horizontally aligned, cavities in lower 2' have white secondary mineralization rimming the outside of the void/cavity, medium dark gray particles up to 10% of rock matrix, trace medium gray cavities up to 3/4" and to trace medium grained black particles/organics throughout entire run; R-19 is highly fossiliferous (microforams and casts/molds) | |
| | | | 6 | 123.6, 123.63, 123.65, 123.7, 123.75, 123.8, 124.0, 124.02' - Bedding plane or mechanical break (8), horizontal, rough, planar, tight, dark surfaces, possibly bedding plane of dark material | | | |
| 125<br>-82.5 | 125.5 | | 0 | | | | R18: 13 minutes |
| | | | 1 | | | | |
| | | | 2 | 126.4, 127.05' - Bedding plane or mechanical break (2), horizontal, rough, undulating, tight to 1/4" open | | | |
| | R19-NQ<br>5 ft<br>100% | 77 | 5 | 127.5-127.65' - Fracture zone, rock fragments<br>128.0-128.15' - Fracture zone, angular rock fragments, 1/2"-5/8" | | | |
| | | | 1 | 128.25, 128.35, 129.0' - Fracture (3), horizontal and vertical, rough, undulating, open up to 3/4", cavity infilled with gray material at 129' | | | |
| 130<br>-87.5 | 130.5 | | >10 | 129.35' - Bedding plane, 10-15 deg, open 3/4" | | | R19: 10 minutes |
| | | | 6 | 130.0-130.5' - Fracture zone, vertical<br>130.55' - Mechanical break or bedding plane, horizontal, smooth, undulating, open 1/8" | | | |
| | | | 4 | 131.0' - Mechanical break or bedding plane, horizontal, rough, undulating | | | |
| | R20-NQ<br>5 ft<br>98% | 65 | 1 | 131.3, 131.35, 131.4, 131.5, 131.6, 131.65, 131.7, 131.8' - Bedding plane or mechanical break (8), horizontal, rough, undulating, open 1/8" | | | |
| | | | 5 | 132.1, 133.0' - Mechanical break (2), tight<br>132.55' - Bedding plane or mechanical break, horizontal, rough, planar | | | |
| 135<br>-92.5 | 135.5 | | 2 | 133.0' - Mechanical break, tight | | | R20: 11 minutes |

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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 on 4/22/07 START : 4/21/2007 END : 5/9/2007 LOGGER : T. Stewart, R. McComb, A. Bonilla

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

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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

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| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | | | NR | | | **Limestone**<br>149.0-150.5' - light olive gray, (5Y 5/2), strong HCl reaction, medium strong to strong (R3 to R4), 1/16" voids on 5-10% of surface, trace cavities up to 3/16"x3/16" with grayish yellow (5Y 8/1) infill, poorly fossiliferous (casts up to 3/8")<br>150.5-153.6' - light olive gray, (5Y 5/2), mild to moderate HCl reaction, weak to medium strong (R2 to R3), dusky yellowish brown (10YR 2/2) wavy laminations, trace of medium grained organics in laminations<br>153.6-155.3' - light olive gray, (5Y 5/2), strong HCl reaction, medium strong to very weak (R3 to R1), very fossiliferous (microforams), very similar to 145.5-149.0', medium to coarse grained plate-like angular fragments, yellowish gray (5Y 8/1) in color<br>**No Recovery 155.3-157.3'**<br>**Poorly Graded Silica Sand (SP)**<br>157.3-159.9' - loose, fine grained, mild to moderate HCl reaction, clear, subrounded sands with trace carbonate fines, matrix of fines are very pale orange (10YR 8/2), trace light brown (5Y 5/6) and black particles (sum of fines is up to 5%), this sand grades to siltier with depth<br>**Limestone**<br>159.9-160.1' - moderate olive brown, (5Y 4/4), strong HCl reaction, 1/16" elongated voids on 30-35% of surface, 10° bedding plane disconformity at 160.1'<br>**Limestone And Carbonate Silt (ML)**<br>160.1-160.5' - pale greenish yellow, (10YR 8/2), very stiff, very fine grained, strong HCl reaction, with 5-10% coarse grained grayish yellow (5Y 8/4) limestone fragments<br>**Limestone**<br>160.5-162.2' - yellowish gray, fine grained, strong HCl reaction, voids absent to 161.3', 1/16" voids from 161.3' to 161.8' on 5%-10% of surface, fossils casts/molds<br>162.2-165.15' - dusky yellow, (5Y 6/4), fine to very fine grained, mild to moderate HCl reaction, weak (R2), becoming (R2) weak rock from approximately 163.5' to 164.5', voids variable over interval from 15-20% to <1% in some intervals (especially R2 rock), fractures in 163.7-164.2' interval, trace organic laminae at 163.2' | T. Stewart/R. McComb are the loggers.<br><br>Driller's Remark: Will add 3" NW casing to seal off sand<br>Driller's Remark: 100% circulation loss<br>On the field log the interval that was not recovered (155.5-157.3') appears to be from the top of the core<br>R25: 14 minutes |
| | R25-NQ<br>5 ft<br>64% | 0 | NR | | | | |
| | | | NA | | | | |
| 160<br>-117.5 | | | 2 | 159.9' - Bedding plane, 0-10 deg, rough, planar, contact with silica sand above | | | SC-7 collected at 160.5-161.6'<br>9:49, 5/1/07 Water level 4.5' below ground surface<br>7:50, 5/8/07 Water level approximately 3' below ground surface<br>Offset approximately 10' to west of A-11 and drill A-11R, lost bit in A-11; tried fishing for bit on 5/6/07 to no avail; offset A-11 on 5/7/07, drilled 4-7/8" borehole to 160', set NW casing at 160.5'<br>R26: 5 minutes |
| | 160.5 | | 0 | 160.1' - Bedding plane, 10 deg | | | |
| | | | 0 | | | | |
| | | | 2 | 161.6, 162.4, 162.57' - Fracture (3), horizontal, rough, undulating, tight | | | |
| | R26-NQ<br>5 ft<br>93% | 57 | 5 | 162.75, 162.95, 163.0, 163.35, 164.25, 164.3, 164.5, 164.6, 164.73, 164.92' - Fracture (10), horizontal, smooth, planar, open | | | |
| | | | 4 | 163.65' - Fracture, horizontal, rough, stepped, open | | | |
| 165<br>-122.5 | | | 3 | 164.3-164.5' - Fracture, vertical, stepped, open | | | |
| | 165.5 | | NR | | | | |
| | | | 2 | 165.77' - Fracture, horizontal, rough, planar, tight | | | |
| | | | 3 | 165.98' - Fracture, horizontal, rough, undulating, open | | | |
| | | | | 166.8' - Fracture, <5 deg, rough, stepped, open | | | |
| | R27-NQ<br>5 ft<br>100% | 75 | 1 | 166.95, 167.7' - Fracture (2), <5 deg, smooth, undulating, tight | | | |
| | | | 2 | 168.4, 169.51' - Fracture (2), 10 deg and 10-20 deg, smooth, planar, tight | | | |
| 170<br>-127.5 | | | 2 | 168.58' - Fracture, horizontal, rough, undulating, open 1/16", silty clayey lining over 80%-90% of surface | | | R27: 8 minutes |
| | 170.5 | | | 169.8' - Fracture, horizontal, rough, undulating | | | |
| | | | 4 | 170.05' - Fracture, horizontal, rough, undulating, open | | | |
| | | | 1 | 170.7' - Fracture, horizontal, smooth, undulating, tight, <1/16" brown clay lining over surface | | | |
| | R28-NQ<br>5 ft<br>98% | 54 | 3 | 170.95' - Fracture, horizontal, smooth, planar, open, <1/16" silty coating over 100% of surface | | | |
| | | | | 171.17' - Fracture, smooth, planar, open | | | |
| | | | 4 | 171.5' - Fracture, 40 deg, rough, stepped, tight | | | |
| 175<br>-132.5 | | | 3 | 172.2' - Fracture, 60 deg, rough, undulating, tight, length is from 172.0-172.9' | | | R28: 7 minutes |
| | 175.5 | | | | | | |

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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 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R29-NQ 5 ft 94% | 51 | NR | 173.15' - Fracture, horizontal, smooth, undulating, open | | **No Recovery 165.15-165.5'** | |
| | | | 2 | 173.7' - Fracture, <5 deg, smooth, stepped, tight | | **Limestone** | |
| | | | 1 | 174.08, 174.2, 174.35, 164.55' - Fracture (4), horizontal, smooth, planar, tight (open at 174.35) | | 165.5-166.1' - moderate olive brown, (5Y 4/4), strong HCl reaction, laminated, voids up to 3/8" to 3/4" covering 50-60% of surface, some cavity infilling with gray limestone (nodules/intraclasts), trace fossil molds and casts | |
| | | | 10 | 174.7' - Fracture, horizontal, smooth, planar, open, <1/16" thick brown clay over 100% of surface | | 166.1-166.8' - yellowish gray to very light gray, (5Y 7/2 to N8), very fine grained, strong HCl reaction, 1/16" voids on 5-10% of surface, cavities (>5) 3/8"x3/16", fossil casts/molds common | |
| | | | >10 | 175.1' - Fracture, <5 deg, rough, stepped, open | | | |
| 180 -137.5 | 180.5 | | >10 | 175.6' - Fracture, <5 deg, smooth, stepped, open, dark brown to black stain over 95%-100% surface | | | R29: 6 minutes |
| | R30-NQ 5 ft 100% | 46 | NR | 176.1' - Fracture, horizontal, rough, stepped, open | | 166.8-170.5' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine to very fine grained, moderate to strong HCl reaction, becoming stronger with depth (up to R2), voids up to 1/16" on 15-25% of surface with some zones of very fine grained limestone with 0% voids, cavities rare, laminated from 167.6-167.8' (very weak rock [R1]), some brownish gray to light gray mottling especially from 168.7-169.3' | |
| | | | 1 | 177.1' - Fracture, horizontal, smooth, planar, tight | | | |
| | | | 3 | 177.6, 177.7, 177.82' - Fracture (3), horizontal and <10 deg, smooth, planar, tight | | | |
| | | | 2 | 177.9' - Fracture, 0-40 deg, smooth, stepped, open, dark brown/black stain over 40% | | | |
| | | | 4 | 178.1-178.4' - Fracture zone, 0-60 deg, rough, undulating, open | | | |
| | | | 3 | 178.55' - Fracture, <5 deg, smooth, undulating, open | | | |
| 185 -142.5 | 185.5 | | | 179.17' - Fracture, horizontal, rough, stepped, open | | 170.5-175.1' - dusky yellow to yellowish gray, (5Y 6/4 to 5Y 7/2), moderate to strong HCl reaction, voids up to 1/16" over 10-15% of surface, 3/8"x3/16" cavities, trace fossil molds//casts, laminated at 171.0', fine grained with occasional thin beds of very fine grained limestone with few voids especially near base of interval | R30: 9 minutes |
| | | | | 179.25-181.2' - Fracture zone, rough to smooth, planar to undulating, open to tight | | | |
| | R31-NQ 5 ft 99% | 62 | 4 | 180.8' - Fracture, <5 deg, rough, stepped, open | | | |
| | | | 7 | 181.8, 181.87' - Fracture (2), horizontal, smooth, planar, open | | | |
| | | | 0 | 182.0' - Fracture, 0-90 deg, smooth, undulating, tight | | | |
| | | | 1 | 182.6' - Fracture, <5 deg, rough, undulating, open | | 175.1-175.4' - dusky yellow, (5Y 6/4), strong HCl reaction, laminated with black organic laminae, minimum voids and cavities covering 50-60% of surface | |
| | | | 5 | 182.95' - Fracture, 40 deg, rough, undulating to stepped, tight | | | |
| 190 -147.5 | 190.5 | | | 183.65, 184.4, 186.4' - Fracture (3), horizontal, rough, undulating, open | | **No Recovery 175.4-175.5'** | R31: 8 minutes |
| | | | | 183.8' - Fracture, 0-<5 deg, smooth, planar to stepped, open | | **Limestone** | |
| | R32-NQ 5 ft 90% | 40 | NR | 184.17' - Fracture, horizontal, smooth, planar, tight | | 175.5-180.2' - variegated dusky yellow to light olive brown, (5Y 6/4 to 5Y 5/6), fine grained, moderate to strong HCl reaction, very weak (R1), light gray mottling (N8), fine grained limestone especially from 176.8-177.8', voids (1/16") common in fine grained material up to 15-20% of surface, some cavities up to 3/8"-3/4"x3/8" deep, voids 1-3% in very fine grained material, some cavity infilling, laminated very weak rock from 177.9-180.2' with black carbonaceous material | End drilling on 5/8/07 |
| | | | 4 | 184.93, 185.2' - Fracture, rough, undulating, tight | | | Water level 3.5' below ground surface on 5/9/07 |
| | | | 3 | 185.25' - Fracture, 40-50 deg, rough, undulating, tight | | | Begin drilling at 190.5' on 5/9/07 |
| | | | 2 | 185.95, 186.0' - Fracture, horizontal, smooth, open | | | SC-8 collected at 191.15-192' |
| | | | 4 | 186-186.4' - Fracture, vertical, rough, undulating, tight | | | |
| | | | >10 | 186.4' - Fracture, horizontal, rough, undulating, open | | | |
| 195 -152.5 | 195.5 | | NR | 186.6, 186.7' - Fracture, <5 deg, rough, undulating, open | | **No Recovery 180.2-180.5'** | R32: 6 minutes |
| | | | | 186.95' - Fracture, <5 deg, rough, stepped, open | | | |

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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 on 4/22/07 START : 4/21/2007 END : 5/9/2007 LOGGER : T. Stewart, R. McComb, A. Bonilla

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

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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 on 4/22/07 START : 4/21/2007 END : 5/9/2007 LOGGER : T. Stewart, R. McComb, A. Bonilla

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R37-NQ 5 ft 52% | 8 | >10 | 211.65' - Fracture, horizontal, smooth, undulating, tight | | **Limestone** 195.5-197.5' - yellowish gray, (5Y 7/2), mild HCl reaction, void and 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, fossiliferous (molds and casts), some thin carbonaceous laminae | R. McComb is the logger. |
| | | | >10 | 211.8' - Fracture, horizontal, smooth, planar, tight | | | |
| | | | >10 | 212.3' - Fracture, horizontal, rough, undulating, open | | | |
| | | | >10 | 212.5-212.7 and 212.85-212.95' - Fracture zone, <5 deg, rough, undulating, open | | | 218' circulation 100% loss |
| | | | NR | 213.4' - Fracture, <5-70 deg, rough, undulating, open<br>213.55' - Fracture, <5-90 deg, rough, undulating, open, black staining on 85-90% of surface<br>215.5-215.75' - Fracture zone, various fracture orientations, gravel-sized fragments, open | | 197.5-200.5' - yellowish gray, (5Y 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 |
| 220 -177.5 | 220.5 | | | | | | |
| | R38-NQ 5 ft 15% | 0 | 3 | 215.75' - Fracture, 0-<5 deg, rough, stepped, open | | 200.5-200.67' - very similar to 197.5-200.5', "chalky" with dark brown carbonaceous layers | |
| | | | NR | 216.15' - Fracture, 0-40 deg, rough, undulating, open<br>216.15-217.1' - Fracture zone, horizontal, rough to smooth, planar to undulating, open<br>217.1' - Fracture, <5 deg, rough, undulating, open<br>217.3' - Fracture, 30 deg, rough, undulating, tight<br>217.6-218.1' - Fracture zone, <5-70 deg, rough, undulating, open<br>220.6' - Fracture, <5-30 deg, rough, stepped, open<br>220.95, 221.2' - Fracture, <5 deg, rough, undulating, open<br>225.5-228.0' - Fracture zone, 0-90 deg, rough to smooth, undulating, open | | 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'<br>202.8-203.5' - yellowish gray, (5Y 7/2), very fine grained, mild HCl reaction, with laminae, 1/16" voids over <1% of surface area<br>**No Recovery 203.5-205.5'** | R38: 4 minutes |
| 225 -182.5 | 225.5 | | | | | | |
| | R39-NQ 5 ft 50% | 0 | >10 | | | **Limestone** 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% of surface, very fine grained rock contains <1-5% voids | 226' Regain approximately 20% circulation |
| | | | >10 | | | | |
| | | | 0 | | | | |
| | | | NR | | | **No Recovery 207.0-210.5'**<br>**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 fine grained, becoming very fine grained at bottom 0.1', little to no voids, no fossils, medium strong (R3) rock | R39: 3 minutes |
| 230 -187.5 | 230.5 | | | | | | |
| | R40-NQ 5 ft 10% | 0 | >10 | 230.5-231.0' - Fracture zone, rock fragments | | 211.4-212.0' - yellowish gray, (5Y 7/2), fine grained, no to mild HCl reaction, laminated with black carbonaceous/organic material, thin vertical fracture extends from 211.4-211.5' | |
| | | | NR | | | | R40: 3 minutes |
| 235 -192.5 | 235.5 | | | | | | |

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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 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (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)<br>**Limestone**<br>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)<br>**No Recovery 213.7-215.5'** | R41: 2 minutes |
| 245 -202.5 | R42-NQ 5 ft 0% 245.5 | 0 | NR | | | **Limestone**<br>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'<br>217.0-218.1' - yellowish gray, (5Y 7/2), mild to moderate HCl reaction, voids and cavities common (up to several centimeters), fossiliferous (molds/casts) and worm burrows (unfilled-open), gastropods, forams<br>**No Recovery 218.1-220.5'** | R42: 2 minutes |
| 250 -207.5 | R43-NQ 5 ft 0% 250.5 | 0 | NR | | | **Limestone**<br>220.5-221.25' - yellowish gray to very light gray, (5Y 7/2 to N8), moderate HCl 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<br>**No Recovery 221.25-225.5'** | No special cores have been pulled since SC-8 because RQDs <0.8' (for a continuous length)<br>R43: 3 minutes |
| 255 -212.5 | R44-NQ 5 ft 8% 255.5 | 0 | >10<br>NR | 250.5-250.9' - Fracture zone, gravel-sized rock fragments | | **Limestone**<br>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<br>**No Recovery 228.0-230.5'** | R44: 5 minutes |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: A-11 | SHEET 14 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 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R45-NQ 5 ft 34% | 0 | >10<br>>10<br>NR | 255.5-256.1' - Fracture zone, gravel-sized rock fragments<br>256.1' - Fracture, <5-50 deg, rough, stepped, open<br>256.3, 256.5' - Fracture (2), 0-60 deg, rough, stepped to undulating, open<br>256.5-256.7' - Fracture, vertical, rough, stepped, open<br>256.7' - Fracture (2), <5-60 deg, rough, stepped<br>256.7-257.2' - Fracture zone, open, sand to gravel-size rock fragments | | **Limestone**<br>230.5-231.0' - yellowish brown, (5YR 7/2), no to mild HCl reaction, gravel-sized fragments, cavities and voids on 30-40% of surface, voids up to 3/16"x3/8", fossil voids/casts common<br>**No Recovery 231.0-250.5'**<br>**Limestone**<br>250.5-250.9' - yellowish gray, (5Y 7/2), mild HCl reaction, fossiliferous (casts/molds), voids (<1/16") covering 80-90% of surface<br>**No Recovery 250.9-255.5'** | R45: 6 minutes |
| 260<br>-217.5 | 260.5 | | | | | | |
| | R46-NQ 5 ft 26% | 0 | >10<br>1<br>NR | 260.5-261.35' - Fracture zone, horizontal and vertical, rough, undulating to stepped, open<br>261.5' - Fracture, <5 deg, rough, stepped, open<br>261.55' - Fracture, 20 deg, rough, stepped, open<br>261.7' - Fracture, 20 deg, rough, undulating to stepped | | **Limestone**<br>255.5-256.1' - yellowish gray, (5Y 7/2), fine to very fine grained, moderate to strong HCl reaction, voids on 20-30% of surface, rare voids in very fine grained limestone, some fossil molds and casts<br>256.1-257.2' - yellowish gray, (5Y 7/2), moderate to mild HCl reaction, extremely weak (R0), friable becoming gravel to sand-sized limestone fragments with depth, voids over 40-50% of surface<br>**No Recovery 257.2-260.5'**<br>**Limestone**<br>260.5-261.8' - yellowish gray, (5Y 7/2), laminated from 260.5-261.0', some bluish gray banding at 261.5-261.6', very weak (R1) to extremely weak (R0), voids and cavities rare in upper laminated section becoming common with depth, some fossil casts/molds<br>**No Recovery 261.8-265.5'**<br>**Limestone**<br>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 limestone containing few <5% voids, cavities 3/8"x3/16", trace fossil voids/casts<br>**No Recovery 265.9-270.5'**<br>**Limestone**<br>270.5-271.9' - yellowish gray, (5Y 7/2), very fine grained, moderate HCl reaction, gravel-sized limestone to 271.25', voids and cavities becoming more common with depth, sparse through upper part of interval | R46: 5 minutes |
| 265<br>-222.5 | 265.5 | | | | | | |
| | R47-NQ 5 ft 8% | 0 | 10<br>NR | 265.5-265.7' - Fracture zone, rock fragments<br>265.7' - Fracture, horizontal, rough, undulating, open<br>265.8' - Fracture, <5 deg, rough, undulating, tight | | | R47: 3 minutes |
| 270<br>-227.5 | 270.5 | | | | | | |
| | R48-NQ 5 ft 70% | 0 | >10<br>4<br>>10<br>10<br>NR | 270.5-271.25' - Fracture zone, variable fracture orientation<br>271.25' - Fracture, 40 deg, smooth, planar, open<br>271.75' - Fracture, horizontal, smooth, undulating to planar, open<br>272.0' - Fracture, 10 deg, smooth, planar, tight<br>272.18' - Fracture, 40 deg, smooth, stepped, loose, conical in shape<br>272.35' - Fracture, horizontal, smooth, stepped, tight<br>272.5, 272.62, 272.73, 272.95, 273.03' - Fracture (5), horizontal, smooth, planar, open | | | R48: 6 minutes |
| 275<br>-232.5 | 275.5 | | | | | | |

| PROJECT NUMBER: | 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 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R49-NQ 5 ft 26% | 0 | >10 | 273.18-273.6' - Fracture zone, variable fracture orientations, limestone gravel | | **Limestone** 271.9-274.0' - yellowish gray, (5Y 7/2), moderate to strong HCl reaction, becoming stronger at 273.6-273.8' (R2) and returning to very weak rock below 273.8', very fine grained (chalky), voids covering 5-10% of surface, laminated in upper 0.5-0.7', trace cavities (3/8"x3/8"), trace fossil molds/casts, gravelly and blue with some black carbonaceous/organic material | |
| | | | 0 | 273.6' - Fracture, horizontal, smooth, undulating, tight | | | |
| | | | NR | 273.8' - Fracture, <5 deg, rough, stepped<br>273.8-274.0' - Fracture zone, various fracture angles, rock fragments<br>275.5-275.95' - Fracture zone, variable fracture orientation, rock fragments<br>275.95' - Fracture, <5 deg, rough, stepped, open<br>276.3' - Fracture, <5 deg, rough, undulating, open<br>276.3-276.8' - Fracture zone, smooth to rough, planar to undulating, variable fracture orientation, rock fragments | | **No Recovery 274.0-275.5'**<br>**Limestone** 275.5-276.8' - yellowish gray to very light gray, (5Y 7/2 to N8), fine to very fine grained, mild to strong HCl reaction, light gray thin bed at 276.55', voids and cavities common up to 3/8"-3/4"x3/16"-3/8", voids and cavities on 40-50% of surface, rock (except for N8 limestone where voids are absent), fossil casts/molds, strong HCl reaction for very fine grained N8 rock | R49: 4 minutes |
| 280 -237.5 | 280.5 | | | | | | |
| | R50-NQ 5 ft 64% | 0 | >10 | 280.5' - Fracture, <5 deg, rough, stepped, open | | **No Recovery 276.8-280.5'**<br>**Limestone** 280.5-282.75' - yellowish gray, (5Y 7/2), fine grained, mild to moderate HCl reaction, voids and cavities common over 60-70% rock with occasional intraclastic limestone rock fragments (darker gray) with cavity infilling, cavities 3/8"-3/4" to 3/16"-3/8", fossiliferous (molds and casts)<br>282.75-283.7' - variegated pale blue to yellowish gray, (5PB 7/2 to 5Y 7/2), fine to medium grained, mild to moderate HCl reaction, becoming laminated with depth, fossil casts/molds common in upper 0.3' (gastropods), voids and cavities present (up to several centimeters)<br>**No Recovery 283.7-285.5'** | |
| | | | 3 | 280.5-281.8' - Fracture zone, numerous fractures, some vertical | | | |
| | | | >10 | 282.2' - Fracture, <5-40 deg, rough, stepped, open<br>282.75-283.15' - Fracture zone, 10 deg, rough, planar, tight | | | |
| | | | 1 | 282.75' - Fracture, <5 deg, rough, undulating, open | | | |
| | | | NR | 283.15' - Fracture, <5-90 deg, rough, stepped, open<br>283.33' - Fracture, 20 deg, rough, stepped, tight | | | R50: 3 minutes |
| 285 -242.5 | 285.5 | | | | | | Total Depth is 285.5', no special cores since SC-8, no lengths >0.8' |
| | | | | | | Bottom of Boring at 285.5 ft bgs on 5/9/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-12 SHEET 1 OF 10 |

# SOIL BORING 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

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

WATER LEVELS : 5.3 ft bgs on 05/03/07 START : 5/2/2007 END : 5/4/2007 LOGGER : W. Elliott, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.1 | 0.0 – 1.5 | 1.0 | SS-1 | 1-2-2 (4) | **Poorly Graded Sand (SP)** 0.0-0.8' - light gray, (N7), moist, very loose, very fine to fine grained, trace nonplastic fines, black (N1) organic bed with plant roots at 0.2-0.3', sand is silica | | Water level is based on Ground Water Monitoring at LNP site (FSAR Table 2.4.12.08) 15:45 on 5/2/07 preparing to drill |
| | | | | | **Silty Sand (SM)** 0.8-1.0' - moderate brown, (5YR 4/4), moist, very loose, very fine to fine grained, approximately 20% nonplastic fines, gradational contact with overlying material, sand is silica | | |
| 5 | 5.0 | | | | | | |
| 37.1 | 5.0 – 6.5 | 1.3 | SS-2 | 4-4-4 (8) | **Silty Sand (SM)** 5.0-5.5' - yellowish gray, (5YR 7/2), wet, loose, very fine to fine grained, grading more silty with depth, approximately 46% nonplastic fines, sand is silica | | Water table about 5' below ground surface |
| | | | | | **Lean Clay (CL)** 5.5-6.3' - light olive gray with dusky yellow mottling, (5YR 5/2 with 5YR 6/4), medium stiff, medium plasticity, no dilatancy, with increasing plasticity and less sand at 6.0', 10% very fine grained silica sand | | |
| 10 | 10.0 | | | | | | |
| 32.1 | 10.0 – 11.5 | 1.1 | SS-3 | 20-29-50 (79) | **Silt (ML)** 10.0-11.1' - grayish orange, (10YR 7/4), wet to moist, hard, nonplastic, rapid dilatancy, moderate to strong HCl reaction, 10-15% very fine grained sand, all carbonate | | |
| 15 | 15.0 | | | | | | |
| 27.1 | 15.0 – 15.3 | 0.0 | SS-4 | 50/3.5 (50/3.5") | **No Recovery 15.0-15.3'** | | |
| 20 | | | | | | | |

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

# SOIL BORING 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

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

WATER LEVELS : 5.3 ft bgs on 05/03/07 START : 5/2/2007 END : 5/4/2007 LOGGER : W. Elliott, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.1 | 20.0 – 21.5 | 1.0 | SS-5 | 24-21-22 (43) | **Silty Sand With Limestone (SM)** 20.0-21.0' - grayish orange, (10YR 7/4), wet, dense, fine to coarse grained, moderate HCl reaction, 24% nonplastic fines, 30% fine to coarse gravel sized (up to 1"), fragments are very porous and fossiliferous, all carbonate | | |
| 25 / 17.1 | 25.0 – 25.9 | 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% nonplastic fines, 25% fine gravel sized | | Driller's Remark: Soft at 28.5' |
| 30 / 12.1 | 30.0 – 31.5 | 1.0 | SS-7 | 20-11-15 (26) | **Silty Sand With Gravel (SM)** 30.0-31.0' - Same as 20.0-21.0' except dark yellowish orange, medium dense | | Driller's Remark: Harder at 32.5' |
| 35 / 7.1 | 35.0 – 35.1 | 0.0 | SS-8 | 50/1 (50/1") | **No Recovery 35.0-35.1'** Begin Rock Coring at 35.0 ft bgs See the next sheet for the rock core log | | Driller's Remark: Switch to NQ at 35' |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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 05/03/07 START : 5/2/2007 END : 5/4/2007 LOGGER : W. Elliott, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 7.1 | 35.0 | | | | | | HW casing set at 35' |
| | R1-NQ 5 ft 98% | 50 | 2 | 35.4' - Fracture, <5 deg, rough, stepped, open | | **Limestone** 35.0-39.9' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, very weak (R1), becoming extremely weak (R0) and friable at 38.9-39.3', fossiliferous (molds and casts) with voids covering 50-60%, cavities >5 up to 3/8"-3/4"x3/16", mottled, less voids through extremely weak rock zone | |
| | | | 3 | 35.6' - Fracture, 0-40 deg, rough, stepped, tight | | | |
| | | | 0 | 36.05' - Fracture, 40-70 deg, rough, stepped, approximately 0.3-0.4' long, open to tight<br>36.2' - Fracture, 40-70 deg, rough, stepped, approximately 0.3-0.4' long, open to tight | | | |
| | | | 1 | 36.8' - Fracture, 30 deg, rough, undulating, tight<br>38.2' - Fracture, 70 deg, rough, undulating, tight | | | |
| | | | 3 | 39.05, 39.25, 39.5' - Fractures (3), <5-90 deg, rough, stepped, tight to open | | | R1: 6 minutes |
| 40 | 40.0 | | | | | | |
| 2.1 | | | NR | | | **No Recovery 39.9-40.0'** | |
| | R2-NQ 5 ft 64% | 8 | 0 | | | **Limestone** 40.0-43.2' - Same as 35.0-39.9' except with interbeds of very weak to extremely weak (R1 to R0) rock at 40.5-41.3' | |
| | | | 2 | 41.65' - Fracture, 60 deg, rough, stepped, open | | | |
| | | | >10 | 41.9' - Fracture, 40-60 deg, rough, stepped, open<br>42.3-42.9' - Fracture zone, <5-90 deg, rough, stepped to undulating, open | | | |
| | | | NR | | | **No Recovery 43.2-45.0'** | Driller's Remark: Very soft drilling at 43.5'<br>R2: 3 minutes |
| 45 | 45.0 | | | | | | |
| -2.9 | | | >2 | 45.0-45.3' - Fracture zone, <5-90 deg, rough, stepped, open<br>45.65' - Fracture, horizontal, rough, undulating, tight | | **Limestone** 45.0-48.4' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, very weak (R1), fossiliferous (casts/molds), voids typically up to 1/16" over 40-50%, cavities (>5) up to 1-3/16"-1-9/16"x3/8" (fossil casts), cavities more common from 45.0-46.0' | |
| | | | 1 | 46.3' - Fracture, horizontal, rough, undulating, open | | | |
| | R3-NQ 5 ft 68% | 47 | 3 | 47.7' - Fracture, 10 deg, rough, planar, tight | | | |
| | | | 3 | 47.8' - Fracture, 60 deg, rough, planar, tight | | | |
| | | | NR | 47.9' - Fracture, <5 deg, rough, undulating, open<br>48.0' - Fracture, 40 deg, rough, planar, open<br>48.2' - Fracture, <5 deg, rough, undulating, open | | **No Recovery 48.4-50.0'** | R3: 3 minutes |
| 50 | 50.0 | | | | | | |
| -7.9 | | | 10 | 48.25' - Fracture, 80-90 deg, rough, undulating, tight<br>50.4-51.1' - Fracture zone, 0-90 deg, rough, undulating to stepped, open to tight | | **Limestone** 50.0-54.2' - Same as 45.0-48.4' except becoming mottled with brownish gray patches of irregularly distributed finer grained limestone | |
| | | | 1 | | | | |
| | R4-NQ 5 ft 84% | 68 | 2 | 51.9' - Fracture, 20-30 deg, rough, undulating, tight<br>52.1' - Fracture, rough, undulating, tight | | | |
| | | | 1 | 52.7' - Fracture, 30 deg, rough, stepped to undulating, tight, very soft on either side of fracture | | | SC-1 collected at 52.75-53.75' |
| | | | NR | 53.7' - Fracture, 40 deg, rough, stepped, open | | **No Recovery 54.2-55.0'** | R4: 4 minutes |
| 55 | 55.0 | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: A-12 | SHEET 4 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 05/03/07 START : 5/2/2007 END : 5/4/2007 LOGGER : W. Elliott, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -12.9 | R5-NQ 5 ft 96% | 64 | 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' except with very fine grained yellowish gray limestone at 55.7-55.9' (irregular), generally weak (R2) and free of voids and cavities compared with adjacent rock, very weak (R1) with thin friable zone of extremely weak rock (R0), adjacent to some fracture traces | |
| | | | 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' | | | |
| | | | 2 | 57.45' - Fracture, 50 deg, rough, stepped, tight, black organics over 10-15% of surface | | | |
| | | | 1 | 57.65' - Fracture, 10 deg, rough, stepped, open, black organics over 5% surface | | | |
| | | | 2 | 59.3' - Fracture, horizontal, rough, undulating, tight | | | R5: 6 minutes |
| 60 | 60.0 | | NR | | | **No Recovery 59.8-60.0'** | |
| -17.9 | R6-NQ 5 ft 96% | 20 | 0 | 59.8' - Fracture, 0-90 deg, rough, stepped, fine grained sandy carbonate covering 100% of surfaces | | **Limestone** 60.0-61.5' - Same as 55.0-59.8' | |
| | | | 1 | 61.55' - Fracture, 0-50 deg, rough, stepped, open | | 61.5-62.3' - moderate yellowish brown, (10YR 5/4), mild to no HCl reaction, extremely weak to very weak (R0 to R1), cavities <1-3%, fossils (casts/molds) absent, thinly laminated, mottled. | |
| | | | 10 | 62.0-62.9' - Fracture zone, 0-90 deg, rough, stepped, open to tight, soft clay at 62.1' and 62.3' lining fracture trace | | | SC-2 collected at 63.1-64.1' |
| | | | 0 | | | 62.3-64.0' - moderate yellowish brown, (10YR 5/4), fine to very fine grained, weak to medium strong (R2 to R3), voids up to 1/16" over 5-10%, few cavities up to 3/16"x3/16", trace fossil molds/casts. | |
| | | | 0 | | | | R6: 7 minutes |
| 65 | 65.0 | | NR | | | | |
| -22.9 | R7-NQ 5 ft 100% | 50 | 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 organics), trace fine grained stronger rock | |
| | | | 10 | 66.2-67.1' - Fracture zone, 80 deg, smooth, undulating, dominated by fracture trace inclined approximately 80 deg from 66.2-68.1', with horizontal fracture at 66.2' | | **No Recovery 64.8-65.0'** | |
| | | | 10 | 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 grained, moderate HCl reaction, very weak to weak (R1 to R2), voids (generally 1/16" or less) over 10-30%, more dense at 65.0-66.0' and 68.5-69.35', cavities more abundant in same two intervals up to 3/4"-1-3/16"x3/8", some mottling, possible void with cavity infilling at 68.5-69.35', very weak (R1) zone at approximately 66.0' | |
| | | | 3 | 68.55' - Fracture, horizontal, rough, undulating, open | | | |
| | | | 3 | 68.6' - Fracture, 50 deg, rough, stepped, open | | | R7: 5 minutes |
| 70 | 70.0 | | | | | | |
| -27.9 | R8-NQ 5 ft 98% | 78 | 2 | 69.35' - Fracture, 40 deg, rough, undulating, tight | | | |
| | | | 1 | 69.65' - Fracture, horizontal, rough, stepped, open | | | |
| | | | 2 | 69.8-70.0' - Fracture, 0-90 deg, rough, stepped, open | | 69.35-70.0' - moderate yellowish brown, (10YR 5/4), very fine grained, moderate HCl reaction, weak (R2), thinly laminated, with trace very fine grain limestone rock nodules up to 1/8" voids become more common with depth from <1% up to 10-15% | |
| | | | 1 | 70.2' - Fracture, 0-90 deg, smooth, stepped, open | | | |
| | | | 2 | 70.65' - Fracture, 70 deg, rough, undulating, tight | | | Driller's Remark: 80% loss of circulation water at 75' |
| | | | 2 | 71.85' - Fracture, 10 deg, smooth, undulating, tight | | | |
| | | | | 72.15' - Fracture, 40 deg, rough, stepped, open | | | R8: 13 minutes |
| 75 | 75.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
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| 338884.FL | A-12 SHEET 5 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 05/03/07 START : 5/2/2007 END : 5/4/2007 LOGGER : W. Elliott, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -32.9 | R9-NQ 5 ft 70% | 26 | NR | 72.2' - Fracture, 80-90 deg, rough, undulating, extends to 72.45', open | | 70.0-72.6' - moderate yellowish brown, (10YR 5/4), very fine grained, 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, punctuated with light gray/yellowish gray very fine grained, irregular-shaped nodules/clasts, voids generally lacking in lighter gray, very fine grained nodules/clasts | Driller's Remark: Soft drilling from 75-77' |
| | | | NR | 73.95' - Fracture, 0-90 deg, smooth, stepped, tight | | | |
| | | | NA | 74.1' - Fracture, <5 deg, rough, stepped, open | | | |
| | | | 1 | 74.7' - Fracture, horizontal, rough, stepped, open, clay (brown) over 90% of surface (sandy) | | | SC-3 collected at 77.1-78.4' |
| | | | 2 | 77.1' - Fracture, <5 deg, smooth, undulating, open | | | |
| | | | 1 | 78.45' - Fracture, 0-30 deg, rough, undulating, open, gravel filled<br>78.7' - Fracture, horizontal, rough, undulating, open, gravel filled | | 72.6-74.9' - Same as 70.0-72.6' except with thick (6"') beds of yellowish gray, very fine grained limestone, weak to medium strong (R2 to R3), thinly laminated with organics, in matrix of void/cavity characterized limestone<br>**No Recovery 74.9-76.5'** | Driller's Remark: Advanced NW casing to 80', regained circulation<br>R9: 8 minutes |
| 80 | 80.0 | | | | | | |
| -37.9 | R10-NQ 5 ft 72% | 48 | 3 | 79.65' - Fracture, 20 deg, rough, undulating, tight, black organic film over 100% of surface | | **Silt (ML)**<br>76.5-77.1' - moderate yellowish brown, (10YR 5/4), wet, soft, rapid dilatancy, mild HCl reaction | Driller's Remark: Very hard from 80' to approximately 81' |
| | | | 3 | 80.1' - Fracture, horizontal, rough, undulating, open, dark gray staining over 30%<br>80.2' - Fracture, horizontal, rough, undulating, open, dark gray staining over 30% | | | |
| | | | 2 | 80.43' - Fracture, horizontal, rough, undulating, open, dark gray staining over 100% | | **Limestone**<br>77.1-78.4' - pale yellowish brown to dark yellowish brown, (10YR 5/4 to 10YR 4/2), very fine grained, strong 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 depth | Driller's Remark: Hard again at 84' |
| | | | 1 | 81.05' - Fracture, horizontal, rough, undulating to stepped, open, brown clay lining <1/16" thick over 100% of surface | | | |
| | | | NR | 81.35, 81.5' - Fractures (2), smooth, planar, black organic stains over 15-20%<br>82.35' - Fracture, horizontal, rough, stepped, open, brown clay lining (silty and sandy), up to 1/16" thick | | | R10: 10 minutes |
| 85 | 85.0 | | | | | | |
| -42.9 | R11-NQ 5 ft 100% | 76 | 0 | 82.65, 83.6' - Fractures (2), <5 deg, rough, undulating, tight, clayey | | | |
| | | | 2 | 86.7, 86.8' - Fractures (2), <5 deg, rough, smooth, undulating | | 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) | |
| | | | 2 | 87.9' - Fracture, <5 deg, smooth, undulating, film of black organic stains over 100% of surface, open | | 79.5-80.0' - very light gray to bluish white, (N8 to 5B 9/1), very light gray mottling, very fine grained, medium 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 | |
| | | | 2 | 87.95' - Fracture, 60-70 deg, rough, stepped, open | | | R11: 7 minutes |
| 90 | 90.0 | | | 88.25, 88.4' - Fractures (2), <5 deg, rough, stepped, open | | | |
| -47.9 | R12-NQ 5 ft 99% | 74 | 0 | 89.42, 89.7' - Fractures (2), horizontal, rough, undulating, open | | 80.0-81.5' - Same as 79.5-80.0' except becoming darker (brownish) with depth, cavities common at 80.4' | |
| | | | 1 | 91.15' - Fracture, horizontal, smooth, undulating, tight | | 81.5-83.6' - moderate yellowish brown, (10YR 5/4), fine to very fine grained, moderate HCl 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'<br>**No Recovery 83.6-85.0'** | |
| | | | 3 | 92.4' - Fracture, 40 deg, rough, undulating, open | | | |
| | | | 2 | 92.4-92.95' - Fracture, vertical, rough, undulating, tight | | | |
| | | | 2 | 92.95' - Fracture, <5 deg, rough, undulating, open<br>93.5' - Fracture, 80 deg, smooth, stepped, tight | | | R12: 10 minutes |
| 95 | 95.0 | | | | | | |

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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 ORIENTATION : Vertical

WATER LEVELS : 5.3 ft bgs on 05/03/07 START : 5/2/2007 END : 5/4/2007 LOGGER : W. Elliott, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -52.9 | R13-NQ 5 ft 98% | 72 | NR | 93.65' - Fracture, <5 deg, smooth, undulating to stepped, tight | | **Limestone** 85.0-88.35' - Same as 81.5-83.6' except black organic laminae at 88.0' and traces of black organic laminae from 87.0-88.0' 88.35-89.45' - variegated very pale orange and very pale blue, (10YR 8/2 and 5B 8/2), strong HCl reaction, very weak (R1), possibly cavity fill with brownish limestone; fossil casts/molds, voids over 15-20%, few cavities 3/8"x3/16", three 2"x3/16" black coated cavities (possible worm burrows) 89.45-90.0' - Same as 85.0-88.35' except fossiliferous, molds/casts and original material 90.0-91.15' - moderate yellow brown, (10YR 5/4), fine to very fine grained, strong HCl reaction, very weak (R1), voids up to 1/16" over 40-50%, cavities generally 3/16"x1/16", fossil casts/molds with whitish fossil layer at 90.8', thin discontinuous black organic laminae 91.15-94.95' - yellowish gray, (5Y 7/2), very fine grained, moderate to strong HCl reaction, very weak (R1), voids 1/16" or less over 1-5% (up to 10-15% at 92.0-92.5'), thinly laminated at 93.8' **No Recovery 94.95-95.0'** **Limestone** 95.0-95.7' - Same as 91.15-94.95' 95.7-95.9' - organic zone, thinly laminated, black peat, soft, platy 95.9-99.9' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, very weak (R1), voids over 40-50%, cavities up to 3/4"-1-3/16"x3/8"-3/4" with thin (1/16"x3/8") black worm tubes, some cavity fill at 97.8-98.0', fossiliferous (casts/molds) **No Recovery 99.9-100.0'** **Limestone** 100.0-105.0' - Same as 95.9-99.9' 105.0-110.0' - yellowish gray, (5Y 7/2), fine to very fine grained, strong HCl reaction, very weak (R1), voids covering 10-15% in upper half of core, becoming less common with depth; cavities more common in upper half also, typically 3/8"x3/16" becoming absent with depth, some molds/casts in upper half, absent below. **No Recovery 110.0-112.75'** | SC-4 collected at 98.15-99.05' R13: 6 minutes R14: 5 minutes End at 13:05 on 5/3/07 depth to water 5'3" Start on 5/4/07 depth to water 5'3" R15: 7 minutes Driller's Remark: Upper 2.75' was lost (soft-no recovery) R16: 7 minutes |
| | | | 1 | 94.05' - Fracture, horizontal, smooth, undulating, tight, black organic coating | | | |
| | | | 2 | 94.55' - Fracture, 80 deg, smooth, undulating, tight | | | |
| | | | 0 | 95.7' - Fracture, horizontal, smooth, planar, open | | | |
| | | | 1 | 96.2' - Fracture, vertical, smooth, undulating, tight | | | |
| | | | 1 | 96.75' - Fracture, <5 deg, rough, stepped, open | | | |
| 100 | 100.0 | | 1 | 98.15' - Fracture, 60 deg, rough, undulating, tight | | | |
| -57.9 | R14-NQ 5 ft 100% | 54 | NR | 99.05' - Fracture, 60 deg, rough, undulating, tight | | | |
| | | | >10 | 100.0-102.0' - Fracture zone, undulating, stepped, horizontal to inclined, open to tight | | | |
| | | | >10 | | | | |
| | | | 1 | | | | |
| | | | 0 | 102.8' - Fracture, <5 deg, rough, undulating, tight, clayey | | | |
| | | | 1 | | | | |
| 105 | 105.0 | | | | | | |
| -62.9 | R15-NQ 5 ft 100% | 40 | 2 | 104.9' - Fracture, <5 deg, rough, undulating, tight, clayey | | | |
| | | | 10 | 105.9' - Fracture, 70 deg, rough, planar, open 105.9-107.9' - Fracture zone, 0-90 deg, rough, undulating to stepped, open, dominated by vertical fracture that propagates to 108.9' | | | |
| | | | >10 | 105.95' - Fracture, 0-90 deg, rough, undulating, open | | | |
| | | | 2 | 108.15' - Fracture, horizontal, rough, stepped, open | | | |
| | | | >10 | 108.4' - Fracture, horizontal, rough, undulating, open | | | |
| 110 | 110.0 | | | 109.25' - Fracture, 0-90 deg, rough, stepped, tight | | | |
| -67.9 | R16-NQ 5 ft 45% | 45 | NR | 109.35-110.0' - Fracture zone, 0-90 deg, rough, stepped, undulating, varying orientations from vertical to horizontal | | | |
| | | | 0 | 112.75-115.0' - Fracture, horizontal, there are vertical fracture planes when rock has separated in thin (1/16") slices | | | |
| | | | 0 | | | | |
| 115 | 115.0 | | | | | | |

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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 ORIENTATION : Vertical

WATER LEVELS : 5.3 ft bgs on 05/03/07 START : 5/2/2007 END : 5/4/2007 LOGGER : W. Elliott, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -72.9 | | | 3 | 115.0' - Fracture, 0-40 deg, rough, stepped, tight | | **Limestone** | |
| | | | 2 | 115.6' - Fracture, 0-20 deg, rough, stepped, tight<br>115.7' - Fracture, horizontal, rough, planar to stepped, open | | 112.75-115.0' - yellowish gray, (5Y 7/2), very fine grained, strong HCl reaction, very weak (R1), voids <1%, 4-5 cavities at approximately 114.2' generally 3/8"x3/8", fossils absent | |
| | R17-NQ 5 ft 100% | 60 | >10 | 116.02' - Fracture, horizontal, smooth, planar, tight<br>116.65' - Fracture, 0-70 deg, rough, stepped, tight | | 115.0-119.35' - Same as 112.75-115.0' except fossiliferous zone at 118.5', casts/molds possibly original material | Fossiliferous zone at 118.7' |
| | | | 0 | 117.0-117.45' - Fracture zone, 0-90 deg, rough, stepped to undulating, tight to open | | | |
| | | | >10 | 117.72' - Fracture, horizontal, smooth, planar, tight | | | R17: 9 minutes |
| 120 | 120.0 | | | 119.3-120.0' - Fracture zone, various orientations, up to gravel sized limestone fragments | | 119.35-120.0' - Same as 115.0-119.35' except except coarser grained (gravelly to sandy), voids and cavities more common than 115.0-119.35' | |
| -77.9 | | | 1 | 120.15' - Fracture, 10 deg, rough, undulating, open | | | |
| | | | 0 | | | 120.0-121.3' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, very weak (R1), voids up to 1/16" covering approximately 15-20%, few cavities 3/8"x3/8", some mottling and some nodules of very fine grained limestone with no voids/cavities | |
| | R18-NQ 5 ft 97% | 95 | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | 121.3-122.7' - Same as 120.0-121.3' except voids and cavities more common, covering 60-70% of surface, fossils (casts/molds) common | SC-5 collected at 123.27-124.3'<br>R18: 6 minutes |
| 125 | 125.0 | | NR | | | | |
| -82.9 | | | 1 | 125.45' - Fracture, horizontal, smooth, planar, tight | | 122.7-124.85' - Same as 120.0-121.3'<br>**No Recovery 124.85-125.0'**<br>**Limestone** | |
| | | | 0 | | | 125.0-128.5' - Same as 122.7-124.85' except fine to very fine grained, voids over 1-3%, cavities rare, some cavity infilling/nodules, sharp undulatory contact between different color limestone at 125.5' (possible stylolite) | |
| | R19-NQ 5 ft 100% | 70 | 0 | | | | |
| | | | >10 | 128.0-129.0' - Fracture zone, <5-90 deg, rough, undulating to stepped, open to tight | | | |
| | | | 10 | 129.0' - Fracture, 60 deg, rough, undulating, open, gravel-filled | | 128.5-129.0' - Same as 125.0-128.5' except some thin laminae, voids becoming more common, transitional with 129.0-130.0' | R19: 7 minutes |
| 130 | 130.0 | | | 129.5-129.9' - Fracture zone, 60-90 deg, multiple fractures | | | |
| -87.9 | | | 1 | 130.1' - Fracture, horizontal, smooth, planar, open | | 129.0-130.0' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, very weak (R1), somewhat friable, cavities cover 70-80%, fossil molds/casts, cavity infillings/nodules | |
| | | | 0 | | | 130.0-130.6' - yellowish gray, (5Y 7/2), fine to very fine grained, strong HCl reaction, very weak (R1), voids over 1-3% of surface, cavities 1/16"x1/16", thinly laminated, fossils (molds/casts) rare and interlaminated between very fine grained limestone | |
| | R20-NQ 5 ft 96% | 88 | 0 | | | | |
| | | | 2 | 133.15, 133.85' - Fractures (2), horizontal, smooth, planar, tight | | | |
| | | | 3 | | | | R20: 7 minutes |
| 135 | 135.0 | | | | | | |

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

WATER LEVELS : 5.3 ft bgs on 05/03/07 START : 5/2/2007 END : 5/4/2007 LOGGER : W. Elliott, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -92.9 | R21-NQ 5 ft 98% | 86 | NR | 134.47, 134.62' - Fractures (2), horizontal, smooth, planar, open | | 130.6-132.65' - yellowish gray, (5Y 7/2), fine grained, strong HCl 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 | |
| | | | 1 | 134.72' - Fracture, horizontal, rough to smooth, stepped, open | | | |
| | | | 2 | 135.25' - Fracture, 10 deg, smooth, planar, tight | | | |
| | | | 0 | 136.5' - Fracture, <5 deg, rough, stepped, open | | 132.65-134.8' - Same as 130.0-130.6' except thinly laminated, very weak (R1), yellowish brown and light olive gray mottling associated with laminae, becoming darker with depth, some cavities and voids up to approximately 5-10% coverage | |
| | | | 0 | 136.8' - Fracture, <5 deg, rough, undulating, open | | | |
| | | | 2 | 139.2' - Fracture, <5 deg, rough, undulating, open | | | R21: 8 minutes |
| 140 | 140.0 | | | | | **No Recovery 134.8-135.0'** | |
| -97.9 | R22-NQ 5 ft 87% | 76 | NR | 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 reaction, very weak to weak (R1 to R2), thinly laminated, voids <1% (1/16" or less), 1 cavity 1-9/16"x9/32" (approximately 3/8" deep) | Driller's Remark: 80% loss of circulation at 140' |
| | | | 0 | | | | |
| | | | 1 | 141.7' - Fracture, <5 deg, rough, undulating, open, dark brown organic stains | | | |
| | | | 5 | 142.03' - Fracture, horizontal, rough, undulating, open with black organic coating over 100% | | 135.25-137.7' - yellowish gray grading to moderate yellowish brown, (5Y 7/2 to 10YR 5/4), fine grained, very weak (R1), thinly laminated from 135.25-135.5' and from 137.3-137.7' (sharp contact with underlying rock), voids up to 1/16" over 15-20%, few cavities generally 3/16"x3/16", trace fossil molds/casts | SC-6 collected at 142.88-144.13' |
| | | | 0 | 142.15' - Fracture, horizontal, rough, undulating, open, dark brown coating over 100% | | | |
| | | | 1 | | | | R22: 10 minutes |
| 145 | 145.0 | | NR | 142.4' - Fracture, horizontal, rough, undulating, open with black organic coating over 100% | | | |
| -102.9 | R23-NQ 5 ft 100% | 97 | 3 | 142.5' - Fracture, <5 deg, rough to smooth, undulating, open, no coatings | | 137.7-139.2' - Same as 135.25-137.7' except yellowish gray, (5Y 7/2), voids <3-5%, few cavities generally 3/8"x3/16", fossil hash accumulation at 139.0-139.2', some mottling, possible cavity infilling/nodules | |
| | | | 1 | 142.85' - Fracture, 10 deg, smooth, undulating, tight | | | |
| | | | 0 | 144.12' - Fracture, horizontal, rough, stepped, tight | | | |
| | | | 1 | 145.1' - Fracture, horizontal, rough, undulating, open | | 139.2-139.9' - yellowish gray, (5Y 7/2), very fine grained, very weak (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 completely through core), fossil molds/casts (gastropods) | |
| | | | 0 | 145.8' - Fracture, 50-60 deg, rough, planar, open | | | |
| | | | | 145.9' - Fracture, 50-60 deg, rough, planar, open | | | R23: 6 minutes |
| 150 | 150.0 | | | 146.4' - Fracture, horizontal, rough, undulating, open | | | |
| -107.9 | R24-NQ 5 ft 95% | 70 | 0 | 148.7' - Fracture, <5 deg, rough to smooth, undulating | | **No Recovery 139.9-140.0'** | |
| | | | 3 | 150.55' - Fracture, horizontal, smooth, planar, tight | | **Limestone** 140.0-142.5' - Same as 139.2-139.9' except becoming grayish yellow at 140.0' and grading to yellowish gray/light olive gray (5Y 7/2 to 5Y 5/2) with depth, sharp boundary between grayish-yellow and yellowish grey at 140.6', cavities becoming more frequent/dense with small voids (1/16") covering 10-15% of limestone, perhaps becoming somewhat coarser grained in depth | |
| | | | | 150.58' - Fracture, horizontal, smooth, planar, tight | | | |
| | | | 0 | 150.83' - Fracture, horizontal, rough, stepped, open | | | |
| | | | 0 | | | | |
| | | | 1 | | | | R24: 6 minutes |
| 155 | 155.0 | | | | | | |

| PROJECT NUMBER: | 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 ORIENTATION : Vertical

WATER LEVELS : 5.3 ft bgs on 05/03/07 START : 5/2/2007 END : 5/4/2007 LOGGER : W. Elliott, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -112.9 | | | NR | 154.67' - Fracture, <5 deg, rough, undulating, open | | 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 | |
| | | | 2 | 155.25' - Fracture, horizontal, rough to smooth, undulating, open | | | SC-7 collected at 156.68-157.65' |
| | | | 1 | 155.85' - Fracture, horizontal, rough, planar, tight | | | |
| | R25-NQ 5 ft 100% | 76 | 1 | 156.7' - Fracture, horizontal, rough, planar, tight | | | |
| | | | | 157.65' - Fracture, <5 deg, rough, undulating, open | | | |
| | | | 4 | 158.45-158.65' - Fracture zone, 70 deg, rough, undulating to stepped, open to tight | | **No Recovery 144.35-145.0'** | |
| | | | 1 | | | **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 HCl reaction, weak (R2), voids (<1/16") over 95-100% surface, becoming fossiliferous with depth, casts/molds with some cavities near base of interval | R25: 6 minutes |
| 160 | 160.0 | | | | | | |
| -117.9 | | | | 159.87' - Fracture, horizontal, rough, undulating, tight | | 148.7-149.7' - dusky yellow to moderate olive brown, (5Y 6/4 to 5Y 5/6), moderate to mild HCl 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 HCl 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 (5Y 5/6) bands, voids over 10-15% surface area 151.85-152.5' - 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 HCl reaction, very weak (R1), coarse grained at 154.5-154.75', voids covering 10-15% with cavities up to 3/8"x2" over 10%, grades to fossil hash below 153.8' with fossils (molds/casts) common below 154.5' where rock becomes friable **No Recovery 154.75-155.0'** | |

| PROJECT NUMBER: | 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 ORIENTATION : Vertical

WATER LEVELS : 5.3 ft bgs on 05/03/07 START : 5/2/2007 END : 5/4/2007 LOGGER : W. Elliott, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | | | **Limestone**<br>155.0-155.25' - light olive gray mottled with yellowish gray, (5Y 5/2 and 5Y 7/2), strong HCl reaction, very weak (R1), thinly laminated with organic material, voids over 20-30%, soft and friable from 155.0-155.1'<br>155.25-155.9' - light olive brown, (5Y 5/6), very fine to fine grained, strong HCl reaction, very weak (R1), voids (<1/16") covering 60-70% surface, trace fossil molds/casts<br>155.9-156.65' - yellowish gray, (5Y 7/2), fine to very fine grained, moderate to strong HCl 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<br>156.65-160.0' - yellowish gray, (5Y 7/2), fine grained, strong HCl 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: |
|---|---|
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# SOIL BORING 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

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 bgs on 5/6/07 START : 5/6/2007 END : 5/23/2007 LOGGER : C. Sump, P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 40.6 | 0.0 | 1.1 | SS-1 | 0-1-2 (3) | **Poorly Graded Sand With Organics (SP)** 0-0.5' - moist, very loose, very fine to fine grained, 30-40% organics and roots, sand is silica | | Borehole located in staked wetlands area--drill rig and equipment staged on swamp mats, surface conditions are dry |
| | 1.5 | | | | **Poorly Graded Sand (SP)** 0.5-1.1' - light gray, (N7), moist, very loose, very fine to fine grained, trace nonplastic fines, organics decreasing with depth, sand is silica | | Water table 2.0' below ground surface |
| 5 | 5.0 | | | | | | |
| 35.6 | | 1.3 | SS-2 | 1-1-2 (3) | **Silty Sand (SM)** 5.0-6.25' - grayish brown, (5YR 3/2), wet, very loose, very fine to fine grained, 20-25% nonplastic fines, fines appear to be organic material, slight sulfur odor, trace medium to coarse sand-sized grains, iron cemented silica sand concretions | | |
| | 6.5 | | | | | | |
| 10 | 10.0 | | | | | | |
| 30.6 | | 1.1 | SS-3 | 2-3-7 (10) | **Clayey Sand (SC)** 10.0-10.2' - dark gray, (N3), wet, loose, fine to medium grained, carbonate material, white limestone fragments incorporated (slough) | | SS-3A 10.0-10.2' SS-3B 10.2-11.1' |
| | 11.5 | | | | **Well Graded Sand With Silt (SW-SM)** 10.2-11.1' - yellowish gray, (5Y 8/1), wet, loose, fine to coarse grained, strong HCl reaction, 10-15% nonplastic fines, material appears to be predominantly fossil fragments | | Drilling's Remark: Approximately 10% loss of circulation (limestone zones) |
| 15 | 15.0 | | | | | | |
| 25.6 | | 1.0 | SS-4 | 0-1-2 (3) | **Well Graded Sand With Silt (SW-SM)** 15.0-15.4' - Same as 10.2-11.1' except pale yellowish brown, (10YR 6/2), silty fines (slough) | | SS-4 15.4-16.0' |
| | 16.5 | | | | **Silty Sand (SM)** 15.4-16.0' - very light gray, (N8), wet, very loose, very fine to fine grained, sand is predominantly silica, 20% fine to medium grained carbonate sand, 20-25% nonplastic fines, scattered pockets of very pale green (10G 8/2) medium plasticity clay, moderate HCl reaction in carbonate materials | | Driller' Remark: Drilling rate slowing down at 18.5' |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

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 bgs on 5/6/07 START : 5/6/2007 END : 5/23/2007 LOGGER : C. Sump, P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 20.6 | 20.0 | 0.2 | SS-5 | 50/2.5 (50/2.5") | **Sandy Silt With Limestone (ML)** 20.0-20.2' - very pale orange, (10YR 8/2), moist, hard, nonplastic, very rapid dilatancy, moderate to strong HCl reaction, 35% fine to coarse sand-sized, 10% fine gravel-sized, all carbonate materials | | |
| 25 | 25.0 | | | | | | |
| 15.6 | 25.8 | 0.8 | SS-6 | 39-50/3.5 (89/9.5") | **Silty Sand (SM)** 25.0-25.8' - pale yellowish orange, (10YR 8/2), moist to wet, very dense, fine to coarse grained, mild to moderate HCl reaction, 25-30% nonplastic fines, trace fine gravel-sized, all carbonate | | Stop drilling for 5/6/07 due to thunderstorm/lightning hazard<br>Resume drilling 5/7/07, water level approximately 2.0' below ground surface<br>Install surface casing (4") to approximately 28.5' |
| 30 | 30.0 | | | | | | |
| 10.6 | 30.3 | 0.3 | SS-7 | 50/3.5 (50/3.5") | **Silty Sand (SM)** 30.0-30.3' - Same as 25.0-25.8' | | |
| 35 | 35.0 | | | | | | |
| 5.6 | 36.5 | 1.2 | SS-8 | 37-47-19 (66) | **Silty Sand (SM)** 35.0-36.2' - pale grayish orange grading to pale yellowish brown, (10YR 8/2 to 10YR 6/2), moist, very dense, fine to coarse grained, mild HCl reaction, 45-50% low plastic fines, 10-15% fine gravel-sized, all carbonate | | Transitional to very weak limestone rock<br>Much softer material, no loss of circulation |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

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 bgs on 5/6/07 START : 5/6/2007 END : 5/23/2007 LOGGER : C. Sump, P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 0.6 | 40.0<br>40.7 | 0.7 | SS-9 | 26-50/2<br>(76/8") | **Silty Gravel With Sand (GM)**<br>40.0-40.7' - light olive gray, (5Y 5/2), moist to wet, very dense, moderate HCl reaction, predominately fine gravel to 1", 30-35% fine to coarse sand-sized, 20-25% low plastic fines, all carbonate, pyrite coating on some large fragments | | |
| 45<br>-4.4 | 45.0<br>45.1 | 0.0 | SS-10 | 50/1.25<br>(50/1.25") | **No Recovery 45.0-45.1'**<br>Begin Rock Coring at 45.0 ft bgs<br>See the next sheet for the rock core log | | |
| 50<br>-9.4 | | | | | | | |
| 55<br>-14.4 | | | | | | | |
| 60 | | | | | | | |

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|---|---|
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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 : 5/23/2007 LOGGER : C. Sump, P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -4.4 | 45.0 | | | | | | |
| | R1-NQ 5 ft 58% | 0 | 1 | 45.3' - Fracture or mechanical break, 50 deg, rough, undulating to mostly planar | | **Limestone** 45.0-45.9' - pale yellowish brown, (10YR 6/2), moderate HCl reaction, medium strong (R3), 10-20% coverage of 1/6" to 1/8" small voids on surface, larger lenticular shaped cavities (up to 1/2" long 1/6"-3/16" high), exhibit preferred horizontal orientation | Switch to rock coring (45.0') |
| | | | 0 | 45.9-47.9' - Fracture zone, friable, disaggregated material, numerous "breaks" handling material (unconsolidated) | | | |
| | | | 0 | | | | |
| | | | NR | | | 45.9-47.9' - Same as 45.0-45.9' except very weak (R1) and disaggregated, easily broken by hand into silty sand material **No Recovery 47.9-50.0'** | R1: 4 minutes |
| 50 | 50.0 | | | | | | |
| -9.4 | R2-NQ 5 ft 88% | 13 | NA | 50.0-53.3' - unconsolidated silty, sandy, gravel material | | **Silty Sand With Limestone Fragments (SM)** 50.0-53.3' - moderate yellowish brown, (10YR 5/4), moderate HCl reaction, 20-25% fines, 35-40% sand, 35-40% gravel-sized fragments of friable limestone with fragments 1/4"- >1" size | |
| | | | 2 | 53.3-54.4' - Fracture zone, rough, irregular, non planar | | **Limestone** 53.3-54.4' - pale yellowish brown, (10YR 6/2), moderate HCl reaction, medium strong (R3), 10-20% coverage of 1/16"-1/8" voids on surface, few larger cavities/fossil molds (<1%) up to 3/4" | |
| | | | 1 | 54.1' - Fracture, 10 deg, rough, planar, tight | | | R2: 7 minutes |
| 55 | 55.0 | | NR | | | **No Recovery 54.4-55.0'** | |
| -14.4 | R3-NQ 5 ft 96% | 47 | 1 | 55.4' - Fracture or mechanical break, rough, undulating, nonplanar | | **Limestone** 55.0-56.8' - yellowish brown, (10YR 5/4), very fine grained, mild to moderate HCl reaction, weak (R2), 20-25% coverage of 1/16"-1/8" small voids on surface, very fine dark black laminations (<1/16") 1/2"-1" spacing 56.8-59.8' - Same as 55.0-56.8' except weak (R2), finer grained (silt sized particles), reduced small void density (<10%) and pronounced fine black laminations (lignite, organics) throughout interval and concentrated in zones up to 1/2" thick | |
| | | | 2 | 56.4, 56.8' - Fractures (2), 15 deg, rough, planar | | | Horizontal partings associated with black laminations (soft) laminae are sinuous and exhibit more pinch and swell patterns and are often slightly inclined to core diameter |
| | | | 3 | 57.0' - Bedding plane, 10 deg, rough, planar to stepped | | | |
| | | | 3 | 57.7' - Mechanical break, rough, nonplanar 57.95, 58.3' - Bedding plane (2), 5 deg, smooth, planar, (organic layer) | | | |
| | | | 2 | 58.6' - Bedding plane, 5 deg, smooth, 0.5" thick zone 58.8' - Bedding plane, smooth, planar | | | R3: 6 minutes |
| 60 | 60.0 | | NR | 59.1' - Fracture or mechanical break, horizontal, rough, undulating | | **No Recovery 59.8-60.0'** | |
| -19.4 | R4-NQ 5 ft 76% | 40 | 2 | 59.4' - Fracture, 10 deg, rough, planar to undulating | | **Limestone** 60.0-63.8' - Same as 56.8-59.8' except weak to medium strong (R2 to R3), decreasing density of fine black layering, variable density of small voids (5-15% surface area), weak unconsolidated zone at 63.5' of silt and sand with gravel | |
| | | | 3 | 60.5, 60.7, 61.4, 61.7' - Fractures or mechanical break (4), horizontal, rough, undulating to planar | | | |
| | | | 3 | 62.1, 62.3, 62.5' - Fractures (3), <10 deg, rough, undulating to semi planar | | | |
| | | | 2 | 63.4' - Fracture, rough, undulating | | | |
| | | | NR | 63.5' - Fracture, 45 deg, rough, undulating | | **No Recovery 63.8-65.0'** | R4: 6 minutes |
| 65 | 65.0 | | | | | | |

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|---|---|
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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 : 5/23/2007 LOGGER : C. Sump, P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -24.4 | | | NA | 65.4, 65.5, 65.6, 65.7' - Mechanical break (4), horizontal, rough, undulating to planar, fine sand/silt material on fracture surface | | **Silty Sand (SM)** 65.0-65.8' - moderate yellowish brown, (10YR 5/4), with gravel-sized limestone fragments 1/2"-2" size (disaggregated by drilling) | |
| | | | 4 | | | **Limestone** 65.8-66.8' - moderate yellowish brown, (10YR 5/4), very fine grained, strong HCl reaction, weak to medium strong (R2 to R3), 15-20% coverage of 1/16" to 1/8" small voids on surface, 1-2% coverage of larger cavities/fossil molds up to 1/4" diameter, fine silt infilling in many voids/molds | |
| | R5-NQ 5 ft 36% | 10 | NR | | | | R5: 10 minutes |
| 70 | 70.0 | | | | | **No Recovery 66.8-70.0'** | |
| -29.4 | | | 0 | | | **Limestone** 70.0-74.9' - moderate yellowish brown, (10YR 5/4), fine grained, mild to moderate HCl reaction, medium strong (R3), fossiliferous, with 4"-6" thick poorly fossiliferous, fine grained intervals, low to medium density, up to 17-20% coverage of small (1/16"-1/8") voids and larger (up to 3/4") cavities/fossil molds, lenticular inclusions of soft black organic material up to 1-1/2"x1/4" thick at 73.2-73.8', few fine (1/16"-3/16") organic inclusions | |
| | | | 2 | 71.1, 71.2' - Fracture or mechanical break (2), horizontal, rough, undulating | | | SC-1 collected at 71.3-72.5' |
| | R6-NQ 5 ft 98% | 67 | 1 | 72.5-73.5' - Fracture or mechanical break, vertical, rough, undulating | | | |
| | | | 2 | 73.4' - Fracture, 45 deg, rough, planar | | | |
| | | | 0 | 74.1' - Fracture or mechanical break, horizontal, rough, undulating | | | R6: 8 minutes |
| 75 | 75.0 | | NR | | | **No Recovery 74.9-75.0** | |
| -34.4 | | | 1 | 75.2' - Fracture or mechanical break, horizontal, rough, undulating | | **Limestone** 75.0-80.0' - Same as 70.0-74.9' except mild HCl reaction, weak (R2), 5-15% coverage of small (1/16"-1/8") voids, loose sand-sized limestone particles on fracture surfaces | |
| | | | 5 | 76.2' - Fracture, 5 deg, rough, planar 76.3, 76.4' - Fractures (2), 30-45 deg, rough, undulating and planar | | | |
| | R7-NQ 5 ft 100% | 50 | 1 | 76.8, 76.95' - Fractures (2), horizontal, rough, undulating | | | |
| | | | 2 | 77.7' - Fracture, 60 deg, rough, non planar (radial) 78.0' - Fracture, 45 deg, rough, planar | | | |
| | | | 1 | 78.3' - Mechanical break, horizontal, rough 79.5' - Mechanical break, 0-15 deg, rough, undulating | | | R7: 7 minutes |
| 80 | 80.0 | | | | | | |
| -39.4 | | | >10 | 80.4-80.7' - unconsolidated zone | | 80.0-84.0' - Same as 75.0-80.0' except mild HCl reaction, weak to medium strong (R2 to R3), with friable, extremely weak (R0), partially unconsolidated zones at 80.4-80.7', 81.4-81.6', and 82.0-82.5' | |
| | | | 1 | 81.4, 82.0' - Fractures (2), horizontal, rough, undulating and planar, (either end of unconsolidated material) | | | |
| | R8-NQ 5 ft 80% | 23 | >10 | 82.0-84.0' - Fracture zone | | | |
| | | | >10 | | | | |
| | | | NR | | | **No Recovery 84.0-85.0'** | R8: 6 minutes |
| 85 | 85.0 | | | | | | |

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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 : 5/23/2007 LOGGER : C. Sump, P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -44.4 | R9-NQ 5 ft 98% | 47 | 1 | 85.6' - Fracture, 45 deg, rough, planar | | **Limestone** 85.0-89.9' - moderate yellowish brown, (10YR 5/4), moderate HCl reaction, medium strong (R3), fossiliferous (molds/casts), surface coverage of voids 20%, with very weak to weak (R1 to R2) zones of limestone disaggregated into carbonate sands or silt from 86.0-86.6' and 87.2-88.1' | 1/2" thick "greasy" organic layer at 85.2 |
| | | | >10 | 86.0-88.0' - Fracture zone, 0-30 deg, limestone fragments 1/4" to 2", larger fragments exhibit semi planar surfaces | | | |
| | | | >10 | | | | |
| | | | 2 | 88.2, 88.8, 89.3, 89.5' - Fractures or mechanical break (4), horizontal, rough, undulating | | | |
| | | | 3 | 89.4' - Fracture, 45 deg, rough, planar | | | R9: 7 minutes |
| 90 | 90.0 | | NR | | | **No Recovery 89.9-90.0'** | |
| -49.4 | R10-NQ 5 ft 84% | 58 | >10 | 90.3' - Fracture, 70 deg, rough, planar | | **Limestone** 90.0-94.2' - Same as 85.0-89.9' except highly fossiliferous zone with greater density of small voids from 90.8-91.1' (fragments <1"), finer grained with decreased density of small voids, weak to medium strong (R2 to R3) below 91.1' | Small flazer structure on fragment material, bioturbation |
| | | | >10 | 90.7' - Fracture, horizontal, rough, undulating to planar, black organics on surface (or fine laminae controlling break) 90.7-91.2' - Fracture zone | | | SC-2 collected at 91.75-92.5' |
| | | | 1 | | | | |
| | | | 2 | 93.0' - Fracture, horizontal, rough, undulating, open 93.5' - Fracture, 25 deg, rough, undulating, 1/16" open | | | |
| | | | 0 | | | | R10: 12 minutes |
| | | | NR | 93.9' - Mechanical break, horizontal | | **No Recovery 94.2-95.0'** | |
| 95 | 95.0 | | | | | | |
| -54.4 | R11-NQ 5 ft 96% | 62 | 2 | 95.2' - Fracture, 5 deg, planar 95.7' - Fracture, 60 deg, rough, planar | | **Limestone** 95.0-98.0' - yellowish gray, (5Y 4/2), variable density of small voids (1/16"-1/8") across interval ranging from sparse up to >20% in discrete zones, typically 5%, few larger cavities/fossil molds 1/4" or larger, dark brown/black (organic) inclusions (1/16"-1/8") and as thin (1/16") fine stringers 98.0-98.7' - fine grained, strong to very strong (R4 to R5), dense 98.7-99.8' - Same as 95.0-98.0' except mild to moderate HCl reaction, weak to medium strong (R2 to R3) | SC-3 collected at 95.6-96.8' |
| | | | 1 | 96.8' - Mechanical break, rough, undulating | | | |
| | | | 2 | 97.3, 97.35' - Fractures (2), 60 deg, rough, planar | | | |
| | | | >10 | 97.9' - Fracture, horizontal, rough, nonplanar, brownish black coating on surface (soft) | | | |
| | | | >10 | 98.0-98.7' - Fracture zone, rock fragments, conchoidal fracture faces, undulating, near vertical break, few 45-60 deg fractures on fragments | | | R11: 11 minutes |
| 100 | 100.0 | | NR | | | **No Recovery 99.8-100.0'** | |
| -59.4 | R12-NQ 5 ft 90% | 33 | >10 | 98.9, 99.2, 99.8' - Fractures (3), horizontal, rough, undulating | | **Limestone** 100.0-104.5' - Same as 95.0-98.0' except medium strong (R3), increasing density of small voids and larger (up to 1/2") cavities/fossil molds (10-20%), irregular zones of dark gray (N6) (redox boundary), few fossil molds/casts infilled with soft clayey carbonate material | |
| | | | 1 | 100.0-101.0' - Fracture zone, vertical, rough, planar to undulating, 3/4"-1" angular rock fragments with large (4"-5") long partial core pieces | | | |
| | | | >10 | 101.3' - Fracture, 70 deg, rough, planar 102.0-102.7' - Fracture zone, limestone fragments | | | |
| | | | >10 | 102.8' - Fracture, 45 deg, rough, undulating 103.3' - Fracture or mechanical break, horizontal, rough, undulating | | | |
| | | | >10 | 103.3-104.5' - Fracture zone, horizontal, rough, planar to undulating, partings with 1-2" spacing | | | R12: 6 minutes |
| 105 | 105.0 | | NR | | | **No Recovery 104.5-105.0'** | |

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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 : 5/23/2007 LOGGER : C. Sump, P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -64.4 | R13-NQ 5 ft 82% | 40 | >10 | 105.2-105.8' - Fracture zone, limestone fragments (1/2"-1-1/2") | | **Limestone** 105.0-107.5' - grayish orange to light olive gray, (10YR 7/4 to 5Y 5/2), mild to moderate HCl reaction, weak (R2), <5% coverage of small (1/16"-1/8") voids on surface, moderately friable | |
| | | | >10 | 106.7' - Fracture, 45 deg, rough, undulating | | | |
| | | | 0 | 106.8-107.1' - Fracture zone, weak friable material, 1/2"-2" fragments, dark brown/black staining (possibly pyrite) on few fragment/fracture surfaces | | 107.5-109.1' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), mild HCl reaction, medium strong (R3), small voids (1/16"-1/8") and larger cavities/fossils/molds (up to 1/2" max dimension) 5-10% coverage on surface, few fossil casts, partial fine recrystallization | |
| | | | >10 | 108.7-109.1' - Fracture zone, rough, undulating | | | R13: 10 minutes |
| | | | NR | | | | |
| 110 | 110.0 | | | | | | |
| -69.4 | R14-NQ 5 ft 78% | 57 | 2 | 110.1' - Fracture or mechanical break, horizontal, rough, planar | | **No Recovery 109.1-110.0'** **Limestone** 110.0-113.9' - Same as 107.5-109.1' except medium strong to strong (R3 to R4), fewer cavities/fossil molds >1/4" | |
| | | | 2 | 110.7' - Fracture, rough, undulating | | | |
| | | | 2 | 111.3' - Fracture, rough, undulating, fine limestone fragments | | | |
| | | | 1 | 111.6' - Fracture, rough, undulating to partially stepped | | | |
| | | | NR | 112.0' - Fracture, 70 deg, rough, undulating, with thin spalls, black staining/coating on surface (pyrite) somewhat radiased surface 112.6, 113.7' - Fractures (2), 45 deg, rough, planar | | **No Recovery 113.9-115.0'** | R14: 9 minutes |
| 115 | 115.0 | | | | | | |
| -74.4 | R15-NQ 5 ft 90% | 37 | >10 | 115.0-116.0' - Fracture zone, 1"-3" rock fragments, larger fragments exhibit 30 deg orientation, planar surfaces | | **Limestone** 115.0-119.5' - intermingled zones of pale yellowish orange and light olive gray, (10YR 8/6 and 5Y 5/2), moderate HCl reaction, medium strong (R3), 5-10% coverage of small (1/6"-1/8") voids on surface, partial recrystallization | |
| | | | 3 | 116.1, 116.2' - Fractures or mechanical break (2), horizontal, rough, undulating | | | |
| | | | 1 | 116.5' - Fracture, 75 deg, rough, undulating to planar | | | |
| | | | 1 | 117.0' - Mechanical break, horizontal, rough, undulating | | | |
| | | | 1 | 118.0' - Fracture, 45 deg, rough, planar | | | |
| | | | NR | 118.5' - Fracture or mechanical break, 15 deg, rough, planar 119.1' - Fracture or mechanical break, rough, undulating | | **No Recovery 119.5-120.0'** | R15: 10 minutes |
| 120 | 120.0 | | | | | | |
| -79.4 | R16-NQ 5 ft 80% | 55 | 1 | 120.6' - Fracture, 15 deg, rough, planar | | **Limestone** 120.0-124.0' - Same as 115.0-119.5' except mild HCl reaction, strong (R4), larger cavities (1/4"-1/2") present in discrete zones of variable spacing, most prominent in fragmented zones (123.0-123.4'), blackish brown staining on some fracture/fragment surfaces, minor recrystallization, color becoming darker with depth light olive gray (5Y 5/2) to medium olive brown (5Y 4/4) | |
| | | | 4 | 121.0' - Mechanical break, rough, undulating 121.1-121.3' - Fracture zone 121.3' - Mechanical break, rough, undulating | | | |
| | | | >10 | 122.1' - Mechanical break, horizontal, rough, undulating | | | |
| | | | 1 | 122.9-123.3' - Fracture zone, limestone fragments (1/2"-1-1/2"), dark brown staining on surfaces | | | |
| | | | NR | 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 | | | | | | |

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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 : 5/23/2007 LOGGER : C. Sump, P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -84.4 | R17-NQ 5 ft 78% | 43 | 4 | 125.35, 123.55' - Mechanical break (2), 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 | Fresh fracture faces indicate possible partial recrystallization |
| | | | 1 | 125.7' - Fracture, vertical, rough, undulating, healed fracture, tight | | | |
| | | | >10 | 125.75, 125.9' - Bedding plane (2), horizontal, planar<br>126.0' - Fracture, horizontal, rough, undulating | | | |
| | | | 1 | 126.2' - Bedding plane, horizontal, smooth | | | |
| | | | NR | 127.3-127.7' - Fracture zone, irregular limestone fragments, undulating surfaces<br>128.6' - Fracture or mechanical break, horizontal, rough, undulating | | **No Recovery 128.9-130.0'** | R17: 9 minutes |
| 130 | 130.0 | | | | | | |
| -89.4 | R18-NQ 5 ft 42% | 0 | >10 | 130.0-132.1' - Fracture zone, rough, 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<br>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 | |
| | | | >10 | | | | |
| | | | NR | | | **No Recovery 132.1-135.0'** | Driller's Remark: 100% loss of circulation at 132.0' below ground surface, soft drilling, possible void<br>R18: 4 minutes |
| 135 | 135.0 | | | | | | |
| -94.4 | R19-NQ 5 ft 74% | 27 | >10 | 135.0-135.2' - Bedding plane, horizontal, smooth, multiple 1/4"-1/2" thick partings<br>135.4' - Fracture or mechanical break, horizontal, 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")<br>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)<br>SC-4 collected at 135.7-136.6' |
| | | | 1 | 135.7' - Fracture, horizontal, rough, planar | | | |
| | | | >10 | 136.7' - Mechanical break, rough, undulating<br>136.9-138.2' - Fracture zone, irregular, undulating surfaces, possible vertical fracture, fine black staining on few fragments | | | |
| | | | 1 | 138.2' - Mechanical break, 60 deg, rough, planar | | | |
| | | | NR | | | **No Recovery 138.7-140.0'** | R19: 10 minutes |
| 140 | 140.0 | | | | | | |
| -99.4 | R20-NQ 5 ft 60% | 13 | 1 | | | **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 |
| | | | 2 | 140.9' - Fracture, 40 deg, smooth, planar<br>141.1' - Fracture or mechanical break, vertical, rough, undulating | | | |
| | | | 3 | 141.4-142.2' - Fracture zone, limestone fragments <1"<br>142.5' - Fracture or bedding plane, horizontal, smooth | | | |
| | | | NR | 142.8' - Fracture, vertical, rough, undulating, healed, tight<br>143.0' - Fracture, rough, undulating, black coating (possibly pyrite) on surface | | | R20: 13 minutes |
| 145 | 145.0 | | | | | | |

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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 : 5/23/2007 LOGGER : C. Sump, P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -104.4 | R21-NQ 5 ft 80% | 17 | >10 | 145.0-145.4' - Fracture zone, rock fragments 1/2" thick | | 140.5-143.0' - very pale yellowish gray, (5Y 7/2), moderate HCl reaction, medium strong to strong (R3 to R4), small zones (<1") of dark gray, fossil molds up to 3/4", numerous small voids (5%-20% surface area) becoming denser, hard below 142.0', black coating on some fracture faces (pyrite) | |
| | | | | 145.75' - Fracture, 10 deg, rough, planar | | | |
| | | | 4 | 146.3' - Fracture or mechanical break, rough, undulating | | | |
| | | | >10 | 146.4' - Bedding plane, horizontal, rough, discontinuity with fine grained limestone | | | Disaggregate carbonate sand 146.8-147.2' |
| | | | | 146.6' - Fracture, >80 deg, rough, undulating, healed | | **No Recovery 143.0-145.0'** | |
| | | | 3 | 146.8' - Bedding plane, discontinuity with yellowish brown, weak, loose, carbonate sand zone | | **Limestone** 145.0-146.8' - yellowish gray, (5Y 7/2), mild HCl reaction, medium strong to strong (R3 to R4), small voids (1/16"-1/8") and larger cavities/fossil molds up to 1/2" variable across interval from trace to >10%, thin (1") fine grained beds show indications of very fine laminations | |
| | | | NR | 147.5-147.8' - Fracture zone, vertical, limestone fragments 1-1/2"-3" | | | R21: 15 minutes |
| 150 | 150.0 | | | | | | |
| -109.4 | R22-NQ 5 ft 100% | 15 | 2 | 147.8, 148.0' - Bedding plane (2), horizontal, smooth | | | |
| | | | | 148.6' - Mechanical break, horizontal, rough, undulating | | | |
| | | | >10 | 148.9, 149.0' - Fractures (2), 45 deg, rough, planar | | | |
| | | | 6 | 150.8' - Fracture or mechanical break, horizontal, rough, planar | | 146.8-147.2' - medium olive brown, fragmented (1/4"-3/4" size), friable, coarse carbonate sand | |
| | | | | 150.9' - Fracture, >80 deg, rough, undulating | | 147.2-147.7' - medium olive brown, weak (R2) | |
| | | | >10 | 151.0-152.0' - Fracture zone, mostly rough, undulating horizontal fractures, few 45 deg rough, planar fractures, limestone fragments 3/4"-2-1/2" in length | | 147.7-149.0' - Same as 145.0-146.8' except light olive gray, (5Y 5/2) | Weak along laminae, dark laminations may be biofeature (algae) |
| | | | >10 | 152.0, 152.1, 152.3, 152.5, 152.7, 152.9' - Fractures (6), horizontal, rough, undulating | | **No Recovery 149.0-150.0'** **Limestone** | R22: 15 minutes |
| 155 | 155.0 | | | | | | |
| -114.4 | R23-NQ 5 ft 68% | 25 | 2 | 153.0-154.0' - Fracture zone, horizontal, rough, undulating, partings controlled by bedding lamination | | 150.0-152.8' - Same as 145.0-146.8' except light olive gray, (5Y 5/2), mild HCl reaction, medium strong (R3) | |
| | | | 3 | 154.0-155.0' - Fracture zone, 20-45 deg, rough, undulating | | 152.8-153.9' - mottled grayish yellow and light olive gray, (5Y 8/4 and 5Y 5/2), medium strong (R3), thin (1"-2") dark yellowish brown (10YR 4/2) fine wavy laminations, dark laminations slightly inclined (5-10 deg) | |
| | | | | 155.3' - Fracture, 15 deg, rough, planar | | | |
| | | | >10 | 155.4, 155.6' - Fractures (2), 10-15 deg, rough, undulating | | | |
| | | | | 156.5' - Fracture, horizontal, rough, planar | | 153.9-155.0' - Same as 150.0-152.8' except strong (R4), denser, fewer voids | |
| | | | >10 | 156.6' - Fracture, rough, undulating | | | |
| | | | | 156.8' - Fracture, horizontal, rough, planar | | | |
| | | | NR | 157.2' - Bedding plane, 4-5 deg, break on fine grained layer | | 155.0-156.3' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), strong (R4), mottled appearance, <5-10% coverage of 1/16"-1/8" small voids and larger cavities/fossil molds up to 1/2" increasing with depth, dense | R23: 11 minutes |
| | | | | 157.2-158.4' - Fracture zone, horizontal, planar, rock fragments 3/4"-2" in length | | | |
| 160 | 160.0 | | | | | | |
| -119.4 | R24-NQ 5 ft 50% | 0 | >10 | | | 156.3-158.4' - Same as 155.0-156.4' except increasing percentage of small voids uniformly distributed, color darkening to medium olive brown (5Y 4/4), very fine laminated dense interbed at 157.6-158.1' | |
| | | | 1 | 161.3' - Fracture, 75 deg, undulating, slightly radial, 6" long | | | |
| | | | 0 | | | | The rig CME 55 (S/N 252345) was changed to CME 75 (S/N 252437) at depth 162 feet below ground surface |
| | | | NR | | | **No Recovery 158.4-160.0'** **Limestone** 160.0-162.5' - light olive gray to olive gray, (5Y 5/2 to 5Y 3/2), medium strong (R3), dense, few small voids or cavities/fossil molds (<5%) **No Recovery 162.5-165.0'** | R24: 10 minutes Core barrel stuck at 162.3' |
| 165 | 165.0 | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: A-13 | SHEET 10 OF 11 |
|---|---|---|

# 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 : 5/23/2007 LOGGER : C. Sump, P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -124.4 | | | >10 | 165.0-166.1' - Fracture zone | | **Limestone**<br>165.0-167.4' - medium dark gray, (N5), fine grained, mild HCl reaction, strong (R4), 10-15% coverage of small (<1/8") voids, 10% coverage of 1"-1-3/8" fossil molds/cavities, trace carbonate infill of cavities, light olive gray (5Y 6/1) coloration of fractured surfaces<br>167.4-168.8' - medium dark gray to yellowish gray, (N5 to 5Y 5/2), fine grained, mild to moderate HCl reaction, medium strong to strong (R3 to R4), trace to 10% coverage of 1/16" voids increasing with depth, visible casts/cavities | 5/9/07, 14:00 hrs - Rig changed to one with a cathead to allow pull-back hammering<br>16:00 hrs - Only 10' of rods removed, decide to overdrill with HQ tools<br>16:20 hrs - Start installing HQ<br>19:00 hrs - HQ tools will not go through 4" bit, HQ tools pulled and resumed back hammering<br>Driller's Remark: Core barrel retrieved, hole currently cased from 0-60' with HW casing<br>Driller's Remark: extending HW casing to 90'<br>Driller's Remark: HW casing installed to 90', NQ rod and tri-cone bit equipped to reach sampling depth of 165'<br>P. De Sa'rego begins logging<br>R25: 28 minutes<br>Driller's Remark: Chatter approximately 145'<br>Driller's Remark: Chatter approximately 150'-155'<br>Driller's Remark: Chatter at approximately 160'<br>R26: 24 minutes<br>Driller's Remark: Chatter<br>Driller's Remark: Chatter<br>R27: 58 minutes<br>Driller's Remark: Chatter<br>Driller's Remark: Chatter<br>R28: 46 minutes |
| | | | >10 | 166.35' - Fracture, <10 deg, rough, undulating, 1/8"-3/16" relief | | | |
| | R25-NQ<br>5 ft<br>76% | 0 | 8 | 166.35-165.55' - Fracture zone, vertical, rough, planar, <1/16" gray carbonate infill<br>166.6' - Fracture, horizontal, smooth, planar | | | |
| | | | >10 | 166.8, 166.9, 167.0, 167.2' - Fractures (4), <10 deg, smooth, undulating | | | |
| | | | NR | 167.4, 167.8, 167.9' - Bedding plane (3), horizontal, smooth, planar<br>167.7' - Mechanical break | | | |
| 170 | 170.0 | | | 167.9-168.8' - Fracture zone | | **No Recovery 168.8-170.0'** | |
| -129.4 | | | 8 | 170.0-170.2' - Fracture zone<br>170.2-170.8' - Fracture, 60 deg, smooth, undulating | | **Limestone**<br>170.0-170.2' - Same as 165.0-167.4'<br>170.2-171.1' - Same as 165.0-167.4' except no visible casts/cavities<br>171.1-172.1' - Same as 165.0-167.4'<br>172.1-174.5' - Same as 167.4-168.4' except size of large casts/cavities up to 1-3/16"x3/4" over 30% of rock at 173.5-174.5' | |
| | | | >10 | 170.8' - Mechanical break<br>170.95-171.25' - Fracture zone | | | |
| | R26-NQ<br>5 ft<br>90% | 7 | >10 | 171.4, 171.6, 172.05, 172.2, 173.1, 173.45, 173.8, 174.2' - Fractures (8), <10 deg, rough, undulating | | | |
| | | | 6 | 172.4-172.6' - Fracture zone<br>172.8-173.0' - Fracture zone | | | |
| | | | 1 | | | | |
| 175 | 175.0 | | NR | | | **No Recovery 174.5-175.0'** | |
| -134.4 | | | >10 | 175.0-176.1' - Fracture zone | | **Limestone**<br>175.0-176.0' - pale yellowish brown to dark gray, (10YR 8/2 to N3), fine grained, mild HCl reaction, medium strong to strong (R3 to R4), trace voids up to 1/16" in size, 10-15% coverage of 1-3/16"x3/8" casts/cavities, with infill/ recrystallization of yellowish brown, fine to medium grained carbonate<br>176.0-177.9' - pale yellowish brown, (10YR 8/2), fine to medium grained, mild to moderate HCl reaction, medium strong (R3), 10-15% coverage of <3/16" voids | |
| | | | >10 | 176.35, 176.45, 176.7, 176.75, 176.8' - Fractures (5), horizontal, smooth, planar to undulating | | | |
| | R27-NQ<br>5 ft<br>58% | 8 | 2 | 176.45-176.7' - Fracture zone<br>176.8-177.0' - Fracture zone | | | |
| | | | NR | 177.4' - Fracture, horizontal, rough, planar to undulating<br>177.75' - Fracture, 60 deg, rough, undulating<br>177.76' - Mechanical break | | | |
| 180 | 180.0 | | | | | **No Recovery 177.9-180.0'** | |
| -139.4 | | | >10 | | | **Limestone**<br>180.0-184.5' - Same as 176.0-177.9' except 40-50% casts/cavities at 180.75-181.1' and 183.7-183.9' (up to 1-3/16"x9/16"), and highly fossiliferous with 50% voids up to 1-3/16" at 183.1-184.1' and thin (1/16"-3/16") dark laminae from 181.4-182.4' | |
| | | | 6 | 180.75-180.9' - Fracture zone, possibly due to cavities in rock<br>181.2' - Fracture, horizontal, smooth to rough, undulating, 1/4"-3/8" relief | | | |
| | R28-NQ<br>5 ft<br>90% | 20 | >10 | 181.5, 181.55' - Fractures (2), 25 deg, smooth, planar, along laminae of darker material | | | |
| | | | >10 | 181.75, 181.80' - Fractures (2), <10 deg, rough, undulating, 1/4"-3/8" relief<br>182.0-182.2' - Fracture zone | | | |
| | | | 1 | 182.4' - Bedding plane, smooth, planar, 1/8" relief | | | |
| 185 | 185.0 | | NR | 182.5-182.9' - Fracture zone | | **No Recovery 184.5-185.0'** | |

| PROJECT NUMBER: | BORING 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 on 5/6/07 START : 5/6/2007 END : 5/23/2007 LOGGER : C. Sump, P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -144.4 | R29-NQ 5 ft 86% | 22 | >10 | 183.2-183.9' - Fracture zone<br>184.1' - Bedding plane, horizontal, rough, planar | | **Limestone**<br>185.0-187.6' - pale yellowish brown, fine to medium grained, mild to moderate HCl reaction, medium strong to strong (R3 to R4), 10% coverage of <3/16" voids, trace casts/cavities up to 9/16"x3/8" with partial carbonate recrystallization on surfaces | |
| | | | >10 | 185.2-185.9' - Fracture zone<br>186.0' - Mechanical break | | | |
| | | | 3 | 186.3' - Fracture, horizontal, rough, undulating, 3/8" relief, <1/16" carbonate infill<br>186.4' - Mechanical break<br>186.7-186.95' - Fracture zone | | | |
| | | | >10 | 187.5' - Fracture, <5 deg, smooth, undulating<br>187.8' - Fracture, <5 deg, rough, undulating, <1/8" relief | | 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" | |
| | | | 2 | 187.95' - Fracture, horizontal, rough, undulating, <3/16" relief | | | R29: 37 minutes |
| 190 | 190.0 | | NR | 188.2-188.4' - Fracture zone | | **No Recovery 189.3-190.0'** | |
| -149.4 | R30-NQ 5 ft 72% | 8 | >10 | 188.55, 188.9, 189.0, 189.1, 189.15' - Fractures (5), horizontal, smooth, planar to undulating, 1/16" relief | | **Limestone**<br>190.0-193.6' - Same as 175.0-176.0' except 10-15% voids up to 3/16" and black laminations from 190.5-192.3', increased (50% by volume) carbonate infill of cavities and casts | |
| | | | >10 | 190.0-190.55' - Fracture zone<br>190.9-191.1' - Fracture zone | | | |
| | | | >10 | 191.3' - Fracture, 15 deg, smooth to rough, undulating<br>191.5-191.6' - Fracture zone<br>191.8-192.1' - Fracture zone | | | |
| | | | 3 | 192.3' - Fracture, 30 deg, rough, undulating<br>192.4-192.6' - Fracture zone, 60 deg, smooth to rough, undulating, gray staining over <10% of fracture surface | | | |
| | | | NR | 192.95' - Fracture, 30 deg, smooth to rough, undulating, gray staining over 75% surface | | **No Recovery 193.6-195.0'** | R30: 51 minutes |
| 195 | 195.0 | | | 193.15-193.3' - Fracture zone | | | |
| -154.4 | R31-NQ 5 ft 36% | 16 | >10 | 195.0-195.4' - Fracture zone<br>195.7-196.0' - Fracture zone | | **Limestone**<br>195.0-196.1' - yellowish gray, (5Y 7/2), fine to medium grained, mild HCl 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 3/8"x3/8" | |
| | | | 1 | 196.3-196.8' - Fracture zone or mechanical break, 40 deg, rough, undulating, pale yellowish brown recrystallization (carbonate, fine to medium grained) on 100% of surface, 3/16"-3/8" relief | | | Driller's Remark: 100% fluid loss at 196' |
| | | | NR | | | 196.1-196.8' - Same as 175.0-176.0' except 5-10% casts/cavities up to 9/16"x1-3/16"<br>**No Recovery 196.8-200.0'** | R31: 15 minutes |
| 200 | 200.0 | | | | | | |
| -159.4 | | | | | | Bottom of Boring at 200.0 ft bgs on 5/23/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

DRILLING METHOD AND EQUIPMENT : CME 55 S/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 bgs on 03/20/07 START : 3/14/2007 END : 4/9/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.4 | | | | | | | 16:35 - Began drilling |
| | 3.5 | | | | | | |
| | 5.0 | 1.5 | SS-1 | 2-2-1 (3) | **Silty Sand (SM)** 3.5-5.0' - dark yellowish orange to light brown, (10YR 6/6 to 5YR 5/6), wet, very loose, fine grained, no HCl reaction, 20-25% nonplastic fines, trace medium to coarse grained sand-sized iron-cemented concretions | | 6" slough removed for photo |
| 5 37.4 | | | | | | | |
| | 8.5 | | | | | | |
| | 10.0 | 1.2 | SS-2 | 3-4-5 (9) | **Clayey Sand (SC)** 8.5-9.7' - very light gray, (N8), wet, loose, fine grained, no HCl reaction, 30% medium plastic fines, trace organics (roots), trace green mineral | | |
| 10 32.4 | | | | | | | |
| | 13.5 | | | | | | |
| | 15.0 | 1.3 | SS-3 | 1-3-5 (8) | **Clayey Sand (SC)** 13.5-14.0' - medium light gray, (N6), wet, loose, no HCl reaction, fine silica sand with 3 distinct CH layers at 13.5-13.55', 13.7-13.75', and 13.8-14.0'; CH is greenish gray (5G 6/1) to greenish black (5GY 2/1), highly plastic | | |
| 15 27.4 | | | | | **Silt (ML)** 14.0-14.8' - grayish orange, (10YR 7/4), wet, medium stiff, nonplastic, rapid dilatancy, strong HCl reaction, carbonate material | | |
| | 18.5 | | | | | | |
| | 20.0 | 1.3 | SS-4 | 2-4-2 (6) | **Clayey Sand (SC)** 18.5-18.6' - very light gray, (N8), wet, loose, fine grained, no HCl reaction, 30% medium to high plasticity fines, silica sand | | 17:30 - Stopped drilling for the day at 20' |
| 20 | | | | | | | |

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

# SOIL BORING 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

DRILLING METHOD AND EQUIPMENT : CME 55 S/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 bgs on 03/20/07 START : 3/14/2007 END : 4/9/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.4 | | | | | **Poorly Graded Sand (SP)** 18.6-19.4' - very light gray, (N8), wet, loose, fine grained, <5% fines, no HCl reaction, silica sand<br>**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 | | Began drilling on 3/15/07 at 08:25 |
| | 23.5 | | | | | | |
| | | 1.2 | SS-5 | 5-7-8 (15) | **Clayey Sand (SC)** 23.5-24.6' - medium light gray, (N6), wet, medium dense, fine grained, no HCl reaction, 22% medium plastic fines, trace very fine sand-sized black minerals, CH lenses at 23.55-23.6', 24.2-24.25' and 24.55-24.6' | | |
| 25 | 25.0 | | | | | | |
| 17.4 | | | | | **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 | | | | | | |
| | | 1.1 | SS-6 | 5-8-29 (37) | **Silt With Sand (ML)** 28.5-29.6' - grayish orange, (10YR 7/4), wet, hard, low plasticity, slow to rapid dilatancy, 15% fine sand, 5-10% medium to coarse sand, lenses of coarse sand 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' | | |
| 30 | 30.0 | | | | | | |
| 12.4 | | | | | | | |
| | 33.5 | | | | | | |
| | 33.8 | 0.1 | SS-7 | 50/1.5 (50/1.5") | **Sandy Silt (ML)** 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 carbonate material | | |
| 35 | | | | | | | Driller's Remark: Lost circulation at 36.5' at 10:07<br>36.5-38.5' Intermittent medium chattering<br>37.0-38.5' Hard/slow drilling |
| 7.4 | | | | | | | |
| | 38.5 | | | | | | |
| | 38.8 | 0.0 | SS-8 | 50/3 (50/3") | **Limestone Fragments** 38.50-38.55' - light olive gray, (5Y 6/1), mild HCl reaction, fragments up to 1/2", voids up to 1/16" over 15-20% of surface | | 12:25 Set 6" diameter casing to 8.5' and 20' HW casing<br>14:30 - End drilling on 3/15/07 |
| 40 | | | | | | | |

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

# SOIL BORING 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

DRILLING METHOD AND EQUIPMENT : CME 55 S/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 bgs on 03/20/07 START : 3/14/2007 END : 4/9/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.4 | | | | | | | Water level at 1.7' at 12:30 on 3/20/07<br>Driller's Remark: Set HW casing from 20-38' at 15:00<br>Driller's Remark: Begin drilling from 38.5' with AWJ rod and 2-7/8" tricone bit (new bit) at 15:20 |
| | 42.5<br>42.8 | 0.2 | SS-9 | 50/3<br>(50/3") | **Silt With Limestone (ML)**<br>42.5-42.65' - light olive gray, (5Y 5/2), wet, low plasticity, mild to moderate HCl reaction, medium to coarse sand-sized and fine gravel-sized limestone, voids up to 1/16" in diameter covering 15-25% of surface, no visible casts or molds | | SS-9 collected from 42.5' to 44.0' |
| 45<br>-2.6 | | | | | | | Driller's Remark: Tagged hole at 52.5', 1' short of presumed depth on 3/21/07 at 08:40; Assuming change in bit on morning of 3/20/07 reconciles loss of 1' in measured depth |
| | 47.5<br>47.9 | 0.3 | SS-10 | 50/4.5<br>(50/4.5") | **Sandy Silt (ML)**<br>47.5-47.75' - pale yellowish brown, (10YR 6/2), wet, hard, nonplastic to low plasticity, rapid dilatancy, mild to moderate HCl reaction, 30-35% fine to coarse sand, all carbonate material | | SS-10 collected from 47.5-49.0'.<br>16:45 Stopped drilling at 53.5' for the day on 3/20/07 |
| 50<br>-7.6 | | | | | | | Driller's Remark: Reamed borehole from 38.5' to 52.5' with 3-7/8" tricone bit on 3/21/07<br>At 08:50; hole tagged at 52.5' |
| | 53.5<br>54.8 | 1.3 | SS-11 | 33-50-50/4<br>(100/10") | **Sandy Silt (ML)**<br>53.5-54.8' - moderate yellowish brown, (10YR 5/4), wet, hard, low plasticity, slow to rapid dilatancy, mild HCl reaction, 30% fine to medium grained sand, 3/16" thick grayish black (N2) organic lens at 53.75', other irregular organic lenses and stringers throughout sample | | |
| 55<br>-12.6 | | | | | | | |
| | 58.5<br>59.4 | 0.9 | SS-12 | 26-50/5<br>(76/11") | | | |
| 60 | | | | | | | |

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

# SOIL BORING 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

DRILLING METHOD AND EQUIPMENT : CME 55 S/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 bgs on 03/20/07 START : 3/14/2007 END : 4/9/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -17.6 | | | | | **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 | | |
| | 63.5 | | | | | | |
| | 63.9 | 0.4 | SS-13 | 50/5 (50/5") | **Silt With Sand (ML)** 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 | | | | | | | Driller's Remark: 66.5-67' hard layer, light chatter |
| | 68.5 | | | | | | |
| | 69.3 | 0.7 | SS-14 | 25-50/4 (75/10") | **Silty Sand With Limestone Lenses (SM)** 68.5-69.15' - moderate yellowish brown, (10YR 5/4), wet, very dense, fine to coarse grained, mild to moderate HCl reaction, 25% low plasticity fines, around 50% of sample is limestone lenses up to 1" in size, voids up to 1/16" in size over 5-10% of surface, all carbonate material | | |
| 70 -27.6 | | | | | | | Driller's Remark: Slow drilling and moderate chattering, hard rock |
| | 73.5 | | | | | | |
| | 73.8 | 0.0 | SS-15 | 50/1 (50/1") | **Limestone Fragments** 73.5-73.55' - Fragments up to 1/2" in size, with Silty Sand (SM) as in 68.5-69.15' | | Driller's Remark: Advance HW casing from 38.0' to 73.5' |
| 75 -32.6 | | | | | | | |
| | 78.5 | | | | | | |
| | 78.9 | 0.0 | SS-16 | 50/5 (50/5") | **Limestone Fragments** 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: |
|---|---|
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# SOIL BORING 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

DRILLING METHOD AND EQUIPMENT : CME 55 S/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 bgs on 03/20/07 START : 3/14/2007 END : 4/9/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -37.6 | | | | | | | Driller's Remark: 81.5-82.5' soft rock<br>Driller's Remark: 82.5-83.5' hard, heavy chattering<br><br>Driller's Remark: Stopped drilling at 83.5' at 18:10<br><br>Driller's Remark: Start SPT with AWJ rod on 3/22/07 at 08:10 |
| | 83.5 – 84.4 | 0.0 | SS-17 | 37-50/5 (87/11") | **Silty Sand With Limestone (SM)**<br>83.5-83.55' - moderate yellowish brown, (10YR 5/4), wet, very dense, fine to coarse grained, mild to moderate HCl reaction, 29% low plasticity fines, 50% of sample is gravel-sized limestone fragments up to 1/2" in size, voids up to 1/16" over 40-60% of surface, all carbonate material | | |
| 85<br>-42.6 | | | | | | | Driller's Remark: 87.5-88.0' heavy chatter, hard rock |
| | 88.5 – 88.8 | 0.0 | SS-18 | 50/3 (50/3") | **Limestone Fragments**<br>88.50-88.55' - pale yellowish brown, (10YR 6/2), moderate HCl reaction, very poor recovery, fragments up to 1/2", voids up to 1/16" over 15-25% of surface, moderately fossiliferous, no visible cavities | | |
| 90<br>-47.6 | | | | | | | Driller's Remark: 90.0-93.5' moderate chatter, slow drilling, hard rock |
| | 93.5 – 93.8 | 0.1 | SS-19 | 50/3 (50/3") | **Sandy Silt With Limestone (ML)**<br>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 6/2) limestone lenses up to 1/4" thick | | |
| 95<br>-52.6 | | | | | | | |
| | 98.5 – 98.9 | 0.3 | SS-20 | 50/5 (50/5") | **Limestone**<br>98.5-98.8' - pale yellowish brown, (10YR 6/2), moderate HCl reaction, limestone fragments up to 1/2"x3/4"<br>Begin Rock Coring at 98.4 ft bgs<br>See the next sheet for the rock core log | | |
| 100 | | | | | | | |

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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

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205; Dietrich D-50 S/N 240, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER LEVELS : 1.7 ft bgs on 03/20/07 START : 3/14/2007 END : 4/9/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 98.4 | | | | | | |
| | | | >10 | 98.9-99.2' - Fracture zone (2), rough, undulating, 1-3/4"x1-3/4" fragments, many fracture orientations | | **Limestone**<br>98.4-102.6' - yellowish gray, (5Y 7/2), fine to medium grained, strong HCl reaction, very weak to medium strong (R1 to R3), 40% of rock mottled with irregularly shaped infilled cavities (bioturbation zones), voids (1/16") over <5% of surface (25-50% in bioturbated zones), up to 1/4"x3/4" trace fossils, highly fractured, many discontinuities; very weak rock from 98.4-99.2', 100.15-101.1' and 101.6-102.6' | Water level 2.9' below ground surface on 3/23/07 at 08:20, borehole depth at 98.5'<br>Driller's Remark: Assembled NQ coring assembly (NW casing with attached drill bit is 8.15' long)<br>Driller's Remark: At 98.5' switch to NQ rock coring assembly at 10:25, length from kelly down position to ground is 3.3'<br>Start coring at 11:50<br>R1: 19 minutes |
| 100<br>-57.6 | R1-NQ<br>5 ft<br>83% | 10 | 5 | 99.4' - Fracture or mechanical break, 20 deg, rough, undulating, potential mechanical break, tight, fossils on surface | | | |
| | | | >10 | 99.6, 99.75, 99.95' - Fractures or mechanical break (3), 30, 90, 90 deg, smooth, undulating | | | |
| | | | >10 | 100.15-101.1, 101.6-102.6' - Fracture zone (4), 45 deg, smooth, undulating, 1"-3" fragments, broken along weaker rock | | | |
| | | | >10 | | | | |
| | | | NR | | | **No Recovery 102.6-103.4'** | |
| | 103.4 | | | | | | |
| | | | 1 | 103.8' - Fracture, 15 deg, smooth, undulating, potential mechanical break, tight | | **Limestone**<br>103.4-107.5' - grayish orange, (10YR 7/4), medium grained, moderate to strong HCl reaction, medium strong (R3), voids (1/16") over 0-20% of surface in mottled pattern, fossils up to 1/4"x1/2" over 5-10% of surface | |
| | | | >10 | 104.5' - Fracture or mechanical break, 20 deg, rough, stepped to undulating, tight | | | |
| 105<br>-62.6 | R2-NQ<br>5 ft<br>82% | 30 | >10 | 104.7-104.9' - Fracture zone (2), 1/2"-1-1/2" fragments, multiple orientations<br>104.9' - Fracture, 70 deg, smooth, undulating, open | | | |
| | | | >10 | 105.0' - Fracture or mechanical break, 80 deg, smooth, undulating, open, intersects 104.9' fracture | | | |
| | | | 0 | 105.1' - Fracture, <10 deg, rough, undulating, open | | **No Recovery 107.5-108.4'** | R2: 18 minutes |
| | | | NR | | | | |
| | 108.4 | | | | | | |
| | | | 6 | 105.2' - Mechanical break, 45 deg, rough, undulating, open 1/2" to tight<br>105.5' - Fracture, 50 deg, smooth, undulating | | **Limestone**<br>108.4-112.8' - moderate yellowish brown, (10YR 5/4), medium grained, moderate to strong HCl reaction, medium strong (R3), voids (1/16") over 35-45% of surface, fossil casts up to 1/4"x1/2" over <5% of surface | |
| | | | 5 | 106.1-106.9' - Fracture zone (2), fragments up to 1"x2", multiple orientations, tight to open 1/4" | | | |
| 110<br>-67.6 | R3-NQ<br>5 ft<br>88% | 38 | 2 | 107.1' - Fracture, 55 deg, smooth, undulating, tight<br>107.3' - Fracture, 45 deg, rough, undulating to stepped, tight | | | |
| | | | 5 | 108.5' - Fracture, 70 deg, rough, undulating, loose | | | |
| | | | 0 | 108.8' - Fracture, 20 deg, rough, undulating to stepped, loose | | | R3: 15 minutes |
| | | | NR | 108.9-109.1' - Fractures (2), 5 deg, rough, undulating, tight | | **No Recovery 112.8-113.4'** | |
| | 113.4 | | | | | | |
| | | | 1 | 109.0' - Fracture, 80 deg, smooth, undulating, black staining (crystal faces) on surface, tight to open 1/4" | | **Limestone**<br>113.4-118.2' - Same as 108.9-112.8' | Driller's Remark: 115-115.5', void, lost circulation, using more pressure to drill |
| | | | 4 | 109.7' - Fracture zone, black staining, up to 1/2"x1-1/4" fragments | | | |
| 115<br>-72.6 | R4-NQ<br>5 ft<br>96% | 82 | 1 | 109.9-110.2' - Fractures (2), 80 deg, rough, undulating, loose<br>110.0' - Fracture, 70 deg, same as 109.9' | | | SC-1 collected at 114.8-115.9' |
| | | | 1 | 110.1' - Fracture or mechanical break, 5 deg, rough, stepped, tight<br>110.7' - Fracture, 10 deg, rough, undulating, open | | | |
| | | | 1 | 110.9' - Fracture, 10 deg, rough, undulating, black metallic crystals, tight to open 1/8" | | | R4: 10 minutes<br>Stop drilling for day at 17:10 on 3/23/07 at 118.4' |
| | 118.4 | | | | | | |

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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

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205; Dietrich D-50 S/N 240, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER LEVELS : 1.7 ft bgs on 03/20/07 START : 3/14/2007 END : 4/9/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | NR | 111.6-111.7' - Fractures or mechanical break (2), 5 deg and 70 deg, rough, undulating, tight | | **No Recovery 118.2-118.4'** | Start drilling on 3/24/07 at 08:05 |
| | | | >10 | 111.8-111.9' - Fractures (2), 10 deg and 70 deg, smooth, undulating, tight | | **Limestone** 118.4-122.0' - Same as 108.9-112.8' except voids up to 1/16" over 15-25% of surface | Still no circulation |
| 120 -77.6 | | | >10 | 112.8-113.4' - Fracture zone (2), 1"x1-1/2" fragments | | | Driller's Remark: 121.4-121.6' small void |
| | R5-NQ 5 ft 72% | 20 | >10 | 114.2-114.4' - Fracture zone (2), 1"x1-1/2" fragments | | | |
| | | | 4 | 114.5-114.6' - Fractures (2), 30 deg, smooth, undulating, intersecting, tight to open 1/4" | | | |
| | | | NR | 114.65-114.8' - Bedding plane or mechanical break (2), horizontal, smooth, undulating, tight to open 1/4" | | **No Recovery 122.0-123.4'** | R5: 9 minutes |
| | 123.4 | | | 115.9' - Fracture, same as 114.65', tight | | | |
| | | | 9 | 117.3' - Fracture, 45 deg, smooth, undulating to stepped, tight | | **Limestone** 123.4-125.9' - Same as 108.9-112.8' except voids up to 1/16" over 15-40% of surface increasing with depth, trace fossil casts up to 1/16"x1/4" | |
| | | | 4 | 117.8' - Fracture or mechanical break, 10 deg, smooth, undulating to stepped, tight to open 1/4" | | | |
| 125 -82.6 | | | | 118.6,-118.7' - Bedding plane or mechanical break (2), horizontal, smooth to undulating, stepped, tight to open 1/8" | | | Driller's Remark: Void at 124.7-125.8' |
| | R6-NQ 5 ft 50% | 16 | 1 | 118.7-119.6' - Fracture zone (2), up to 1-3/4"x2" sized fragments, many fractures at 0 deg, a few at 70-80 deg | | **No Recovery 125.9-128.4'** | |
| | | | NR | 119.7' - Fracture, 80 deg, smooth, undulating, tight | | | |
| | | | | 120.3' - Fracture, 40 deg and 45 deg, smooth, undulating, tight | | | R6: 12 minutes |
| | 128.4 | | | 120.8' - Fracture, 80 deg, rough, undulating, tight | | | |
| | | | 7 | 120.9' - Mechanical break | | **Limestone** 128.4-131.2' - pale yellowish brown, (10YR 6/2), fine to medium grained, mild to moderate HCl reaction, medium strong (R3), voids up to 3/16" over 10-20% of surface, trace fossil casts up to 1/4" diameter | Water level at 1.9' below ground surface on 3/26/07 at 08:00 |
| | | | | 121.0-121.5' - Fracture zone (2), breaks at 80-90 deg, many discontinuities up to 1-3/4"x1-3/4" fragments | | | |
| 130 -87.6 | | | 7 | 121.5' - Bedding plane, horizontal, smooth, undulating, open | | | Water level 1.9' below ground surface on 3/27/07 at 08:08 |
| | R7-NQ 5 ft 56% | 9 | >10 | 121.8-121.9' - same as 121.5' except tight | | | Driller's Remark: No circulation during run |
| | | | | 121.85' - Fracture, 80 deg, rough, undulating, open | | **No Recovery 131.2-133.4'** | Driller's Remark: Light chatter from 128.4-132.4' |
| | | | NR | 123.4-123.7' - Fracture zone (2), three rock fragments | | | Driller's Remark: no chatter, faster drilling from 132.4-132.9' |
| | | | | 123.9, 124.2, 124.45' - Fracture or mechanical break (3), horizontal and 10 deg, rough, undulating, open | | | R7: 12 minutes |
| | 133.4 | | | 124.7-124.75' - Bedding plane or mechanical break (2), horizontal, smooth, planar to undulating, tight to 1/4" open | | **Limestone** 133.4-134.25' - light olive gray, (5Y 5/2), very fine to fine grained, mild to moderate HCl reaction, medium strong (R3), voids (1/16") over <10% of surface, trace fossil casts up to 1/2"x1/4" | Driller's Remark: Very soft from 133.4-135.4', harder from 135.4-137.4', soft from 137.4-138.4' |
| | | | >10 | 125.0' - Bedding plane or mechanical break, horizontal, smooth, planar to undulating, open | | | |
| 135 -92.6 | | | >10 | 125.4' - Fracture, 60 deg, planar to stepped, open 1/4"-1/2" | | | |
| | R8-NQ 5 ft 28% | 0 | NR | 128.5' - Fracture, 40 deg, rough, undulating, open | | 134.25-134.65' - dusky yellow, (5Y 6/4), medium to coarse grained, moderate HCl reaction, medium strong (R3), voids (3/16") over 15-30% of surface, 5-10% fossil casts up to 3/6"x1/2" | |
| | | | | 128.8' - Fracture, 70 deg, rough, undulating, tight to open 1/5" | | | |
| | | | | 128.85' - Fracture, 30 deg, rough, undulating, tight to open 1/8" | | 134.65-134.8' - Same as 133.4-134.25' | R8: 8 minutes |
| | 138.4 | | | | | | |

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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

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205; Dietrich D-50 S/N 240, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER LEVELS : 1.7 ft bgs on 03/20/07 START : 3/14/2007 END : 4/9/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 140<br>-97.6 | R9-NQ<br>5 ft<br>30%<br>143.4 | 0 | 3<br>4<br>NR | 129.05' - Fracture, 20 deg, smooth, undulating, tight<br>129.25' - Fracture, 10 deg, rough, undulating, open 1/8"-1/4"<br>129.4' - Fracture, 85 deg, smooth, undulating, dark staining, open<br>129.-129.75' - Fracture (2), 70 deg, smooth, undulating, dark staining, tight<br>129.85' - 70 deg, smooth, undulating, tight<br>130.0' - Fracture, 20 deg, smooth, undulating, tight, dark staining<br>130.05' - Fracture, 35 deg, smooth, undulating, tight<br>130.3-130.35' - Fractures (2), 15 deg, smooth, undulating, tight | | **No Recovery 134.8-138.4'**<br>**Limestone**<br>138.4-139.2' - pale yellowish brown 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<br>139.2-139.9' - very fine grained, trace voids (1/16"), no visible cavities or fossils<br>**No Recovery 139.9-143.4'** | R9: 15 minutes<br>Driller's Remark: Continued circulation loss, potentially rock fragment jammed in core barrel shoe and unable to capture rock core<br>Driller's Remark: End drilling for the day at 143.4' on 3/27/07 at 18:00<br>Water level at 2.4' below ground surface on 3/28/07 at 08:00<br>Driller's Remark: Retrieved 1.3' core from bottom of NQ bit |
| 145<br>-102.6 | R10-NQ<br>5 ft<br>93%<br>148.4 | 65 | 2<br>2<br>2<br>1<br>1<br>NR | 133.5' - Fracture, 70 deg, smooth, undulating, black staining, open<br>133.65' - Mechanical break, horizontal, smooth, planar, tight, open 1/2"<br>133.8' - Fracture, 75 deg, smooth, undulating, tight to open 1/4"<br>134.05' - Mechanical break, horizontal, smooth, planar, open<br>134.25' - Fracture zone, up to 1"x1-1/2" fragments<br>134.5-134.65' - Fracture zone (2), up to 1"x1-1/2" fragments<br>138.4-138.7' - Fracture zone, up to 1"x2" fragments<br>138.95, 139.2, 139.5, 139.7, 139.8' - Mechanical break (5), horizontal and 10 deg, rough, undulating, tight to open 1/2" | | **Limestone**<br>143.4-148.05' - light olive gray, (5Y 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 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'<br>**No Recovery 148.05-148.4'** | Driller's Remark: Add <1 cup synthetic mud mix at 145.0' |
| 150<br>-107.6 | R11-NQ<br>5 ft<br>92%<br>153.4 | 58 | 1<br>2<br>3<br>10<br>>10<br>NR | 139.65' - Fracture, 60 deg, smooth to rough, undulating, tight to open 1/4"<br>143.7' - Fracture, vertical and horizontal, rough, undulating to stepped, tight to open 1/5"<br>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"<br>147.3' - Fracture, 50 deg and horizontal, smooth, undulating, tight to open 1/8"<br>147.85' - Fracture, 60 deg, smooth, undulating, open<br>147.9' - Fracture, 40 deg, smooth, planar, open | | **Limestone**<br>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 (1/16") over 10-25% of surface, dissolution cavities up to 1"x3" following 60-70% angle fracture pattern<br>151.7-153.0' - moderate yellowish brown, (10YR 5/4), fine to medium grained, mild to moderate HCl reaction, weak to medium strong (R2 to R3), voids (3/16") over 20-40% of surface, trace fossil casts up to 1/4"x1/8", dissolution cavities up to 1-1/2"x1" over 10-15% of surface<br>**No Recovery 153.0-153.4'** | SC-2 collected at 144.5-145.3'<br>R10: 35 minutes<br>Driller's Remark: 2nd gear with 500psi down pressure, then switched to 3rd gear at 300psi for R11-NQ in order to decrease run time at 14:35<br>R11: 17 minutes |
| 155<br>-112.6 | R12-NQ<br>5 ft<br>73%<br>158.4 | 22 | >10<br>4<br>2<br>4<br>NR | 147.95-148.05' - Fracture zone (2), up to 1"x1-1/2" fragments<br>148.5' - Fracture, 55 deg, smooth, undulating, tight<br>150.2' - Mechanical break, horizontal, rough, dark metallic staining, tight<br>150.8' - Fracture, 60 deg, smooth, undulating, tight<br>150.4' - Fracture, 50 deg, smooth, planar, heavy dark metallic staining, tight<br>151.35' - Fracture, 60 deg, smooth, undulating, dark metallic staining, open<br>151.5' - Mechanical break, 40 deg, rough, undulating to stepped, tight | | **Limestone**<br>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 (increasing percentage with depth), poorly fossiliferous, trace casts to 1/4"x2", trace cavities up to 1/4"x2"<br>**No Recovery 157.1-158.4'** | |

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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

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205; Dietrich D-50 S/N 240, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER LEVELS : 1.7 ft bgs on 03/20/07 START : 3/14/2007 END : 4/9/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| 160<br>-117.6 | R13-NQ<br>5 ft<br>98% | 78 | 1<br>4<br>2<br>1<br>2 | 152.0' - Fractures, 80 deg, rough, undulating, dark metallic staining, intersecting, tight<br>152.1' - Fracture, 10 deg, smooth, undulating, open 1/4", lightly stained<br>152.25-153.0' - Fracture zone (2), up to 2"x2" fragments<br>153.4-153.55' - Fracture zone (2), up to 3/4"x1-1/4" fragments<br>153.7' - Fracture, 10 deg, smooth, undulating, light tan thin coating on surface, tight to open 1/4"<br>153.8' - Fracture, vertical, same as 153.7'<br>153.95-154.05' - Fracture zone (2), up to 1/2"x1" fragments<br>154.25' - Fracture, same as 153.7' | | **Limestone**<br>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<br>160.65-160.85' - moderate yellowish brown, (10YR 5/4), weak (R2), voids (1/16") over 15-25% of surface<br>160.85-163.3' - moderate yellowish brown, (10YR 5/4), voids (1/16") over 15-25% of surface, trace cavities (1/16"-1/2"), trace fossils (1/8"-1/4") | 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'<br><br>Water level at 2.1' below ground surface on 3/29/07 at 08:20<br><br>Water level at 2.7' below ground surface on 4/3/07 at 09:10<br><br>Water level at 2.8' below ground surface on 4/4/07 at 08:20 |
| 165<br>-122.6 | R14-NQ<br>5 ft<br>97% | 18 | NR<br>7<br>4<br>7<br>7<br>4 | 154.35' - Fracture, 30 deg, smooth, undulating, tight to open 1/4"<br>154.6' - Mechanical break, horizontal, rough, undulating, tight<br>155.1-155.15' - Fractures (2), 60 deg and 40 deg, rough, undulating, open<br>155.15-155.4' - Fracture zone (2), fragments up to 3/4"x1-1/2"<br>155.4' - Fracture, 75 deg, rough, undulating, dark staining<br>156.05-156.2' - Fractures (2), 70 deg and 55 deg, rough, undulating, tight to open 1/8"<br>156.6' - Fracture or mechanical break, vertical, rough, undulating, tight<br>156.65, 156.7, 156.8, 156.9' - Bedding plane or mechanical break (4), smooth, horizontal to 10 deg, planar to undulating, tight | | **No Recovery 163.3-163.4'**<br>**Limestone**<br>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 gray (5Y 5/2), contains grayish orange beds that are weak rock (R2) and coarse grained, voids (3/16") over 10-40% of surface; light olive 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' | Water level at 7.6' below ground surface on 4/5/07 at 08:10, inside core barrel casing<br>R 12: 25 minutes<br>SC-3 collected at 161.35-162.4'<br>R13: 17 minutes<br>R14: 16 minutes |
| 170<br>-127.6 | R15-NQ<br>5 ft<br>98% | 58 | NR<br>2<br>1<br>4<br>5<br>4 | 156.9-157.1' - Fracture zone (2), up to 1/2"x1-1/2" fragments<br>158.4-158.55' - Fracture zone (2), up to 1"x2" fragments<br>158.55' - Fracture, 40 deg, rough, undulating, open<br>159.8-160.0' - Fractures (2), 30 deg, rough, undulating, tight<br>160.2' - 70 deg, same as 159.65'<br>160.65' - Fracture or bedding plane, horizontal, smooth, planar, tight<br>161.35-162.4' - Fractures (2), 20 deg, rough, undulating, tight | | **No Recovery 168.25-168.4'**<br>**Limestone**<br>168.4-173.35' - pale yellowish brown, (10YR 6/2), fine to medium grained, mild to moderate HCl 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 laminations | R15: 17 minutes |
| 175<br>-132.6 | R16-NQ<br>5 ft<br>73% | 0 | NR<br>>10<br>>10<br>>10<br>>10<br>NR | 163.05' - Fracture, 20 deg, smooth, undulating, tight<br>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), horizontal and 50 deg, smooth, planar, tight<br>163.8, 165.1, 165.6' - Fractures (3), rough, undulating, horizontal to 10 deg, tight<br>164.15' - Fracture, 60 deg, same as 163.8'<br>166.2' - Fracture, 60 deg, rough, undulating, tight<br>166.65' - Fractures (2), 30 deg, rough, undulating, intersecting fractures, tight<br>167.1-167.15' - Fractures (2), 40 deg and 70 deg, rough, undulating, tight | | **No Recovery 173.35-173.4'**<br>**Limestone**<br>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<br>**No Recovery 177.1-178.4'** | R16: 17 minutes |

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|---|---|
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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

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205; Dietrich D-50 S/N 240, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER LEVELS : 1.7 ft bgs on 03/20/07 START : 3/14/2007 END : 4/9/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| 180<br>-137.6 | R17-NQ<br>5 ft<br>73% | 22 | >10<br>8<br>0<br>5<br>NR | 167.6-167.7' - Fractures (2), 40 deg and 70 deg, rough, undulating, intersecting, tight<br>167.85-167.95' - Fractures (2), 30 deg and 70 deg, rough, undulating, intersecting, tight<br>168.55' - Fracture, 10 deg, rough, undulating, tight<br>169.05' - Fracture, 50 deg, rough, undulating, tight<br>169.7' - Fracture, 60 deg, smooth, undulating to stepped, tight<br>170.15' - Fracture or mechanical break, 5 deg, smooth, stepped, open 1/8", dark staining<br>170.55' - Fracture, 55 deg, rough, undulating, open 1/8"-3/4" | | **Limestone**<br>178.4-182.1' - Same as 173.4-177.1' except trace cavities up to 1-1/2"x1/4", dark discoloration associated with cavities<br>**No Recovery 182.1-183.4'** | R17: 15 minutes |
| 183.4 | | | | | | | |
| 185<br>-142.6 | R18-NQ<br>5 ft<br>100% | 77 | 2<br>2<br>5<br>4<br>3 | 170.8' - Fracture zone, 3/4"x1-1/2" fragments<br>171.2' - Fracture, 20 deg, rough, undulating, tight<br>171.35, 171.5, 171.8, 172.0, 172.45, 173.2' - Bedding plane or mechanical break, horizontal, smooth, undulating, tight to open 1/8"<br>172.1' - Fracture, 60 deg, rough, undulating, tight<br>172.4' - same as 172.1' except 30 deg<br>173.25' - same as 172.1' except vertical<br>173.4-174.4' - Fracture zone (2), 1-1/2"x2-1/2" fragments<br>175.2' - Fracture, 20 deg, smooth, undulating, tight to open 1/4" | | **Limestone**<br>183.4-188.4' - dark yellowish brown to pale yellowish brown, (10YR 4/6 to 10YR 6/2), fine to coarse grained, mild to moderate HCl reaction, medium strong (R3), abrupt color change at 184.45', voids (1/16" to 3/16") over 5-30% of surface, moderately fossiliferous, fossil casts up to 1"x1/2" over 5-10% of surface (percent increases with depth), trace cavities up to 1-1/4"x1/4" | SC-4 collected at 186.25-187.05'<br>R18: 18 minutes |
| 188.4 | | | | | | | |
| 190<br>-147.6 | R19-NQ<br>5 ft<br>97% | 67 | 4<br>3<br>3<br>3<br>2 | 175.6' - Fracture zone, 1"x1/2" fragments<br>175.9' - Fracture, 30 deg, rough, undulating, tight<br>176.0-176.1' - Fracture zone (2), fragments up to 1"x1/2"<br>176.3' - Fracture, 70 deg, rough, undulating, tight to open 1/4"<br>176.4' - Fracture, horizontal, rough, undulating, tight<br>176.5' - Mechanical break, horizontal, smooth, planar, tight<br>176.6-177.1' - Fracture zone (2), up to 1-1/2"x1-1/2" fragments<br>178.4-179.3' - Fracture zone (2), up to 1/2"x1-3/4" fragments | | **Limestone**<br>188.4-193.25' - light olive gray to moderate yellowish brown, (5Y 5/2 to 10YR 5/4), fine to coarse grained, mild to moderate HCl reaction, weak to medium strong (R2 to R3), voids up to 3/16" over 30% of surface, moderately fossiliferous from 188.4-190.1', poorly fossiliferous from 190.1-191.9', casts up to 1/2"x1/4", trace laminations, fine grained infill over 20-40%, trace cavities up to 1-1/2"x1/8", short (1/4"x1/2") stacked 60 deg fractures from 188.95-189.0' (micro structural feature)<br>**No Recovery 193.25-193.4'**<br>**Limestone**<br>193.4-193.75' - Same as 188.4-191.9' | Driller's Remark: Hard material, about 2" thick at 189.6'<br>Driller's Remark: Hard material, about 2" thick<br>R19: 14 minutes |
| 193.4 | | | NR | | | | |
| 195<br>-152.6 | R20-NQ<br>5 ft<br>98% | 26 | 7<br>5<br>4<br>2<br>6 | 179.3' - Fracture, 40 deg, smooth, undulating, open<br>179.55' - Fractures (2), 20 deg and 10 deg, rough, undulating, open, intersecting<br>179.75' - Fracture, 50 deg, rough, undulating, tight<br>179.85' - Fracture, 40 deg, rough, undulating, open<br>180.0' - Fracture, 20 deg, smooth, undulating to stepped, tight, dark staining<br>180.15' - Fracture, 10 deg, rough, undulating, open<br>180.33- 180.37' - Fractures (2), <10 deg, smooth, undulating, tight to open 1/2"<br>181.45' - Bedding plane, horizontal, smooth, planar, dark staining, tight | | | |
| 198.4 | | | | | | | |

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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

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205; Dietrich D-50 S/N 240, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER LEVELS : 1.7 ft bgs on 03/20/07 START : 3/14/2007 END : 4/9/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 200<br>-157.6 | R21-NQ<br>5 ft<br>63%<br>203.4 | 11 | NR<br>3<br>2<br>>10<br><10<br>NR | 181.65' - Fracture, 70 deg, smooth, planar to undulating, tight<br>181.7' - Bedding plane, horizontal, smooth, planar to stepped, open<br>181.8' - Mechanical break, hardness test<br>181.9' - Fracture, vertical, rough, undulating, tight<br>184.05, 184.2, 184.5, 185.6, 185.65, 185.7, 185.85, 186.25, 188.05' - Fractures or bedding plane (9), 5 deg, smooth, undulating, tight<br>185.7-185.85' - Fracture zone (2), up to 1-1/2"x2/3" fragments<br>187.05, 187.2, 187.35' - Fractures (3), 10 deg and 20 deg, rough, undulating, tight | | 193.75-198.3' - yellowish gray to moderate yellowish brown, (5Y 7/2 to 10YR 5/4), fine to coarse grained, mild to moderate HCl reaction, very weak to medium strong (R1 to R3), voids up to 3/16" over 5-25% of surface increasing percentage with depth, trace fossil casts up to 1/4"x1/8", 196.4-197.7' has moderate coverage (15-10%) of cavities up to 1"x1/2", grain size coarsens with depth<br>**No Recovery 198.3-198.4'**<br>**Limestone**<br>198.4-199.9' - moderate yellowish brown, (10YR 5/4), medium grained, mild to moderate HCl reaction, weak to medium strong (R2 to R3), voids up to 3/16" over 15-20% of surface, trace cavities up to 1/4" diameter, trace fossil casts up to 1/4"x1/3"<br>199.9-201.55' - grayish orange, (10YR 7/4), mild HCl reaction, medium strong (R3), trace voids up to 1/16"<br>**No Recovery 201.55-218.25'** | R20: 14 minutes<br>End drilling on 4/5/07 at 18:00 at 198.4'<br>Water level at 3.3' below ground surface on 4/6/07 at 07:56<br>Begin coring at 08:00<br><br>Driller's Remark: Slow, hard coring from 201.0-201.5', rock core fragment was jammed inside shoe of core barrel<br>R21: 26 minutes |
| 205<br>-162.6 | R22-NQ<br>5 ft<br>0%<br>208.4 | 0 | NR | 187.25' - Fracture, vertical, rough, undulating, tight<br>188.4' - Fracture, 45 deg, rough, undulating, tight<br>188.5, 189.1, 189.2, 189.3, 189.55' - Bedding plane (5), horizontal, smooth, planar, open to tight<br>189.1-189.2' - Fracture zone (2), 1"x1-1/4" fragments<br>189.5' - Fracture, horizontal, smooth, planar<br>190.05' - Fracture, 10 deg, rough, undulating, tight<br>191.05-191.2' - Fractures (2), 30 deg and 60 deg, smooth, undulating, intersecting, tight<br>191.3' - horizontal, same as 190.05' | | | R22: 15 minutes<br><br>Driller's Remark: 1.2' slough at bottom of boring |
| 210<br>-167.6 | R23-NQ<br>5 ft<br>0%<br>213.4 | 0 | NR | 191.55' - Fracture, 65 deg, rough, undulating, tight<br>192.3' - same as 190.05'<br>192.95-193.15' - Fractures (2), 40 deg and 25 deg, smooth, undulating, intersecting, tight<br>193.75-193.85' - Fractures (2), smooth, planar, tight<br>193.8' - Fracture, 75 deg, smooth, planar, tight<br>193.95, 194.1, 194.6' - Fractures (3), 30 deg and 60 deg, rough, undulating, tight<br>194.3' - 50 deg, same as 194.1'<br>194.85' - vertical, same as 194.1'<br>195.0-195.2' - Fracture zone (2), up to 2"x1" fragments | | | R23: 15 minutes |
| 215<br>-172.6 | R24-NQ<br>5 ft<br>3%<br>218.4 | 0 | NR | 195.45, 195.65, 195.85' - Fractures (3), 60 deg, rough to smooth, undulating, tight<br>196.3, 196.5, 196.9' - Fractures (3), 10 deg and 20 deg, rough, undulating, tight<br>197.4-197.55' - Fracture zone (2), up to 1"x3/4" fragments<br>197.75' - Fracture, 70 deg, same as 195.45'<br>198.0' - <10 deg, same as 195.45'<br>198.3' - 70 deg, same as 195.45', open<br>198.6' - Fracture, 10 deg, rough, undulating, tight to open 1/4"<br>199.35-199.55' - Fractures (2), 40 deg, smooth, undulating, tight<br>199.85' - 60 deg, same as 198.85'<br>199.95-201.55' - Fracture zone (2), up to 1-3/4"x3" fragments | | | |

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|---|---|
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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

CORING METHOD AND EQUIPMENT : CME 55 S/N 299205; Dietrich D-50 S/N 240, mud rotary, NQ tools, HW casing ORIENTATION : Vertical

WATER LEVELS : 1.7 ft bgs on 03/20/07 START : 3/14/2007 END : 4/9/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | 0 | | | **Limestone** | R24: 12 minutes |
| 220 -177.6 | R25-NQ 5 ft 0% | 0 | NR | | | 218.25-218.4' - pale yellowish brown, (10YR 6/2), fine to medium grained, moderate HCl reaction, medium strong (R3), trace voids up to 1/16" over 5-10% of surface **No Recovery 218.4-223.4'** | Driller's Remark: Circulation almost returned, hard coming up casing; harder rock at bottom of run |
| | 223.4 | | | | | | R25: 18 minutes |
| | | | | | | Bottom of Boring at 223.4 ft bgs on 4/9/2007 | Driller's Remark: Switched to split spoon to attempt to recover a sample Stop coring for day on 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 terminated short of 250.0' total depth due to borehole collapse from 174.0-223.0' and ground collapse around the surface casing and under the drill rig |

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

WATER LEVELS : 3.6 ft bgs on 6/13/07 START : 6/12/2007 END : 6/13/2007 LOGGER : D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.2 | 0.0 – 1.5 | 1.3 | SS-1 | 2-2-3 (5) | **Silty Sand With Organics (SM)** 0.0-0.55' - brownish black, (5YR 2/1), moist, loose, bark and root matter present, sand is light gray (N7), fine grained, silica, 22% fines | | 11:30 - Start sampling using AWJ rods, 2'x2" split spoon, drilling with 2-15/16" tri-cone bit<br>Wet at 1' |
| | | | | | **Poorly Graded Sand (SP)** 0.55-1.3' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), moist to wet, loose, very fine to fine grained, trace non-plastic fines, 10% roots and organics | | |
| 5 | 5.0 | | | | | | |
| 37.2 | 5.0 – 6.5 | 1.1 | SS-2 | 1-1-0 (1) | **Poorly Graded Sand (SP)** 5.0-6.1' - yellowish gray, (5Y 7/2), wet, very loose, very fine to fine grained, medium plasticity, 4% nonplastic fines, sand is silica | | |
| 10 | 10.0 | | | | | | |
| 32.2 | 10.0 – 11.5 | 0.3 | SS-3 | 0-0-1 (1) | **Clayey Sand (SC)** 10.0-10.25' - light bluish gray, (5B 7/1), wet, very loose, no HCl reaction, 33% high plasticity fines, fine to coarse sand and fine gravel-sized limestone fragments that are yellowish gray (5Y 7/2) with strong HCl reaction | | Driller's Remark: Slight loss of circulation at 12' |
| 15 | 15.0 | | | | | | |
| 27.2 | 15.0 – 15.4 | 0.3 | SS-4 | 50/5 (50/5") | **Silt (ML)** 15.0-15.33' - very pale orange to grayish orange, (10YR 8/2 to 10YR 7/4), wet, hard, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 3% fine sand, trace organics, all carbonate material | | 14:40 - 15' of HW casing installed<br>15:00 - Add bentonite chips around surface casing and borehole to prevent caving |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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

WATER LEVELS : 3.6 ft bgs on 6/13/07 START : 6/12/2007 END : 6/13/2007 LOGGER : D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.2 | 20.0 – 21.5 | 1.0 | SS-5 | 10-16-13 (29) | **Silt With Sand (ML)** 20.0-21.0' - grayish orange, (10YR 7/4), wet, very stiff, nonplastic, rapid dilatancy, moderate HCl reaction, 25% very fine to medium grained sand, coarse sand to fine gravel-sized lenses at 20.0-20.5', all carbonate material | | |
| 25 17.2 | 25.0 – 25.4 | 0.4 | SS-6 | 50/4.5 (50/4.5") | **Silt With Sand (ML)** 25.0-25.4' - grayish orange to dark yellowish orange, (10YR 7/4 to 10YR 6/6), moist, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 15% fine sand sized, all carbonate material | | |
| 30 12.2 | 30.0 – 31.5 | 0.6 | SS-7 | 14-5-9 (14) | **Sandy Silt (ML)** 30.0-30.6' - grayish orange to dark yellowish orange, (10YR 7/4 to 10YR 6/6), wet, stiff, nonplastic, rapid dilatancy, moderate HCl reaction, 40% fine to coarse sand sized, 10% fine gravel-sized grains, all carbonate | | 16:10 - Recover SS-8, decide to start rock coring; add 20' HW casing to 34' (1' stickup) |
| 35 7.2 | 35.0 – 35.3 | 0.3 | SS-8 | 50/3.5 (50/3.5") | **Silt And Limestone Fragments (ML)** 35.0-35.3' - grayish orange to pale yellowish brown, (10YR 7/4 to 10YR 6/2), wet, moderate to strong HCl reaction, 60% of sample is silt (similar to SS-7), 40% of sample is limestone fragments up to 1/4", all carbonate material<br>Begin Rock Coring at 36.0 ft bgs<br>See the next sheet for the rock core log | | SS-8 may be slough/cuttings<br>Borehole drilled from 35.3-36.0' without sampling to set stroke |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
| 338884.FL | A-14A | SHEET 3 OF 6 |

# 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 6/13/07 START : 6/12/2007 END : 6/13/2007 LOGGER : D. Whitaker

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

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
| 338884.FL | A-14A | SHEET 4 OF 6 |

# 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 6/13/07 START : 6/12/2007 END : 6/13/2007 LOGGER : D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | | | **No Recovery 56.0-61.0'** | |
| | R5-NQ 5 ft 0% | 0 | NR | | | | Driller's Remark: All sand/silt-sized particles fell out/washed out of core barrel during retrieval<br>Driller's Remark: Fragments/pieces of rock could be felt at 59.0'<br>R5: 2 minutes |
| 60 -17.8 | | | | | | | |
| 61.0 | | | | | | | |
| | R6-NQ 5 ft 31% | 0 | >10<br>2<br>NR | 61.0-61.2' - Fracture zone, 2 subrounded gravel sized fragments<br>61.4' - Bedding plane or mechanical break, horizontal, smooth, undulating, tight<br>61.65' - Bedding plane, horizontal, rough, planar, black staining on surface, <1/2" open<br>61.9' - Bedding plane or mechanical break, <10 deg, rough, undulating, tight<br>62.05' - Fracture or mechanical break, 25 deg, smooth, undulating, tight<br>62.35' - Fracture or mechanical break, 10 deg, smooth, undulating, tight to 1" open | | **Limestone**<br>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"<br>**No Recovery 62.55-66.0'** | |
| 65 -22.8 | | | | | | | R6: 2 minutes |
| 66.0 | | | | | | | |
| | R7-NQ 5 ft 75% | 14 | 3<br>>10<br>>10<br>2<br>NR | 66.1' - Bedding plane, horizontal, rough, stepped, up to 1" open<br>67.05-67.55' - Fracture zone<br>67.7, 69.1' - Fracture (2), 75 deg, rough, undulating to stepped, tight to <1/2" open<br>67.9, 68.05' - Bedding plane or mechanical break (2), <10 deg, smooth, undulating<br>68.25, 68.45, 68.6' - Bedding plane or mechanical break (3), <15 deg<br>68.7' - Fracture, 45 deg, rough, stepped, tight<br>69.34-69.5' - Fracture zone | | **Limestone**<br>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)<br>**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'<br>11:20 Casing installed, borehole flushed<br>R7: 5 minutes |
| 70 -27.8 | | | | | | | |
| 71.0 | | | | | | | |
| | R8-NQ 5 ft 62% | 22 | 1<br>3<br>3<br>0<br>NR | 71.8' - Bedding plane, 10 deg, rough, stepped<br>72.1' - Bedding plane, horizontal, rough, stepped<br>72.6, 72.9, 73.65, 73.9' - Mechanical break or bedding plane (4), <15 deg, smooth, planar to undulating, tight<br>73.2' - Fracture, 40 deg, tight | | **Limestone**<br>71.0-72.15' - Same as 66.0-69.75' except very weak (R1), 40% surface voids <1/16"<br>72.15-74.1' - Same as 66.0-69.75' except extremely weak (R0), 5% surface voids <1/16"<br>**No Recovery 74.1-76.0'** | |
| 75 -32.8 | | | | | | | R8: 4 minutes |
| 76.0 | | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: A-14A | SHEET 5 OF 6 |
|---|---|---|

# 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 6/13/07 START : 6/12/2007 END : 6/13/2007 LOGGER : D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R9-NQ 5 ft 80% | 0 | 1 | 76.55' - Mechanical break | | **Limestone** 76.0-80.0' - moderate yellowish brown, (10YR 5/4), fine to medium grained, moderate HCl reaction, extremely weak to very weak (R0 to R1), 50% surface voids <1/16", many (5+) cavities, few large cavities up to 1-3/16"x5/16", minor silt-sized infill, minor recrystallization, trace black fossil casts, poorly fossiliferous, zone from 77.95-78.75' is weak rock (R2), 5% surface coverage of voids <1/16" with minor recrystallization | |
| | | | 2 | 76.9-77.05, 77.25-77.43' - Fracture zone, sand to gravel-sized limestone fragments | | | |
| | | | >10 | 78.05' - Bedding plane, 5 deg, rough, stepped, up to 1/4" open<br>78.15' - Bedding plane, horizontal, rough, stepped, up to 3/4" open | | | Driller's Remark: Slight mud loss at 80.0' |
| | | | 1 | 78.25-78.5, 78.7-78.8' - Fracture zone | | | |
| 80<br>-37.8 | | | NR | 79.65' - Mechanical break, <15 deg, rough, stepped | | **No Recovery 80.0-81.0'** | R9: 5 minutes |
| | 81.0 | | | | | | |
| | R10-NQ 5 ft 84% | 34 | >10 | 81.1' - Fracture, horizontal, smooth, planar, black organic infill or staining | | **Limestone** 81.0-81.4' - very pale orange, (10YR 8/2), fine grained, very weak (R1), laminated bedding, 3/4" black organic layer at 81.0'<br>81.4-82.9' - pale olive, (10Y 6/2), weak to medium strong (R2 to R3), 20-25% coverage of surface voids up to 1/16", fossiliferous<br>82.9-83.6' - grayish orange, (10YR 7/4), fine grained, moderate to strong HCl reaction, very weak (R1) | |
| | | | 3 | 81.3-81.75' - Fracture zone, angular rock fragments<br>81.7' - Fractures (2), 60 deg and 45 deg, smooth, stepped, intersecting, tight | | | |
| | | | >10 | 81.85' - Fracture, vertical, rough, undulating, 1/8" open | | | |
| | | | 0 | 82.5, 82.65, 83.4, 83.55' - Fracture (4), 50 deg, rough, undulating to stepped, tight to 1/4" open<br>83.0-83.2, 83.76-83.95' - Fracture zone | | | |
| 85<br>-42.8 | | | 1 | 84.1' - Fracture, 45 deg, rough, stepped | | 83.6-85.2' - yellowish gray, (5Y 7/2), medium strong (R3), 20-25% voids up to 1/16" over surface, 1-2% fossil molds up to 5/16" | R10: 5 minutes |
| | | | NR | | | **No Recovery 85.2-86.0'** | |
| | 86.0 | | | | | | |
| | R11-NQ 5 ft 60% | 40 | 3 | 86.4-86.6' - Fracture zone, bound by 45 deg fractures, rough, undulating | | **Limestone** 86.0-89.0' - yellowish gray, (5Y 7/2), fine grained, mild to moderate HCl reaction, medium strong (R3), 15-20% surface coverage of voids up to 1/8", <2% surface coverage of cavities/molds up to 3/8" (1"x2" cavity at 88.9'), sparse soft white infilling in some of the larger molds | |
| | | | 1 | 87.1' - Fracture, 75 deg, smooth, undulating<br>87.3' - Bedding plane, horizontal, rough, undulating, bedding plan splits into 45 deg fractures above and below | | | SC-2 collected at 87.3-88.35' |
| | | | 1 | 88.4' - Mechanical break, smooth, stepped, tight | | | |
| 90<br>-47.8 | | | NR | | | **No Recovery 89.0-91.0'** | R11: 9 minutes |
| | 91.0 | | | | | | |
| | R12-NQ 5 ft 82% | 7 | 3 | 91.1, 91.4' - Bedding plane (2), <10 deg, smooth, undulating<br>91.5' - Fracture, 45 deg, smooth, undulating | | **Limestone** 91.0-91.7' - Same as 86.0-89.0'<br>91.7-95.1' - moderate yellowish brown, (10YR 5/4), fine to medium grained, strong HCl reaction, extremely weak (R0), 5-10% surface coverage of voids <1/16", trace black oblong material up to 3/8"x1/16", minor recrystallization | |
| | | | 2 | 91.88, 92.2, 92.6' - Bedding plane or mechanical break (3), <5 deg, rough, undulating to stepped, tight except 1/4" open at 92.2' | | | Driller's Remark: Slight mud loss at 92.0', lost circulation completely at 93.0' |
| | | | >10 | 92.9' - Mechanical break, horizontal, smooth, undulating, tight<br>93.0-93.33' - Fracture zone | | | |
| | | | 2 | 93.33' - Fracture, 60 deg, rough, stepped | | | |
| 95<br>-52.8 | | | 1 | 93.5' - Fracture, 45 deg, smooth, stepped, black staining, tight | | **No Recovery 95.1-96.0'** | R12: 7 minutes |
| | 96.0 | | NR | 93.8, 93.95, 94.2' - Fractures (3), 45-60 deg, rough, planar to stepped | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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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 6/13/07 START : 6/12/2007 END : 6/13/2007 LOGGER : D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R13-NQ 5 ft 86% | 18 | 5 | 94.5, 94.8, 95.0' - Bedding plane (3), <10 deg, rough, undulating, black staining at 94.5', tight to 1/4" open | | **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 3/8" diameter | |
| | | | >10 | 96.1' - Bedding plane, horizontal, smooth, undulating | | | |
| | | | >10 | 96.4' - Fracture, 55 deg, smooth, undulating, tight | | | |
| | | | 6 | 96.7-96.95' - Fracture zone | | 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 to 1/8", few large cavities up to 3/8", fossiliferous (molds) | |
| 100 -57.8 | | | 1 | 97.5' - Fracture or mechanical break, 40 deg, rough, undulating, tight | | | R13: 7 minutes |
| | 101.0 | | NR | 97.85, 98.3' - Bedding plane (2), horizontal, rough, undulating, tight; 98.0' - Fracture, 80 deg, smooth to rough, undulating, with fragments along length from 97.55-98.5' | | **No Recovery 100.3-101.0'** | |
| | R14-NQ 5 ft 58% | 16 | 1 | 98.5, 98.7' - Fracture (2), 50 deg, smooth, stepped, V-shaped fractures | | **Limestone** 101.0-103.9' - Same as 97.8-100.3' | |
| | | | >10 | 98.8, 99.2, 99.4' - Bedding plane or mechanical break (3), horizontal | | | |
| | | | >10 | 99.4-99.5' - Fracture zone | | | |
| | | | NR | 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 | | | | 101.75' - Fracture, 40 deg, smooth to rough, stepped, up to 3/4" open; 101.9-102.45' - Fracture zone | | | R14: 9 minutes |
| | 106.0 | | | 102.7' - Fracture, rough, undulating, conchoidal fracture plane, 1/4" open | | | |
| | R15-NQ 5 ft 90% | 37 | >10 | 102.9, 103.1' - Fractures (2), 50 deg, smooth, stepped | | **Limestone** 106.0-110.5' - pale yellowish brown, (10YR 6/2), fine to medium grained, moderate HCl reaction, weak to 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 | |
| | | | >10 | 103.25-103.9' - Fracture zone | | | |
| | | | 1 | 103.55' - Fracture, 45 deg, smooth, planar; 106.0-106.7' - Fracture zone | | | |
| | | | 1 | 106.8, 107.2' - Fractures (2), 70 deg, rough, stepped, tight to 1/8" open | | | |
| | | | 1 | 107.05, 107.3' - Bedding plane (2), horizontal, rough, undulating; 107.4-107.9' - Fracture zone | | | |
| 110 -67.8 | | | 1 | 107.9, 108.2' - Fractures (2), 60 deg, rough, undulating to stepped, up to 3/4" open; 109.2' - Mechanical break, 65 deg | | | 16:00 - Reached total depth of 111.0' |
| | 111.0 | | NR | 110.2' - Bedding plane or mechanical break, horizontal, smooth, undulating, tight to 1/2" open | | **No Recovery 110.5-111.0'** | R15: 10 minutes |
| | | | | | | 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: |
|---|---|
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# 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 START : 2/11/2007 END : 2/20/2007 LOGGER : A. Teal, R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.5 | | | | | | | Water level is based on Ground Water Monitoring at LNP site (FSAR Table 2.4.12.08)" |
| | 4.5 | | | | | | Water levels not recorded during drilling |
| 5 37.5 | 6.0 | 1.5 | SS-1 | 3-3-4 (7) | **Poorly Graded Sand (SP)** 4.5-6.0' - grayish orange pink, (5YR 7/2), wet, loose, very fine to fine grained, no HCl reaction, 20% fine organics, trace nonplastic fines, trace fine rounded gravel, silica sand | | |
| | 9.5 | | | | | | |
| 10 32.5 | 11.0 | 1.0 | SS-2 | 6-6-8 (14) | **Poorly Graded Sand (SP)** 9.5-10.5' - pinkish gray, (5YR 8/1), wet, medium dense, very fine to fine grained, no HCl reaction, trace nonplastic fines, trace black minerals, silica sand | | |
| | 14.5 | | | | | | |
| 15 27.5 | 16.0 | 0.9 | SS-3 | 3-3-2 (5) | **Poorly Graded Sand (SP)** 14.5-15.4' - Same as 9.5-10.5' except loose | | |
| | 19.5 | | | | | | |
| 20 | | | | | | | |

| 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 START : 2/11/2007 END : 2/20/2007 LOGGER : A. Teal, R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.5 | 21.0 | 1.1 | SS-4 | 1-1-0 (1) | **Poorly Graded Sand (SP)** 19.5-20.35' - Same as 14.5-15.4' | | Weight of hammer drove last 6" |
| | 24.5 | | | | **Sandy Lean Clay (CL)** 20.35-20.6' - light olive gray, (5Y 5/2), moist, very soft, low to medium plasticity, slow dilatancy, no HCl reaction, 35-40% very fine to fine silica sand | | |
| 25 17.5 | 26.0 | 1.5 | SS-5 | 2-1-1 (2) | **Clayey Sand (SC)** 24.5-26.0' - very pale orange, (10YR 8/2), moist, very loose, very fine to fine grained, no HCl reaction, 27% 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) | | |
| | 29.5 | | | | | | |
| 30 12.5 | 31.0 | 1.2 | SS-6 | 18-19-13 (32) | **Silt With Sand (ML)** 29.5-30.7' - grayish orange, (10YR 7/4), moist, hard, nonplastic, very rapid dilatancy, mild to moderate HCl reaction, 19% fine to medium sand sized, carbonate | | |
| | 34.5 | | | | | | |
| 35 7.5 | 35.8 | 1.1 | SS-7 | 21-42-50/4 (92/10") | **Silt With Sand (ML)** 34.5-35.6' - dark yellowish orange, (10YR 6/6), moist, 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 | | |
| | 39.5 | | | | | | |
| | 39.6 | 0.0 | SS-8 | 50/1.5 (50/1.5") | **Limestone Fragments** 39.5' - olive gray, (5Y 3/2), voids over 80-90% of surface, mild HCl reaction on unscratched surface, moderate HCl reaction when scratched | | Switch to rock coring at 40' |
| 40 | | | | | Begin Rock Coring at 40.0 ft bgs<br>See the next sheet for the rock core log | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# ROCK CORE 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 2.5 | 40.0 | | | 40.0-40.2' - Fracture zone | | **Limestone** | Begin rock coring at 40' |
| | R1-NQ 2 ft 95% | 70 | 3 | 40.35' - Fracture, vertical, rough, planar, tight | | 40.0-41.9' - light olive gray, (5Y 5/2), moderate to strong HCl reaction, medium strong to strong (R3 to R4), fossiliferous (casts) voids 60-70% coverage, few cavities up to 1/16" | Core run times were not recorded at the time of drilling |
| | | | 0 | 40.5' - Fracture, 10 deg, rough, undulating, open | | | |
| | 42.0 | | NR | | | **No Recovery 41.9-42.0'** | |
| | | | 0 | | | **Limestone** | |
| | | | 4 | 43.3-43.4' - Fracture zone, rock fragments, coarse sand (1/16") to gravel (1") size | | 42.0-47.0' - Same as 40.0-41.9' except many cavities up to 1/4", voids (1/16") up to 60% coverage, very weak (R1) below 46.0' | |
| | R2-NQ 5 ft 100% | 60 | 6 | 44.1' - Fracture, 5 deg, rough, undulating, open | | | |
| 45 -2.5 | | | 5 | 44.25, 44.4' - Fracture (2), 88 deg and vertical, rough, planar, tight<br>44.5, 44.6' - Fractures (2), 10 deg, rough, undulating, <1" relief | | | |
| | | | 2 | 44.85, 45.35' - Fractures (2), 40 deg, rough, planar, tight | | | |
| | 47.0 | | | 45.55-45.7' - Fracture zone, rock fragments from fine gravel (3/16") to coarse gravel (1"x2") size | | **Sandy Silt (SM)** | |
| | | | NA | 45.9' - Fracture, 50 deg, rough, undulating, open<br>46.6' - Mechanical break<br>46.9' - Fracture zone, 10 deg, smooth, undulating, 1-1/4" relief | | 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 | |
| | R3-NQ 5 ft 62% | 0 | | 47.0-50.1' - Fracture zone, sandy silt, mostly loose indurated material, fractures very easily, some fractures may be mechanical | | | |
| 50 -7.5 | | | | | | **No Recovery 50.1-52.0'** | |
| | | | NR | | | | |
| | 52.0 | | | 52.0-57.0' - Fractures or mechanical break, mostly mechanical breaks due to soft material, partially lithified compacted fragments from silt to coarse sand, up to 1" sections | | **Limestone** | Loggers: A. Teal/ C. Dougherty |
| | | | >10 | | | 52.0-53.8' - light olive gray, (5Y 5/2), fine grained, strong HCl reaction, very weak (R1), black organic fragments (1/16"x3/16") distributed throughout the rock (<5%), generally horizontal orientation, poorly fossiliferous | |
| | | | >10 | | | | |
| | R4-NQ 5 ft 84% | 20 | 2 | 54.0' - Fracture, horizontal, rough, undulating, 3/8" relief<br>54.4' - Fracture, 3/16" open | | | |
| 55 -12.5 | | | >10 | | | 53.8-55.0' - moderate olive brown, (5Y 4/4), fine grained, strong HCl reaction, very weak (R1), (<1/16") voids about 70% of surface, poorly fossiliferous, black organic fragments as for 52.0-53.8' above, but more (still <5%) | |
| | | | 0 | | | | |
| | 57.0 | | NR | | | | |
| | | | 4 | 57.25' - Fracture, 15 deg, smooth, undulating, <1" open | | 55.0-56.2' - Same as 52.0-53.8' except more abundant black organics | |
| | | | 0 | 57.5, 60.8' - Fractures (2), 20 deg, rough, undulating, open<br>57.8' - Fracture, 10 deg, smooth, planar, tight, lignite lamination 3/8" thick | | **No Recovery 56.2-57.0'** | |
| | R5-NQ 5 ft 100% | 80 | 1 | 57.95' - Fracture, 60 deg, rough, undulating to planar, tight | | | |
| 60 | | | | | | | |

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|---|---|
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# ROCK CORE 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -17.5 | | | 3 | 58.3, 58.7, 59.1, 59.7, 61.1' - Mechanical break (5) | | **Limestone** | |
| | | | 2 | 59.4' - Fracture, 10 deg, smooth, undulating, tight<br>60.5' - Fracture, 10 deg, rough, undulating | | 57.0-62.0' - Same as 53.8-55.0' except laminations of organic material present throughout, apparent bioturbation zone from 61.7-62.0' | |
| | 62.0 | | | 61.7' - Fracture, 5 deg, smooth, undulating, <1" relief | | **Limestone** | |
| | R6-NQ 5 ft 28% | 0 | 5 | 62.0' - Fracture, 15 deg, rough, undulating, open, 1-1/4" relief | | 62.0-62.5' - dusky yellow, (5Y 6/4), fine grained, moderate HCl reaction, very weak (R1), laminations of organic material about 25% | |
| | | | 0 | 62.1, 62.3, 62.4, 62.5' - Fracture zone (4), 10 deg, smooth, undulating, open | | | |
| | | | NR | 62.15' - Fracture, 25 deg, rough, undulating, <1" relief<br>62.5-63.4' - Fracture zone, soft, partially lithified limestone fragments | | 62.5-63.4' - dusky yellow, (5Y 6/4), fine grained, strong HCl reaction, extremely weak (R0), crumbles easily to silt-sized particles<br>**No Recovery 63.4-67.0'** | |
| 65<br>-22.5 | | | | | | | |
| | 67.0 | | | | | | 17:00 7/12/07 End of drilling for the day, at 67' |
| | R7-NQ 5 ft 88% | 46 | 3 | 67.2, 67.4' - Fractures (2), 15 deg, rough, undulating, open | | **Limestone**<br>67.0-70.2' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, weak (R2), voids (<1/16") over 60% of surface, laminations of organic material (<5%) most are in zone from 67.8-68.7' | |
| | | | 1 | 67.3' - Fracture, 30 deg, rough, undulating, open<br>68.4' - Fracture, 70 deg, rough, planar, tight | | | |
| | | | 3 | 69.4, 69.7' - Fractures (2), 10 deg, rough, undulating, tight, open at 69.7' | | | |
| 70<br>-27.5 | | | >10 | 69.5, 70.0' - Fractures (2), 80 deg and vertical, rough, planar, tight | | 70.2-71.0' - Same as 62.5-63.4' | |
| | | | >10 | 70.2-72.0' - Fracture zone, soft, partially lithified limestone fragments | | 71.0-71.4' - dusky yellow, (5Y 6/4), fine grained, moderate HCl reaction, very weak (R1), voids (<1/16") over 30% of surface, few organic laminations | |
| | 72.0 | | NR | | | **No Recovery 71.4-72.0'** | |
| | R8-NQ 5 ft 86% | 68 | >10 | 72.0-72.6' - Fracture zone, limestone fragments from silt to gravel-sized | | **Limestone**<br>72.0-74.7' - yellowish gray, (5Y7/2), fine grained, strong HCl reaction, weak (R2), voids (<1/16") over 80% of surface, few larger (up to 3/8") voids, except larger voids are 10% of surface from 74.0-74.7', moderately fossiliferous, few black organic fragments | |
| | | | 1 | 73.4, 75.2' - Mechanical break | | | |
| | | | 0 | 73.9' - Fracture, 60 deg, rough, planar, tight | | | |
| 75<br>-32.5 | | | 0 | | | | |
| | | | 1 | | | 74.7-76.3' - dusky yellow, (5Y 6/4), fine grained, strong HCl reaction, very weak to weak (R1 to R2), voids (<1/16") over 75% of surface, few black organic fragments | |
| | 77.0 | | NR | 76.3' - Fracture, 5 deg, rough, undulating, tight | | **No Recovery 76.3-77.0'** | |
| | R9-NQ 5 ft 78% | 70 | 1 | | | **Limestone**<br>77.0-79.4' - Same as 74.7-76.3' | SC-1 collected at 77.0-77.85' |
| | | | 1 | 77.85' - Fracture, horizontal, smooth, undulating, tight | | | |
| | | | >10 | 78.65' - Fracture, 10 deg, rough, undulating, tight<br>79.2-79.4' - Fracture zone, limestone fragments, gravel to cobble-sized | | | |
| 80 | | | | | | | |

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|---|---|---|

# ROCK CORE 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -37.5 | | | 0 | 79.8, 78.3, 80.4' - Mechanical break (3) | | **Limestone**<br>79.4-80.9' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids (<1/16") over 80% of surface, few larger (up to 3/16") voids, moderately fossiliferous | |
| | | | NR | | | **No Recovery 80.9-82.0'** | |
| | 82.0 | | | | | | |
| | R10-NQ<br>5 ft<br>94% | 30 | >10 | 82.0-82.5' - Fracture zone, limestone fragments, coarse sand cobble-sized | | **Limestone**<br>82.0-86.7' - dusky yellow, (5Y 6/4), fine grained, moderate to strong HCl reaction, very weak to weak (R1 to R2), voids (<1/16") over 80% of surface, moderately fossiliferous, zones at 83.7-84.0' and 86.3-86.7' have few voids, black organic laminations (20%), and color closer to yellowish gray 5Y 7/2 | Many of the fragments at 82.0-82.5' show tooling marks from drilling; fragmentation could be result of drilling |
| | | | 2 | 82.65' - Fracture, 60 deg, smooth, undulating, open<br>83.35' - Fracture, 25 deg, rough, undulating, open | | | |
| | | | >10 | 83.7, 84.0, 84.1, 84.15' - Bedding plane (4), organic beds, black, thin laminations | | | |
| 85<br>-42.5 | | | 1 | 84.4-85.3' - Fracture zone, limestone fragments from silt to cobble-sized | | | |
| | | | 2 | 85.75' - Fracture, 25 deg, rough, undulating, tight | | | |
| | 87.0 | | NR | 86.0, 86.2' - Fractures (2), 30 deg, rough, undulating, 2-1/2" relief at 86.0', open at 86.2' | | **No Recovery 86.7-87.0'** | |
| | R11-NQ<br>5 ft<br>79% | 46 | 3 | 87.1, 87.15' - Fractures (2), 5 deg and 10 deg, smooth, undulating, open | | **Limestone**<br>87.0-90.95' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids (<1/16") over 85% of surface (only 30% below 90.3'), larger (up to 3/8") voids over <5% of surface with most between 89.0 -90.3', larger voids are fossil molds, moderately fossiliferous | |
| | | | 2 | 87.45-87.75' - Fracture zone, limestone fragments, gravel to cobble-sized<br>88.0, 89.0' - Fractures (2), 20 deg and 10 deg, rough, undulating, open | | | |
| | | | 3 | 88.45' - Fracture, 70 deg, smooth, planar, tight | | | |
| 90<br>-47.5 | | | 1 | 89.2, 90.4' - Fractures (2), 40 deg and 20 deg, rough, undulating, open at 89.2', 2-1/2" relief at 90.4'<br>89.45' - Fracture, 70 deg, rough, planar, open | | | |
| | | | NR | 89.8, 90.0' - Mechanical break (2) | | **No Recovery 90.95-92.0'** | |
| | 92.0 | | | | | | |
| | R12-NQ<br>5 ft<br>92% | 49 | 3 | 92.2' - Fracture, 75 deg, smooth, planar, open | | **Limestone**<br>92.0-96.6' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids (1/16") over 30% of surface, few larger (up to 3/8") voids, poorly to moderately fossiliferous, rock appears to continue from material at 90.3 -91.0', some organic laminations below 96.0', also more abundant fossils | |
| | | | 3 | 92.75, 92.95' - Fractures (2), 20 deg, smooth, undulating, tight<br>93.0' - Fracture, vertical, smooth, planar, tight | | | |
| | | | 3 | 93.2, 93.4' - Fractures (2), 20 deg, smooth, undulating, open at 93.2', tight at 93.4'<br>93.7' - Mechanical break | | | |
| 95<br>-52.5 | | | 0 | 94.0' - Fracture, 70 deg, rough, planar, open<br>94.2, 94.35' - Fractures (2), 15 deg, rough, undulating, open | | | SC-2 collected at 94.95-95.8' |
| | | | 4 | | | | |
| | 97.0 | | NR | | | **No Recovery 96.6-97.0'** | |
| | R13-NQ<br>5 ft<br>100% | 60 | 2 | 97.3' - Fracture, 20 deg, rough, undulating, <1" relief | | **Limestone**<br>97.0-97.5' - dusky yellow, (5Y 6/4), fine grained, moderate HCl reaction, medium strong (R3), matrix with abundant voids (<1/16"), very fossiliferous at 97.3-97.5', yellowish gray (5Y 7/2) fragments held in matrix have few voids | |
| | | | 2 | 97.95-98.3' - Fracture zone, 60 deg, smooth, planar, tight/multiple fractures | | | |
| | | | 2 | 98.6' - Fracture, horizontal, rough, undulating, open<br>99.3' - Fracture, 10 deg, rough, undulating, 2-1/2" relief | | | |
| 100 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
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# ROCK CORE 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -57.5 | | | 1 | 99.9' - Fracture, 50 deg, rough, planar, tight<br>100' - Fracture, 75 deg, rough, planar, tight<br>100.5' - Fracture, 45 deg, rough, undulating, open | | **Limestone**<br>97.5-98.3' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, medium strong (R3), few voids<br>98.3-102.0' - dusky yellow, (5Y 6/4), fine grained, moderate HCl reaction, medium strong (R3), voids (<1/16") over 85% of surface, few larger (up to 3/8") voids, few organic laminations, moderately fossiliferous<br>102.0-106.6' - Same as 98.3-102.0' except area of intermixed material (yellowish gray 5Y 7/2, with few voids) from 102.3-103.3', larger voids (up to 3/8") and fossil molds/casts more common, zone from 104.0-104.5' appears more moderate olive brown (5Y 4/4) in color | |
| | 102.0 | | 1 | 101.6' - Fracture, 70 deg, rough, undulating, 1-1/4" relief | | | |
| | R14-NQ<br>5 ft<br>92% | 51 | 3 | 101.65' - Fracture, 25 deg, rough, undulating, tight<br>102.25, 102.7' - Fractures (2), 30 deg and 10 deg, rough, undulating, open | | | Bioturbation zones are highly HCl reactive, matrix has slow to moderate HCl reaction |
| | | | 3 | 102.4' - Fracture, 70 deg, smooth, planar, tight | | | |
| 105<br>-62.5 | | | 2 | 103.2' - Fracture, 5 deg, smooth, undulating, tight | | | |
| | | | 1 | 103.5' - Fracture, 40 deg, rough, undulating, 3-1/2" relief<br>103.8' - Fracture, 40 deg, smooth, planar, tight | | | SC-3 collected at 105.75-106.6' |
| | | | 1 | 104.2' - Fracture, 25 deg, smooth, undulating, open | | | |
| | 107.0 | | NR | 104.2-104.7' - Fracture zone, cobble-sized rock fragments | | **No Recovery 106.6-107.0'** | |
| | | | 1 | 105.75' - Fracture, 60 deg, rough, stepped, 3-1/2" relief | | **Limestone**<br>107.0-111.8' - dusky yellow, (5Y 6/4), fine grained, moderate to strong HCl reaction, weak (R2), voids (<1/16") over 80% of surface, larger (up to 3/8") voids and fossil molds/casts cover up to 5% of surface, moderately fossiliferous, particularly at 107.8-109.5' | |
| | | | 2 | 106.6' - Fracture, 15 deg, rough, undulating, open | | | |
| | R15-NQ<br>5 ft<br>96% | 86 | 2 | 107.7, 109.4' - Fracture (2), 25 deg, rough, undulating, 2-1/2" relief for 107.7', open for 109.4' | | | |
| 110<br>-67.5 | | | 1 | 108.0, 108.5' - Fractures (2), 35 deg, rough, undulating, tight for 108.0', open for 108.5'<br>109.7' - Fracture, 20 deg, rough, undulating, open | | | SC-4 collected at 110.35-111.35' |
| | | | 2 | 109.85' - Mechanical break | | | |
| | 112.0 | | NR | 110.35, 111.35' - Fractures (2), 40 deg and 5 deg, rough, undulating, tight for 110.35', open for 111.35' | | **No Recovery 111.8-112.0'** | |
| | | | 2 | 111.6' - Fracture, 15 deg, smooth, undulating, open | | **Limestone**<br>112.0-117.0' - Same as 107.0-111.8' except medium strong (R3) | |
| | | | 5 | 112.0-112.5' - Fracture zone, limestone fragments, gravel to cobble-sized | | | |
| | R16-NQ<br>5 ft<br>100% | 44 | 3 | 112.8, 113.2' - Fractures (2), 70 deg, smooth, planar, open<br>113.2, 113.5' - Fractures (2), 10 deg and 15 deg, rough, undulating, open | | | |
| 115<br>-72.5 | | | 6 | 113.7, 113.85' - Fractures (2), 20 deg, rough, undulating, open | | | |
| | | | 0 | 114.0' - Fracture, 30 deg, rough, undulating, tight<br>114.1' - Fracture, 40 deg, smooth, undulating, tight | | | |
| | 117.0 | | 4 | 114.9, 115.0' - Fractures (2), 50 deg, smooth, planar, tight | | 117.0-118.7' - Same as 112.0-117.0' | |
| | | | 1 | 115.2, 115.6' - Fracture (2), 60 deg, smooth, planar, tight<br>115.45' - Fracture, 25 deg, smooth, undulating, tight | | | SC-5 collected at 117.7-118.7' |
| | R17-NQ<br>5 ft<br>94% | 62 | 3 | 115.7' - Fracture, 30 deg, smooth, undulating, open | | | |
| 120 | | | | | | | |

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

# ROCK CORE 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -77.5 | | | 3 | 115.75' - Fracture, 5 deg, rough, undulating, open | | **Limestone** | |
| | | | 1 | 117.25, 117.30, 119.1' - Fractures (3), 25 deg, smooth, undulating, tight for 117.25' and 117.30', open for 119.1' | | 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 | |
| | 122.0 | | NR | 117.6, 119.3' - Fractures (2), 5 deg, smooth, undulating, tight for 117.6', open for 119.3' | | | |
| | R18-NQ 5 ft 46% | 9 | >10 | 117.7, 118.7' - Fractures (2), 45 deg, smooth, planar, tight | | 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 | 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 |
| | | | >10 | 119.25' - Fracture, 20 deg, smooth, undulating, tight | | | |
| | | | >10 | 120.1' - Fracture, 15 deg, smooth, undulating, open | | | |
| 125 -82.5 | | | NR | 120.8, 120.9' - Fractures (2), 30 deg and 45 deg, smooth, planar, tight<br>121.2' - Fracture, 25 deg, smooth, undulating, open<br>122.0-124.3' - Fracture zone or mechanical break, fragmented | | **No Recovery 121.7-122.0'**<br>**Limestone Fragments**<br>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 has no voids, with laminated alternating colors, strong (R4), fine grained, strong HCl reaction | |
| | 127.0 | | | | | | |
| 130 -87.5 | R19-NQ 5 ft 0% | 0 | NR | | | **No Recovery 124.3-132.0'** | |
| | 132.0 | | | | | | |
| | | | 3 | 132.0-132.2' - Fracture zone, gravel-sized limestone fragments | | **Limestone** | 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 |
| | | | 5 | 132.35' - Fracture, 5 deg, rough, undulating, open<br>132.85' - Fracture, 5 deg, smooth, planar, open | | 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' | |
| 135 -92.5 | R20-NQ 5 ft 72% | 19 | 4 | 133.0, 133.3' - Fractures (2), 40 deg and 5 deg, smooth, planar, open for 133.0', very tight for 133.3' | | | |
| | | | 4 | 133.05, 133.35' - Fractures (2), 5 deg, smooth, planar, very tight | | | |
| | | | NR | 133.5, 134.55' - Fractures (2), 5 deg and 15 deg, rough, undulating, open<br>134.0, 134.25' - Fractures (2), horizontal, rough, undulating, open | | 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 | |
| | 137.0 | | | | | | |
| | | | 4 | 134.7' - Fracture, 10 deg, smooth, undulating, open | | 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 | |
| | | | 2 | 135.0' - Fracture, 5 deg, rough, undulating, open<br>135.0-135.2' - Fracture zone, limestone fragments, gravel to cobble-sized | | | |
| 140 | R21-NQ 5 ft 84% | 50 | 4 | 135.3' - Fracture, horizontal, smooth, planar, very tight | | **No Recovery 135.6-137.0'** | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: A-15 | SHEET 8 OF 11 |
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# ROCK CORE 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -97.5 | | | 1 | 135.5' - Fracture, 5 deg, smooth, undulating, open<br>137.3' - Fracture, vertical, rough, planar, tight | | **Limestone**<br>137.0-137.6' - Same as 135.0-136.6' except light colored (dusky yellow (5Y 6/4)) laminations have increasing amount of voids<br>137.6-141.2' - dusky yellow, (5Y 6/4), fine grained, moderate to strong HCl reaction, medium strong (R3), voids (<1/16") over 75% of surface decreasing to 40% below 139.5', moderately fossiliferous, molds up to 3/16"x9/16", few black organic laminations at 138.5-139.8', few inclusions (3/16"x3/4") of grey limestone material at 138.0' and 139.9'<br>**No Recovery 141.2-142.0'**<br>**Limestone**<br>142.0-144.0' - mottled medium light gray and yellowish gray, (N6, 5Y 7/2), fine grained, moderate HCl reaction, yellowish gray is in bands around cavities, few voids (<1/16"), several larger (up to 3/8") voids and fossil molds<br>144.0-145.5' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, medium strong (R3), voids (<1/16") 30% coverage, larger voids (up to 3/4") 15%, organic material on irregular bedding plane and fracture surfaces, moderately to very fossiliferous, gradational contact with material below<br>145.5-146.7' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, medium strong (R3), few voids (1/16"), no larger voids, organic lamination<br>**No Recovery 146.7-147.0'**<br>**Limestone**<br>147.0-151.4' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, medium strong (R3), voids (<1/16") over 30% of surface, more abundant in zone from 147.3-148.8' and 150.0-151.0', fossiliferous in same zones, black staining is on uneven and irregularly laminated bedding at 148.1-148.8', clasts (up to 3/8"x1-3/16") of yellowish gray (5Y 7/2) limestone without voids appear imbedded in the core from 147.0-148.0', coloration on bedding ranging from light olive gray (5Y 5/2) to dusky yellow (5Y 6/4)<br>**No Recovery 151.4-152.0'** | SC-6 collected at 143.0-144.0' |
| | | | 2 | 137.6' - Fracture, horizontal, smooth, undulating, open | | | |
| | 142.0 | | NR | 137.8, 138.15' - Fractures (2), 5 deg, rough, undulating, tight | | | |
| | R22-NQ 5 ft 94% | 55 | >10 | 137.9, 138.6' - Fractures (2), 15 deg and 70 deg, rough, undulating, tight for 137.9', open with gray staining at 138.6' | | | |
| | | | >10 | 139.0, 139.55' - Fractures (2), 70 deg and 15 deg, rough, undulating, open, gray staining | | | |
| | | | >10 | 139.2' - Fracture, 50 deg, rough, planar, open, gray staining | | | |
| 145<br>-102.5 | | | 3 | 139.9, 141.1' - Fractures (2), 5 deg, smooth, undulating, tight<br>140.45, 141.25' - Fractures (2), 30 deg and 20 deg, rough, undulating, open | | | |
| | | | 2 | 142.0-143.0, 144.0-145.1' - Fracture zone or mechanical break (2), sections crushed, limestone fragments from gravel to cobble-sized | | | |
| | 147.0 | | NR | | | | |
| | R23-NQ 5 ft 88% | 62 | 3 | 145.2' - Fracture, 60 deg, rough, undulating, open | | | |
| | | | 2 | 145.3, 145.5' - Fractures (2), 15 deg, rough, undulating, open, moderate yellowish brown (10Y 5/4) to dusky brown (5Y 2/2) staining<br>145.9' - Mechanical break | | | |
| 150<br>-107.5 | | | 4 | 146.6, 146.9' - Fractures (2), horizontal and 50 deg, smooth, planar, tight | | | |
| | | | 6 | 147.30, 147.6' - Fractures (2), 60 deg, smooth, planar, tight<br>147.35' - Fracture, 20 deg, smooth, undulating, open | | | |
| | | | 2 | 148.22' - Fracture, 5 deg, smooth, planar, tight, moderate yellowish brown (10Y 5/4) to dusky brown (5Y 2/2) staining | | | |
| | 152.0 | | NR | | | | |
| | R24-NQ 5 ft 100% | 78 | 1 | 148.4' - Fracture, 15 deg, rough, undulating, open, partial coverage up to 20% of moderate yellowish brown (10Y 5/4) to dusky brown (5Y 2/2) staining | | | |
| | | | 0 | 149' - Fracture, 70 deg, rough, planar, open | | | |
| | | | 2 | 149.3' - Fracture, 20 deg, rough, undulating, open<br>149.4, 149.6' - Fractures (2), 75 deg, rough, planar, tight | | | |
| 155<br>-112.5 | | | 2 | 150' - Fracture, 60 deg, rough, planar, tight<br>150.1' - Fracture, 60 deg, slickensided, planar, very tight, light to dark brown staining (possibly hematite) | | | |
| | | | 1 | 150.6' - Fracture, 50 deg, smooth, undulating, open | | | |
| | 157.0 | | | | | | |
| | R25-NQ 5 ft 100% | 50 | 3 | 150.65, 150.8' - Fractures (2), 30 deg and 10 deg, smooth, undulating, tight<br>150.9' - Fracture, 40 deg, smooth, undulating, tight | | | |
| | | | 1 | 151.3, 151.5' - Fractures (2), 5 deg and 35 deg, smooth, undulating, open | | | |
| 160 | | | 2 | 152.0-152.9' - Fracture zone, limestone fragments, gravel to cobble-sized | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: A-15 | SHEET 9 OF 11 |
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# ROCK CORE 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -117.5 | | | 1 | 152.9' - Fracture, 5 deg, smooth, undulating, open | | **Limestone** | |
| | | | | 154.4' - Fracture, 45 deg, rough, planar, tight | | 152.0-155.7' - Same as 147.0-151.4' except fewer (now 10%) voids (<1/16") covering surface, thin bedding from 153.5-155.0', uneven and irregular laminations from 155.2-155.7' | |
| | | | 3 | 154.9, 156.7, 156.9' - Mechanical break (3) | | | |
| | | | | 155.2' - Fracture, 10 deg, smooth, undulating, open | | | |
| | 162.0 | | | | | | |
| | | | 1 | 155.7' - Fracture, horizontal, smooth, planar, tight | | 155.7-157.0' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, medium strong to strong (R3 to R4), few (<5%) voids or fossil molds/casts, thin bedding (1/4") from 155.7-157.0', olive gray (5Y 3/2) coloration along healed fracture at 156.8-157.0' | |
| | | | | 156.5' - Fracture, 30 deg, rough, undulating, open | | | |
| | | | 5 | 157.2' - Fracture, 75 deg, rough, planar, open | | | |
| | | | | 157.4' - Fracture, 20 deg, rough, undulating, open | | | |
| | R26-NQ 5 ft 84% | 32 | 3 | 157.8, 158.4' - Fractures (2), 25 deg and 10 deg, rough, undulating, tight for 157.8', open for 158.4' | | | |
| 165 -122.5 | | | | | | | |
| | | | 4 | 158.4-159.0' - Fracture zone, limestone fragments, gravel to cobble-sized | | 157.0-157.4' - Same as 155.7-157.0' | |
| | | | 2 | 159.5- 159.7' - Fracture zone, limestone fragments, gravel to cobble-sized | | 157.4-158.8' - fragments of light olive gray (35%) and yellowish gray (15%) in a dusky yellow matrix (50%), (5Y 5/2 and 5Y 7/2 in 5Y 6/4), fine grained, moderate HCl reaction, medium strong (R3), voids (<1/16") over 50% of matrix area but only 10% of other areas, larger (up to 3/16"x3/8") voids and fossil casts/molds over 5% of area overall | |
| | | | NR | 159.5' - Fracture, 5 deg, smooth, planar, tight | | | |
| | 167.0 | | | | | | |
| | | | 0 | 159.9, 160.4' - Fractures (2), 40 deg, smooth, undulating, tight | | | |
| | | | | 161.0' - Fracture, 15 deg, smooth, undulating, open | | | |
| | | | 0 | 161.2' - Fracture, 85 deg, smooth, planar, tight | | | |
| | | | | 161.3' - Fracture, 20 deg, smooth, undulating, open | | 158.8-160.0' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, strong (R4), voids (<1/16") over 5% of surface, mainly in thin (1/2") zones, thinly bedded, few fossil casts | |
| | R27-NQ 5 ft 100% | 62 | 2 | 161.3-162.0' - Fracture, limestone fragments, gravel to cobble-sized | | | |
| 170 -127.5 | | | | | | | |
| | | | 2 | 162.4, 163.15' - Fractures (2), 10 deg and 25 deg, rough, undulating, open | | | |
| | | | 0 | 163.0' - Fracture, 20 deg, smooth, planar, tight | | 160.0-162.0' - mottled light olive gray and dusky yellow, (5Y 5/2 and 5Y 6/4), fine grained, moderate to mild HCl reaction, medium strong to strong (R3 to R4), voids (1/16") cover 70% of surface, few large voids, fragments of other limestone material imbedded in dusky yellow matrix below 161.0' | |
| | 172.0 | | | 163.15-164.2' - Fracture zone, limestone fragments, gravel to cobble-sized | | | |
| | | | 6 | 164.0' - Fracture, 60 deg, rough, undulating, tight | | | |
| | | | >10 | 165.0, 165.05' - Fractures (2), 15 deg and 5 deg, smooth, undulating, open | | | |
| | | | | 165.3' - Fracture, 80 deg, rough, planar, open | | 162.0-166.2' - moderate olive brown grading to light olive gray by 165.0', (5Y 4/4 to 5Y 5/2), fine grained, moderate to mild HCl reaction, strong (R4), voids (1/16") only 5% from surface area except zones from 163.0-163.3' and 165.4-166.0', few larger voids (up to 3/16") below 165.4', uneven and disturbed bedding below 165.6' | |
| | | | >10 | 165.5' - Fracture, 35 deg, rough, undulating, open | | | |
| | R28-NQ 5 ft 100% | 30 | | 165.5-166.0' - Fracture zone, limestone fragments, gravel to cobble-sized | | | |
| 175 -132.5 | | | | | | | |
| | | | 4 | 167.0-168.8' - Fracture zone, limestone fragments, gravel to cobble-sized | | | |
| | | | | 169.2' - Fracture, 5 deg, smooth, planar, tight | | | |
| | | | 3 | 169.4' - Fracture, 30 deg, rough, undulating, tight | | | |
| | 177.0 | | | 170.2, 170.4' - Fractures (2), 10 deg, smooth, undulating, tight | | **No Recovery 166.2-167.0'** | |
| | | | >10 | 172.25' - Fracture, 40 deg, rough, planar, tight | | **Limestone** | |
| | | | | 172.3, 172.8' - Fractures (2), 5 deg, rough, undulating, tight | | 167.0-167.9' - Same as 162.0-166.2' except presence of breccia (1" fragments) at 167.3-167.9' | |
| | | | >10 | 172.55' - Fracture, 15 deg, rough, stepped, open | | 167.9-169.0' - dusky yellow, (5Y 6/4), mild to moderate HCl reaction, medium strong (R3), voids (<1/16") over 80% of surface | |
| | R29-NQ 5 ft 100% | 0 | 3 | 172.75' - Fractures, 10 deg, rough, undulating, tight | | | |
| 180 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-15 SHEET 10 OF 11 |

# ROCK CORE 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -137.5 | | | 1 | 172.95' - Fracture, 40 deg, rough, stepped, tight | | **Limestone** | |
| | | | | 173.2' - Fracture, 40 deg, rough, planar, tight | | 169.0-169.4' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, strong (R4), few voids or cavities | |
| | | | 0 | 173.4' - Fracture, 50 deg, rough, undulating, open | | | |
| | 182.0 | | | 173.45, 174.5' - Fractures (2), 5 deg and 20 deg, smooth, undulating, open | | 169.4-172.0' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, medium strong (R3), voids (<1/16") over 20% of surface (up to 50% from 169.4-170.0'), laminated bedding below 171.0' at an angle of 5-10 degrees | R30: 10 minutes |
| | | | >10 | 173.6, 173.75' - Fractures (2), 10 deg, smooth, undulating, tight | | | |
| | | | >10 | 174.5-175.0' - Fracture zone, limestone fragments, gravel to cobble-sized | | | |
| | R30-NQ 5 ft 90% | 27 | >10 | 175.2' - Fracture, 10 deg, smooth, undulating, tight | | 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 3/16"x3/4") below 175.0', laminated bedding 174.8-175.3' | |
| 185 -142.5 | | | 0 | 175.25, 175.4' - Fractures (2), 75 deg and 15 deg, rough, undulating, open | | | SC-7 collected at 185.0-186.0' |
| | | | 1 | 175.8' - Fracture, 80 deg, rough, planar, open to tight | | | |
| | | | NR | 176.5' - Mechanical break | | | |
| | 187.0 | | | 176.75' - Fracture, 30 deg, rough, planar, tight | | 177.0-178.0' - Same as 172.0-177.0' | |
| | | | 1 | 177.0-182.0' - Fracture, no piece longer than 5", most fractures could be from drilling, others appear to be in place | | 178.0-178.6' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, weak (R2), voids (<1/16") over 40% of surface | |
| | | | 3 | 179.1' - Fracture, 70 deg, rough, planar, open | | 178.6-182.0' - dusky yellow to light olive gray, (5Y 6/4 to 5Y 5/2), fine grained, moderate HCl reaction, medium strong (R3), voids (1/16") over 50% of surface area below 180.0', breccia and dark stained laminated bedding below 180.5', some larger (3/16"x3/4") cavities below 180.5' | |
| | | | | 179.3, 179.5' - Fractures (2), 20 deg and 10 deg, rough, undulating, open | | | |
| | | | | 180.2' - Fracture, 20 deg, rough, planar, open | | | |
| | R31-NQ 5 ft 100% | 38 | 3 | 182.0-185.0' - Fracture zone or mechanical break, no piece longer than 5", most fractures could be from drilling, others appear to be in place | | | Bioturbation zones appear to be becoming more linear features possibly bedding features |
| 190 -147.5 | | | | | | | |
| | | | 3 | 182.3, 182.5' - Fractures (2), 70 deg and 25 deg, rough, undulating, open for 182.3', tight for 182.5' | | 182.0-186.5' - light olive gray with laminations (uneven and irregular) of yellowish gray, (5Y 5/2 with 5Y 7/2), moderate HCl reaction, strong (R4), few areas of voids, few fossil molds, apparent breccia zones at 182.8-184.0' and 186.0-186.3', color of core mainly yellowish gray below 186.0' | |
| | | | 1 | 182.8' - Fracture, 30 deg, smooth, undulating, tight, dusky brown to dusky yellow infilling 100% | | | |
| | 192.0 | | | 182.9' - Fracture, 15 deg, smooth, undulating, tight | | | |
| | | | 0 | 186.35' - Fracture, 10 deg, smooth, planar, tight to open up to 1/16" | | | |
| | | | 2 | 187.4' - Fracture, 20 deg, smooth, undulating, open | | **No Recovery 186.5-187.0'** | |
| | R32-NQ 5 ft 70% | 20 | >10 | 187.4-188.15' - Fracture zone, limestone fragments, gravel to cobble-sized | | **Limestone** | |
| 195 -152.5 | | | >10 | 188.25' - Fracture, 5 deg, smooth, undulating, open | | 187.0-189.0' - mottled yellowish gray and light olive gray, (5Y 7/2 and 5Y 5/2), fine grained, mild to moderate HCl reaction, strong (R4), mottling resolves into laminated bedding by 188.0', few voids or fossil molds | |
| | | | NR | 188.35' - Fracture, 85 deg, smooth, planar, tight | | | |
| | | | | 188.5' - Fracture, 5 deg, smooth, undulating, tight | | | |
| | 197.0 | | | 189.0, 189.2' - Fractures (2), 25 deg and 40 deg, rough, undulating, open for 189.0', tight for 189.2' | | 189.0-192.0' - dusky yellow with thin beds (1/2" thick) of pale olive, (5Y 6/2 with 10Y 6/2), fine grained, moderate to strong HCl reaction, medium strong (R3), voids (<1/16") over 70% of the dusky yellow areas, larger voids (up to 3/8") also present, pale olive areas have few voids, fewer voids overall below 191.0', possible breccia from 189.4-190.0' | |
| | | | 4 | 189.4' - Fracture, 20 deg, smooth, undulating, open | | | |
| | | | >10 | 189.4-190.0' - Fracture zone, limestone fragments, gravel to cobble-sized | | | |
| | 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' | | | |
| 200 | | | | | | | |

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

# ROCK CORE 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -157.5 | | | NR | 190.7, 191.0' - Fractures (2), 20 deg, rough, undulating, open<br>191.5' - Mechanical break<br>192.0-193.0' - Fracture zone, limestone fragments, gravel to cobble-sized<br>193.6' - Fracture, 20 deg, rough, stepped, open<br>193.8, 194.3' - Fractures (2), 15 deg and 10 deg, rough, undulating, tight for 193.8', open for 194.3'<br>194.5' - Fracture zone, 15 deg, smooth, planar, open<br>194.5-195.5' - Fracture zone, limestone fragments, gravel to cobble-sized<br>197.3' - Fracture, 35 deg, rough, undulating, open<br>197.6, 197.7, 197.9' - Mechanical break (3)<br>197.9-198.2' - Fracture zone, limestone fragments, gravel to cobble-sized<br>198.8' - Fracture, 20 deg | | **Limestone**<br>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'<br>195.0-195.5' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, medium strong (R3), voids (<1/16") over 5% of surface, fossil molds and larger voids <5% of surface, moderately fossiliferous<br>**No Recovery 195.5-197.0'**<br>**Limestone**<br>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<br>**No Recovery 199.4-202.0'**<br>Bottom of Boring at 202.0 ft bgs on 2/20/2007 | |
| | 202.0 | | | | | | 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.7 | 0.0 – 1.5 | 1.0 | SS-1 | 0-2-3 (5) | **Poorly Graded Sand With Organics (SP)** 0.0-1.0' - black to light brownish gray, (N1 to 5YR 6/1), moist, loose, no HCl reaction, very fine to fine silica sand, trace nonplastic fines, 30-35% fine organics, trace roots | | 08:33 Water level at 2.5' below ground surface<br>3-7/8" tricone bit |
| 5 | 5.0 | | | | | | |
| 37.7 | 5.0 – 6.5 | 0.3 | SS-2 | 4-4-2 (6) | **Sandy Lean Clay With Silt (CL-ML)** 5.0-5.3' - greenish gray, (5G 6/1), wet, stiff, low to medium plasticity, slow dilatancy, no HCl reaction, 30-35% very fine silica sand, trace roots | | |
| 10 | 10.0 | | | | | | |
| 32.7 | 10.0 – 11.5 | 0.8 | SS-3 | 11-15-6 (21) | **Silt And Limestone (ML)** 10.0-10.8' - moderate yellow, (5Y 7/6), wet, very stiff, very fine grained, 10-15% sand, nonplastic, rapid dilatancy, strong HCl reaction, 50% limestone, light olive brown, fine to coarse gravel-sized, strong rock | | |
| 15 | 15.0 | | | | | | |
| 27.7 | 15.0 – 16.0 | 1.0 | SS-4 | 39-50/6 (89/12") | **Silt And Limestone (ML)** 15.0-16.0' - Same as 10.0-10.8' | | Set casing to 20' |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-16 SHEET 2 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.7 | 20.0 | 0.1 | SS-5 | 50/3.5 (50/3.5") | **Limestone Fragments** 20.0-20.1' - dark yellowish orange, (10YR 6/6), weak rock (R2), voids to 1/16", limestone fragments to 1/8"-1/2" | | 21.0': End soil sampling switch to rock coring |
| | | | | | Begin Rock Coring at 21.0 ft bgs<br>See the next sheet for the rock core log | | |
| 25<br>17.7 | | | | | | | |
| 30<br>12.7 | | | | | | | |
| 35<br>7.7 | | | | | | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
| 338884.FL | 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

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

WATER LEVELS : 2.5 ft bgs on 4/5/07 START : 4/5/2007 END : 4/8/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 21.0 | | | | | | |
| | R1-NQ 5 ft 44% | 0 | >10 | 21.0-21.7' - Fracture zone, limestone fragments from gravel to cobble-sized | | **Limestone** 21.0-23.2' - grayish orange, (10YR 7/4), medium grained, strong HCl reaction, extremely weak to very weak (R0 to R1), highly fossiliferous (molds/casts), voids (<1/16") over 70-75% of surface | Fossils including echinoids, gastropods and brachipods |
| | | | >10 | 21.7-22.7' - Fracture zone | | | |
| | | | 0 | 22.9' - Fracture, 45 deg, rough, planar, open | | **No Recovery 23.2-26.0'** | |
| | | | NR | | | | |
| 25 17.7 | | | | | | | R1: 2 minutes |
| | 26.0 | | | | | | |
| | R2-NQ 5 ft 80% | 25 | >10 | 26.0-26.9' - Fracture zone, limestone fragments from gravel to cobble-sized | | **Limestone** 26.0-30.0' - Same as 21.0-23.2' except dusky yellow, (5Y 6/4) | |
| | | | >10 | 27.3-28.8' - Fracture zone, fragments up to 1-1/2" | | | |
| | | | >10 | | | | |
| | | | 4 | 29.4-29.7' - Fracture or mechanical break (4), horizontal and 15 deg, rough, undulating, open | | | |
| 30 12.7 | | | | | | **No Recovery 30.0-31.0'** | R2: 2 minutes |
| | | | NR | | | | |
| | 31.0 | | | | | | |
| | R3-NQ 5 ft 70% | 50 | >10 | 31.0-32.5' - Fracture zone, limestone fragments from gravel to cobble-sized | | **Limestone** 31.0-34.5' - moderate yellow and light olive gray, (5Y 7/6 and 5Y 5/2), light olive gray mottling from 32.6-33.4', fine grained, strong HCl reaction, weak to medium strong (R2 to R3), predominately weak rock, medium strong from 32.3-33.8', voids (<1/16") over 80% of surface, fossiliferous | |
| | | | >10 | 32.5' - Fracture, 40 deg, rough, stepped, open | | | 11:06 Stopped drilling to remix mud |
| | | | 2 | | | | Driller's Remark: Lost circulation at 34.0-35.0' |
| | | | 0 | 33.75' - Fracture, 25 deg, rough, undulating, open | | | |
| 35 7.7 | | | | | | **No Recovery 34.5-36.0'** | |
| | | | NR | | | | R3: 5 minutes |
| | 36.0 | | | | | | |
| | R4-NQ 5 ft 84% | 47 | >10 | 36.0-37.2' - Fracture zone, limestone fragments from gravel to cobble-sized | | **Limestone** 36.0-40.2' - Same as 31.0-34.5' except light olive gray, (5Y 5/2), color transition from above run complete by 37.0', voids <1/16" and abundant larger cavities to 3/16" yielding a rough surface | |
| | | | 1 | 37.25' - Mechanical break 37.55' - 25 deg, smooth, undulating, very tight | | | |
| | | | >10 | 38.3-38.75' - Fracture zone, limestone fragments from gravel to cobble-sized | | | |
| | | | 0 | 38.9' - 75 deg, rough, planar, very tight | | | |
| 40 2.7 | | | >10 | 40.0-40.7' - Fracture zone, limestone fragments from gravel to cobble-sized | | **No Recovery 40.2-41.0'** | R4: 4 minutes |
| | 41.0 | | NR | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-16 SHEET 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

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

WATER LEVELS : 2.5 ft bgs on 4/5/07 START : 4/5/2007 END : 4/8/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R5-NQ 5 ft 22% | 0 | >10 | 41.0-42.1' - Fracture zone, fragments up to 1-1/2" | | **Limestone** 41.0-42.1' - moderate olive brown, (5Y 4/4), fine grained, strong HCl reaction, extremely weak (R0), friable **No Recovery 42.1-46.0'** | |
| | | | NR | | | | |
| 45 -2.3 | | | | | | | R5: 2 minutes |
| | 46.0 | | | | | | |
| | R6-NQ 5 ft 100% | 70 | >10 | 46.0-46.4' - limestone fragments, silt to fine sand-sized particles | | **Limestone** 46.0-51.0' - Same as 41.0-42.1' except very weak (R1), voids <1/16" and cavities to 3/16" yielding rough appearance, trace black organic material 49.0-50.5' | SC-1 collected 46.4-47.45' |
| | | | 1 | 47.45' - Fracture, 35 deg, smooth, undulating, open | | | |
| | | | 0 | 48.3, 48.5, 48.7, 49.0' - Mechanical break (4) | | | |
| | | | 0 | | | | |
| 50 -7.3 | | | | | | | R6: 2 minutes |
| | | | 0 | | | | |
| | 51.0 | | | | | | |
| | R7-NQ 5 ft 50% | 18 | 0 | | | 51.0-51.9' - light olive gray, (5Y 5/2), 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 | |
| | | | NA | | | **Silt (ML)** 51.9-53.5' - light olive gray, (5Y 5/2), strong HCl reaction, carbonate material **No Recovery 53.5-56.0'** | |
| 55 -12.3 | | | | | | | R7: 2 minutes |
| | 56.0 | | | | | | |
| | R8-NQ 5 ft 78% | 10 | NA | | | **Silt (ML)** 56.0-58.7' - Same as 51.9-53.5' | |
| | | | 3 | 58.75-59.0' - Fracture zone, limestone fragments from gravel to cobble-sized 59.1' - Fracture, 80 deg, rough, planar, open | | **Limestone** 58.7-59.9' - moderate olive brown, (5Y 4/4), fine grained, moderate HCl reaction, weak (R2), voids <1/16" over 15% of surface, trace cavities to 9/16"x3/4" on surface **No Recovery 59.9-61.0'** | |
| 60 -17.3 | | | NR | 59.25' - Fracture, 30 deg, rough, stepped, tight 59.4' - 35 deg, rough, undulating, tight | | | R8: 3 minutes |
| | 61.0 | | | | | | |

| PROJECT NUMBER: 338884.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

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

WATER LEVELS : 2.5 ft bgs on 4/5/07 START : 4/5/2007 END : 4/8/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | | | NA | | | **Silt (ML)**<br>61.0-63.0' - Same as 51.9-53.5' except trace organics 61.0-61.3', carbonate material | |
| | R9-NQ<br>5 ft<br>96% | 43 | 1 | 63.0' - 60 deg, rough, planar, tight<br>63.4, 64.3' - Mechanical break (2) | | **Limestone**<br>63.0-65.8' - moderate olive brown, (5Y 4/4), fine grained, moderate HCl reaction, very weak (R1), voids <1/16" over 15% of surface, trace cavities to 9/16"x3/4" on surface | SC-2 collected at 63.4-64.3' |
| 65<br>-22.3 | | | 0 | 64.4-65.2' - Mechanical break (>10) | | | R9: 3 minutes |
| | 66.0 | | 2 | 65.3' - Fracture, 15 deg, smooth, undulating, open | | | |
| | | | NR | | | **No Recovery 65.8-66.0'** | |
| | R10-NQ<br>5 ft<br>88% | 50 | 1 | 65.7' - Fracture, 40 deg, rough, undulating, open<br>66.4' - Fracture, 10 deg, rough, undulating, open | | **Limestone**<br>66.0-70.4' - dusky yellow, (5Y 6/4), fine grained, moderate HCl reaction, very weak to weak (R1 to R2), voids <1/16" on 25% of surface increasing from 68.8', extremely weak (R0) zone from 67.2-67.5', 3/4"x1-3/16" cavity at 70.2', very fossiliferous below 68.5', solution cavity at 68.5-69.0' | |
| | | | 2 | 67' - Fracture, 10 deg, smooth, undulating, tight | | | |
| | | | 3 | 67.8' - Fracture, 65 deg, rough, planar, tight<br>68.1, 68.3' - Fracture (2), 20 deg, rough, undulating, open | | | |
| | | | 3 | 69.5, 69.8' - 40 deg, rough, undulating, open | | | |
| 70<br>-27.3 | | | 1 | 70.1' - Fracture, 20 deg, rough, undulating, open | | | R10: 3 minutes |
| | 71.0 | | NR | | | **No Recovery 70.4-71.0'** | |
| | | | 2 | 71.25' - 10 deg, rough, undulating, open<br>71.5' - 85 deg, rough, planar, tight | | **Limestone**<br>71.0-73.3' - Same as 66.0-70.4' except moderate olive brown, (5Y 4/4) | |
| | | | >10 | 72.0' - Mechanical break, strong to very strong (R4-R5)<br>72.25' - Fracture, 20 deg, rough, undulating, open | | | |
| | R11-NQ<br>5 ft<br>98% | 67 | 5 | 73.2' - Fracture zone, limestone fragments from gravel to cobble-sized<br>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 HCl reaction, weak (R2), laminated bedding, voids <1/16" over 10%-15% of surface, trace organics | |
| | | | 0 | 73.95' - 25 deg, smooth, undulating, tight<br>74.5' - Mechanical break, medium strong (R3) | | | |
| 75<br>-32.3 | | | >10 | 75' - 10 deg, smooth, undulating, tight | | | R11: 4 minutes |
| | 76.0 | | NR | 75.4-75.9' - Fracture zone, limestone fragments from gravel to cobble-sized | | 74.4-75.9' - dusky yellow, (5Y 6/4), fine grained, moderate HCl reaction, very weak (R1), voids <1/16" over <10% of surface, lower strength rock from 75.5-75.9' | |
| | | | 0 | 76.75' - Mechanical break | | **No Recovery 75.9-76.0'** | |
| | | | >10 | 77.0-77.35' - Fracture zone, limestone fragments from gravel to cobble-sized | | **Limestone**<br>76.0-77.2' - Same as 74.4-75.5'<br>77.2-79.0' - light olive brown, (5Y 5/6), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids <1/16" over 40% of surface, cavities up to 3/4"x1-9/16" over 15% of surface, fossiliferous, trace organics | |
| | R12-NQ<br>5 ft<br>60% | 47 | >10 | | | | |
| | | | NR | 78.75' - 10 deg, rough, undulating, tight<br>78.9-79.0' - Fracture zone, limestone fragments from gravel to cobble-sized | | | |
| 80<br>-37.3 | | | | | | **No Recovery 79.0-81.0'** | R12: 2 minutes |
| | 81.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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

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

WATER LEVELS : 2.5 ft bgs on 4/5/07 START : 4/5/2007 END : 4/8/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R13-NQ 5 ft 50% | 27 | >10 | 81.1' - 5 deg, smooth, undulating, 1/16" clay infilling, dark brown clay infilling | | **Limestone** 81.0-83.5' - dusky yellow grading to yellowish gray, (5Y 6/4 grading to 5Y 7/2), fine grained, moderate to mild HCl reaction, weak to medium strong (R2 to R3), voids <1/16" over 25% of surface, cavities up to 3/16"x3/8" over <5% of surface **No Recovery 83.5-86.0'** | 4/6/07 08:04 Water level at 5.4' below ground surface |
| | | | >10 | 81.6-82.6' - Fracture zone, limestone fragments from gravel to cobble-sized | | | |
| | | | 1 | 83.05' - 15 deg, smooth, undulating, open | | | |
| 85 -42.3 | | | NR | | | | R13: 5 minutes |
| | 86.0 | | | | | | |
| | R14-NQ 5 ft 90% | 37 | >10 | 86.0-86.95' - Fracture zone, limestone fragments from gravel to cobble-sized | | **Limestone** 86.0-89.5' - dusky yellow, (5Y 6/4), fine grained, moderate to strong HCl reaction, medium strong (R3), voids <1/16" over 35% of surface, cavities to 3/4"x3/4" and fossil molds on 15% of surface, very fossiliferous transitioning to moderately fossiliferous at 88.0' | |
| | | | 4 | 87.3' - 45 deg, rough, planar, tight<br>87.5' - 80 deg, rough, planar, open<br>87.55' - 10 deg, rough, undulating | | | |
| | | | 10 | 87.85' - 50 deg, rough, planar, tight<br>88.2, 88.5' - 60 deg, rough, planar, tight<br>88.7' - 20 deg, rough, undulating | | | |
| | | | >10 | 89.1-89.4' - Fracture zone, limestone fragments from gravel to cobble-sized | | 89.5-90.5' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, weak (R2), voids <1/16" on 5-10% of surface, trace cavities to 3/16", moderately fossiliferous (molds) **No Recovery 90.5-91.0'** | |
| 90 -47.3 | | | 0 | 89.5' - 30 deg, smooth, undulating, open<br>89.6' - rough, undulating, tight | | | R14: 6 minutes |
| | 91.0 | | NR | | | | |
| | R15-NQ 5 ft 40% | 0 | >10 | 91.0-92.6' - Fracture zone, limestone fragments from gravel to cobble-sized | | **Limestone** 91.0-93.0' - dusky yellow, (5Y 6/4), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids <1/16" on 30% of surface, cavities to 3/8"x3/4" **No Recovery 93.0-96.0'** | |
| | | | >10 | 92.8' - 25 deg, smooth, undulating, tight | | | |
| 95 -52.3 | | | NR | | | | R15: 6 minutes |
| | 96.0 | | | | | | |
| | R16-NQ 5 ft 100% | 65 | 3 | 96.25, 96.6, 96.7' - 30 deg, smooth, planar, very tight | | **Limestone** 96.0-97.9' - Same as 91.0-93.0' except inclusion fragments (to 1-3/16") of yellowish gray | |
| | | | >10 | 97.2-97.25' - 45 deg, rough, planar, high angle fracture zone, very tight | | | |
| | | | >10 | 97.9-98.6' - Fracture zone, limestone fragments from gravel to cobble-sized | | 97.9-101.0' - yellowish gray, (5Y 7/2), fine grained, moderate to strong HCl reaction, weak (R2), voids <1/16" on 5% of surface, trace fossil molds to 3/16" | |
| | | | 4 | 98.8' - 60 deg, rough, planar, tight<br>98.95' - 25 deg, rough, undulating, open<br>99.05, 99.3' - 5 deg, rough, undulating, tight | | | |
| 100 -57.3 | | | 1 | 99.2' - 15 deg, rough, undulating, tight<br>99.9' - 10 deg, rough, undulating, tight<br>100.2' - 60 deg, smooth, planar, tight | | | R16: 7 minutes |
| | 101.0 | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: 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

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

WATER LEVELS : 2.5 ft bgs on 4/5/07 START : 4/5/2007 END : 4/8/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | >10 | | | **Limestone**<br>101.0-103.1' - Same as 97.9-101.0' | SC-3 collected at 101.0-102.0' |
| | | | 2 | 102.0-102.2' - Fracture zone, limestone fragments from gravel to cobble-sized<br>102.65' - 10 deg, rough, undulating, open<br>102.9' - 60 deg, rough, planar, open | | | |
| | R17-NQ<br>5 ft<br>94% | 62 | NA | | | **Silt (ML)**<br>103.1-104.2' - moderate olive brown, (5Y 4/4), soft, strong HCl reaction, trace organics | |
| | | | 0 | | | **Limestone**<br>104.2-105.7' - yellowish gray, (5Y 7/2), mild to moderate HCl reaction, weak to medium strong (R2 to R3), voids <1/16" on 30% of surface, trace fossil molds | |
| 105<br>-62.3 | | | 1 | 105.4' - 60 deg, rough, planar, tight | | | R17: 6 minutes |
| | 106.0 | | NR | | | | |
| | | | 6 | 106.0-106.2' - Fracture zone, limestone fragments from gravel to cobble-sized<br>106.6' - 30 deg, rough, undulating, open | | **No Recovery 105.7-106.0'**<br>**Limestone**<br>106.0-110.0' - Same as 104.2-105.7' except color grades to mottled dusky yellow and light olive gray (5Y 6/4 and 5Y 6/1) by 107.0' then transitions to only dusky yellow by 109.0' | |
| | | | 9 | 107.1-107.8' - 85 deg and vertical, planar, high angle fracture zone, multiple planar features open to moderately tight | | | |
| | R18-NQ<br>5 ft<br>80% | 58 | 3 | 108.5-110.0' - vertical, rough, planar, 15-20% charcoal gray to black, same as 107.1-107.8' | | | |
| | | | 6 | | | | |
| 110<br>-67.3 | | | NR | | | **No Recovery 110.0-111.0'** | R18: 5 minutes |
| | 111.0 | | | | | | |
| | | | >10 | 111.0-111.2' - Fracture zone, limestone fragments from gravel to cobble-sized | | **Limestone**<br>111.0-115.1' - dusky yellow grading to light olive gray by 112.4' grading to pale olive by 114.5', (5Y 6/4 to 5Y 5/2 to 10Y 6/2), fine grained, moderate HCl reaction, medium strong (R3), voids <1/16" on 35% of surface | Driller's Remark: Boring "cave-in" 15.0' from bottom (111.0')<br>Advance HW casing from 70.0-110.0' |
| | | | 3 | 112.35' - 60 deg, smooth, planar, tight | | | |
| | R19-NQ<br>5 ft<br>82% | 33 | 10 | 112.9' - 10 deg, rough, undulating, tight | | | |
| | | | 7 | | | | SC-4 collected at 113.8-114.5' |
| 115<br>-72.3 | | | NR | 114.55-114.7' - Fracture zone, limestone fragments from gravel to cobble-sized<br>114.9' - 20 deg, smooth, undulating, open | | **No Recovery 115.1-116.0'** | R19: 4 minutes |
| | 116.0 | | | | | | |
| | | | >10 | 116.0-116.3' - Fracture zone, rough, undulating, fragments 1/2"-1-1/2"<br>116.5, 117.0' - 20 deg, rough, undulating, open | | **Limestone**<br>116.0-120.3' - Same as 114.5-115.1' | |
| | | | 2 | 117.35' - 10 deg, rough, undulating, tight | | | |
| | R20-NQ<br>5 ft<br>86% | 52 | 1 | 118' - horizontal, smooth, undulating, open<br>118.25' - horizontal, smooth, undulating, black, open to 1/16" | | | |
| | | | 1 | 118.25-118.5' - Mechanical break, limestone fragments from gravel to cobble-sized<br>119.3-119.8; 120.0-120.3' - 70 deg, rough, undulating, black, open to 1/16" | | | |
| 120<br>-77.3 | | | 1 | | | | R20: 6 minutes |
| | 121.0 | | NR | | | **No Recovery 120.3-121.0'** | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: A-16 | SHEET 8 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

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

WATER LEVELS : 2.5 ft bgs on 4/5/07 START : 4/5/2007 END : 4/8/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R21-NQ 5 ft 35% | 20 | 3 | 121.1' - 5 deg, smooth, undulating, open<br>121.5' - 20 deg, rough, undulating, open<br>121.65' - 20 deg, rough, undulating, open | | **Limestone**<br>121.0-122.3' - Same as 111.0-115.1' except yellowish gray and pale olive mottling, (5Y 7/2 and 10Y 6/2)<br>122.3-122.75' - dusky yellow, (5Y 6/4), fine grained, moderate to strong HCl reaction, very weak (R1), voids <1/16" on 25% of surface, cavities and fossil molds to 3/8" on 5% of surface | |
| | | | >10 | 122.3-122.5' - Fracture zone, limestone fragments from gravel to cobble-sized | | | |
| | | | NR | | | **No Recovery 122.75-126.0'** | |
| 125<br>-82.3 | | | | | | | R21: 6 minutes |
| 126.0 | | | | | | | |
| | R22-NQ 5 ft 84% | 33 | >10 | 126.2-127.35' - Fracture zone, horizontal and 60 deg, 1/2"-2" | | **Limestone**<br>126.0-126.2' - Same as 122.3-122.8'<br>126.2-130.2' - dusky yellow, (5Y 6/4), fine grained, moderate HCl reaction, medium strong (R3), voids <1/16" on 10% of surface, trace cavities to 3/16" and fossil molds, zone of light olive gray which has neither voids nor fossils from 127.7 -128.1' | |
| | | | 1 | 127.65-128.1' - Fracture zone, vertical, rough, undulating, black, open to 1/16", 127.65' 45 deg | | | SC-5 collected at 128.1-128.9' |
| | | | 3 | 128.2, 128.9' - horizontal, rough, undulating, open | | | |
| | | | >10 | 129.05' - 10 deg, smooth, undulating, open<br>129.35' - 50 deg, smooth, planar, open | | | |
| 130<br>-87.3 | | | 0 | 129.6-130.0' - Fracture zone, fragments up to 1/16"-2" | | | R22: 8 minutes |
| | | | NR | | | **No Recovery 130.2-131.0'** | |
| 131.0 | | | | | | | |
| | R23-NQ 5 ft 58% | 50 | 4 | 131.7' - 70 deg, rough, planar, tight | | **Limestone**<br>131.0-133.9' - yellowish gray, (5Y 7/2), fine grained, mild to moderate HCl reaction, medium strong (R3), voids <1/16" on 25%, cavities to 3/16" and fossil molds on <5% of surface, moderately fossiliferous | |
| | | | 4 | 131.7-132.4' - Fracture zone, 70 deg and vertical, rough, planar, tight to open | | | |
| | | | 3 | | | | |
| | | | | 133.8' - 10 deg, smooth, undulating, open | | **No Recovery 133.9-136.0'** | |
| 135<br>-92.3 | | | NR | | | | R23: 5 minutes |
| 136.0 | | | | | | | |
| | R24-NQ 5 ft 75% | 38 | >10 | 136.0-136.5' - Fracture zone, rough, undulating, fragments 1/16"-2" | | **Limestone**<br>136.0-139.75' - grayish yellow with pale olive from 138.8-139.5', (5Y 8/4 with 10Y 6/2), fine grained, strong HCl reaction, weak (R2), voids <1/16" on 35% of surface, fossil molds to 3/16"x3/8" from 138.4-139.8', moderately fossiliferous | SC-6 collected at 136.5-137.4' |
| | | | 5 | 137.75-138.4' - Fractures or mechanical break, 5 deg, smooth, planar, tight | | | |
| | | | 3 | 138.75' - 10 deg, rough, undulating, open | | | |
| | | | 3 | 139.5' - 15 deg, rough, undulating, open<br>139.75' - 25 deg, smooth, undulating, open | | **No Recovery 139.75-141.0'** | |
| 140<br>-97.3 | | | NR | | | | R24: 5 minutes |
| 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

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

WATER LEVELS : 2.5 ft bgs on 4/5/07 START : 4/5/2007 END : 4/8/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R25-NQ 5 ft 56% | 0 | 10 | 141.2' - 10 deg, smooth, undulating, open<br>141.35' - 15 deg, smooth, undulating, open<br>141.5' - 30 deg, smooth, undulating, open<br>141.75' - 20 deg, smooth, undulating, open<br>141.76-142.4' - Fracture zone, black, irregular fragments to 1-1/2" | | **Limestone**<br>141.0-141.8' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, weak (R2), voids <1/16" on 30% of surface, cavities and fossil molds up to 3/16" on 5% of surface<br>141.8-142.6' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, medium strong to strong (R3 to R4), voids <1/16" on 5% of surface<br>142.6-143.8' - light olive gray, (5Y 5/2 with 5Y 7/2), 10% yellowish gray mottling, fine grained, strong HCl reaction, strong (R4), voids <1/16" on 25% of surface, trace cavities and fossil (molds) to 9/16" | |
| | | | >10 | | | | |
| | | | 6 | 142.6-143.7' - Fracture (6), 20 deg and 30 deg, rough, undulating, open | | | |
| 145<br>-102.3 | | | NR | | | | R25: 5 minutes |
| | 146.0 | | | | | **No Recovery 143.8-146.0'** | |
| | R26-NQ 5 ft 30% | 0 | >10 | 146.0-147.3' - Fracture zone, dark, limestone fragments from gravel to cobble-sized | | **Limestone**<br>146.0-147.5' - yellowish gray, (5Y 7/2 and 5Y 5/2), light olive gray mottling, fine grained, mild HCl reaction, strong (R4), trace voids <1/16", cavities 1/16"x1/16" and fossil molds | |
| | | | >10 | | | | Set casing to 150.0' due to cave-in on last run; stop coring at 151.0' for the day 4/7/07 |
| | | | NR | | | **No Recovery 147.5-151.0'** | |
| 150<br>-107.3 | | | | | | | R26: 10 minutes |
| | 151.0 | | | | | | |
| | R27-NQ 5 ft 90% | 48 | >10 | 151.0-151.5' - Fracture zone, subangular fragments predominately 1"-1/2" | | **Limestone**<br>151.0-155.5' - yellowish gray, (5Y 7/2 with 5Y 5/2), light olive gray mottling from 152.5-153.8', mild to moderate HCl reaction, medium strong (R3), laminar bedding below 153.5' | |
| | | | 5 | 152' - 25 deg, smooth, undulating, open<br>152.3' - Mechanical break<br>152.45-153.2' - Fracture zone, rough, undulating, dark, staining on vertical fracture | | | Water level at 5.3' below ground surface |
| | | | >10 | 153.7-154.2' - Fracture zone, fragments 1/16"-1/2" | | | |
| | | | >10 | 154.4, 154.7, 155.05' - Mechanical break | | | |
| 155<br>-112.3 | | | 4 | | | | R27: 10 minutes |
| | 156.0 | | NR | 155.25' - 15 deg, smooth, planar, open, solution cavity | | **No Recovery 155.5-156.0'** | |
| | R28-NQ 5 ft 60% | 47 | >10 | 155.3' - 10 deg, smooth, planar, tight<br>155.4' - 15 deg, smooth, planar, tight<br>156.0-156.4' - Fracture zone, rough, undulating, small fragments 1/16"- 1-1/2" | | **Limestone**<br>156.0-159.0' - yellowish gray transitions to dusky yellow below 158.0', (5Y 7/2 to 5Y 6/4), fine grained, mild HCl reaction, medium strong (R3), laminated bedding, voids <1/16" on 5% of surface, cavities and fossil molds to 3/16" on <5% of surface (predominantly on lighter colored laminations), increased voids and fossil abundance below 158.0' | |
| | | | 1 | 157.65' - Mechanical break<br>157.9' - 20 deg, smooth, undulating, open | | | |
| | | | >10 | 158.7-158.9' - Fracture zone | | | |
| 160<br>-117.3 | | | NR | | | **No Recovery 159.0-161.0'** | R28: 9 minutes |
| | 161.0 | | | | | | |

| PROJECT NUMBER: | 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

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

WATER LEVELS : 2.5 ft bgs on 4/5/07 START : 4/5/2007 END : 4/8/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R29-NQ 5 ft 86% | 37 | 1 | 161.65' - Mechanical break | | **Limestone** 161.0-162.9' - dusky yellow with moderate olive brown from 161.8-162.7', (5Y 6/4 with 5Y 4/4), fine grained, mild HCl reaction, medium strong (R3), thin bedding, voids <1/16" on 50% of surface, cavities up to 3/8"x3/4" and fossil molds on <5% of surface, evenly distributed thin (1/2"-1") bedding 162.9-165.3' - yellowish gray with zone of dusky yellow and light olive from 164.6-165.3', (5Y 7/2 with 5Y 6/4 and 5Y 5/2), fine grained, mild HCl reaction, medium strong (R3), laminar bedding from 164.2-164.6', trace voids <1/16" | |
| | | | 6 | 161.8' - Fracture or mechanical break, horizontal, smooth, planar, open 162.1' - 20 deg, rough, undulating, open, solution cavity | | | |
| | | | >10 | 162.25' - Fracture or mechanical break, horizontal, smooth, planar, open 162.35' - Mechanical break | | | |
| | | | >10 | 162.7' - 20 deg, rough, undulating, open 162.9-163.5' - Fracture zone | | | |
| 165 -122.3 | | | 1 | 163.5-164.2' - Fracture zone, 45 deg and 75 deg | | | R29: 4 minutes |
| | 166.0 | | NR | 164.2-164.6' - Fracture zone | | | |
| | R30-NQ 5 ft 90% | 77 | 1 | 164.9,164.95, 165.05' - 10 deg, smooth, planar, tight 166.35, 167.7' - 40 deg, rough, planar, tight | | **No Recovery 165.3-166.0'** **Limestone** 166.0-170.5' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, medium strong (R3), laminar bedding from 167.8-169.4', voids <1/16" on 20% of surface from 166.0-168.0', <5% below 168.0', cavities 3/8"x3/8" and fossil molds on 5% of surface from 166.4-168.0' | |
| | | | 2 | | | | |
| | | | >10 | 167.8' - 55 deg, rough, planar, tight 167.95' - Mechanical break | | | SC-7 collected at 167.95-168.75' |
| | | | 2 | 168.75-169.2' - Fracture zone, dark, staining on vertical fractures | | | |
| 170 -127.3 | | | 1 | 169.7' - Mechanical break 169.9' - 30 deg, smooth, undulating, tight | | | R30: 6 minutes |
| | 171.0 | | NR | 170.4' - horizontal, smooth, planar, open | | **No Recovery 170.5-171.0'** | |
| | R31-NQ 5 ft 100% | 73 | 2 | 171.45' - 5 deg, smooth, planar, tight 171.5' - 5 deg, smooth, planar, open | | **Limestone** 171.0-171.5' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, medium strong to strong (R3 to R4), voids <1/16" on 5% of surface 171.5-172.2' - yellowish gray, (5Y 7/2), mild HCl reaction, strong (R4), laminated bedding at 5-10 deg. 172.2-176.0' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), mild HCl reaction, medium strong (R3), laminated bedding 175.0-176.0', voids <1/16" on <5% of surface | |
| | | | 5 | 172.2' - 5 deg, smooth, undulating, open 172.4' - 85 deg, rough, planar, tight | | | |
| | | | >10 | 172.55-173.9' - Fracture zone, 45 deg and 75 deg, smooth, planar, black staining, tight | | | |
| | | | 0 | | | | SC-8 collected at 173.9-175.0' |
| 175 -132.3 | | | 4 | 175.1, 175.2, 175.35' - 10 deg, smooth, undulating, open, brownish staining at 175.2' | | | R31: 6 minutes |
| | 176.0 | | | | | | 15:07 End boring at 176.0', met recovery and RQD requirements |
| | | | | | | Bottom of Boring at 176.0 ft bgs on 4/8/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

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 4/10/07 START : 4/9/2007 END : 4/18/2007 LOGGER : A. Teal, N. Jarzyniecki, M. Faurote

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.3 | 0.0 | 1.2 | SS-1 | 1-3-6 (9) | **Poorly Graded Sand With Organics (SP)** 0.0-1.2' - brownish black to pale brown, (5YR 2/1 to 5YR 5/2), moist, loose, very fine to fine grained, no HCl reaction, up to 30% fine organics and roots, silica sand | | 4/9/07, 17:20 no water encountered |
| | 1.5 | | | | | | 04/10/07 08:01: Begin drilling for the day |
| | | | | | | | Water level: 2.5' below ground surface, 08:01 on 4/10/07 |
| 5 | 5.0 | | | | | | |
| 37.3 | | 1.2 | SS-2 | 1-1-1 (2) | **Silty Sand (SM)** 5.0-5.9' - moderate yellowish brown, (10YR 5/4), wet, very loose, very fine to fine grained, no HCl reaction, 13% low plastic fines, silica sand | | |
| | 6.5 | | | | **Lean Clay With Sand (CL)** 5.9-6.2' - greenish gray to dark yellowish orange to pale purple, (5G 6/1 to 10YR 6/6 to 5P 6/2), wet, very soft, medium to high plasticity, no dilatancy, no HCl reaction, 20-25% very fine to fine grained silica sand | | |
| 10 | 10.0 | | | | | | |
| 32.3 | | 1.0 | SS-3 | 5-10-5 (15) | **Silty Limestone Fragments With Sand** 10.0-11.5' - white to yellowish gray, (N9, 5Y 9/1), wet, medium dense, strong HCl reaction, fine to coarse gravel, 20% low plastic fines, grained predominantly fine to medium sand, all carbonate | | |
| | 11.0 | | | | | | Driller's Remark: Slight mud loss at 12.0' below ground surface |
| 15 | 15.0 | | | | | | |
| 27.3 | | 1.3 | SS-4 | 34-39-42 (81) | **Silt (ML)** 15.0-16.3' - grayish yellow, (5Y 8/4), moist to wet, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 8% very fine to medium sand, trace organics, trace black minerals, all carbonate | | |
| | 16.5 | | | | | | 08:39 set casing to 20.0' |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-17 SHEET 2 OF 14 |

# SOIL BORING 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

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 4/10/07 START : 4/9/2007 END : 4/18/2007 LOGGER : A. Teal, N. Jarzyniecki, M. Faurote

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.3 | 20.0 20.2 | 0.3 | SS-5 | 50/3 (50/3") | **Sandy Silt (ML)** 20.0-20.2' - grayish orange, (10YR 7/4), moist, hard, nonplastic, very rapid dilatancy, mild to moderate HCl reaction, 25-30% fine to medium sand, two fine gravel-sized limestone fragments, all carbonate<br>Begin Rock Coring at 20.3 ft bgs<br>See the next sheet for the rock core log | | |
| 25 17.3 | | | | | | | |
| 30 12.3 | | | | | | | |
| 35 7.3 | | | | | | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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 ORIENTATION : Vertical

WATER LEVELS : 2.5 ft bgs on 4/10/07 START : 4/9/2007 END : 4/18/2007 LOGGER : A. Teal, N. Jarzyniecki, M. Faurote

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | NQ-1 0.8 ft 75% | 0 | NA | | | **Silt (ML)** 20.3-20.85' - Same as 15.0-16.3' except strong HCl reaction | |
| 21.0 | | | NR | | | **No Recovery 20.85-21.0'** | |
| | R2-NQ 5 ft 62% | 0 | 0 | | | **Limestone** 21.0-24.1' - grayish orange, (10YR 7/4), medium to fine grained, mild HCl reaction, extremely weak to very weak (R0 to R1), voids <1/16" on 90-95% of surface, trace rounded to subrounded white casts, at 22.55' sandy clay lens, greenish gray, 0.1' thick, 22.56-22.9' trace linear white bedding, moderately to very fossiliferous | Casing advanced to 25.0' |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| 25 17.3 | | | NR | | | **No Recovery 24.1-26.0'** | |
| 26.0 | | | | | | | |
| | R3-NQ 5 ft 90% | 0 | 1 | 26.0-27.0' - Fracture zone or mechanical break, 0-70 deg, rough, undulating, open to 3/16" | | **Limestone** 26.0-29.4' - grayish orange, (10YR 7/4), fine grained, moderate HCl reaction, extremely weak to very weak (R0 to R1), voids <1/16" on 25% of surface, zones of silt 27.0'-29.4', 6" thick | |
| | | | >10 | 27.0-29.4' - Fracture zone, silt and rock fragments to 1-1/2" | | | |
| | | | >10 | | | | |
| | | | >10 | 29.4-30.5' - Fracture zone, sand to cobble-sized limestone fragments | | 29.4-30.5' - grayish orange, (10YR 7/4), fine grained, moderate HCl reaction, medium strong (R3), few voids <1/16" | |
| 30 12.3 | | | >10 | | | | |
| 31.0 | | | NR | | | **No Recovery 30.5-31.0'** | |
| | R4-NQ 5 ft 64% | 18 | >10 | | | **Limestone** 31.0-34.2' - grayish orange with olive gray mottling over 60-70% of surface, (10YR 7/4, 5Y 4/1), very fine to fine grained, mild HCl reaction, weak (R2), predominately olive gray by 34.0', grayish orange material becoming associated with casts/molds, moderately fossiliferous, voids vary from 10-15% up to 50% in matrix | |
| | | | >10 | 31.9-34.2' - Fracture zone, 0-65 deg, rough, undulating, lighter coloration (grayish orange) up to 1/8" wide along 65 deg fracture at 33.0-33.3' | | | |
| | | | >10 | | | | |
| | | | 0 | | | | |
| 35 7.3 | | | NR | | | **No Recovery 34.2-36.0'** | |
| 36.0 | | | | | | | |
| | R5-NQ 5 ft 56% | 27 | >10 | 36.0-36.5' - Fracture zone, 0-70 deg, rough, undulating, grayish orange coloration on most surfaces, rock fragments to 2" | | **Limestone** 36.0-38.0' - olive gray, (5Y 4/1), fine grained, moderate HCl reaction, voids <1/16" on 20% of surface, very fossiliferous, few cavities to 3/16" (molds) | |
| | | | 1 | 36.5-36.7' - Fracture, 65 deg, rough, undulating, tight<br>37.6' - Fracture, 60 deg, rough, planar, tight | | | |
| | | | >10 | 38.0-38.8' - Fracture zone, smooth, planar to undulating, fragments <1" | | 38.0-38.8' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, extremely weak (R0), friable, trace organics | |
| 40 2.3 | | | NR | | | **No Recovery 38.8-41.0'** | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: A-17 | SHEET 4 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 ORIENTATION : Vertical

WATER LEVELS : 2.5 ft bgs on 4/10/07 START : 4/9/2007 END : 4/18/2007 LOGGER : A. Teal, N. Jarzyniecki, M. Faurote

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 41.0 | | | | | | |
| | R6-NQ 5 ft 68% | 0 | >10 | 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 brown, (10YR 6/2), fine grained, moderate HCl reaction, very weak (R1), voids <1/16" on 50% of surface, moderately fossiliferous, trace organics | |
| | | | >10 | | | | |
| | | | >10 | | | 42.3-44.4' - Same as 41.0-43.0' except extremely weak (R0), 42.3-42.5' seam of sandy lean clay | |
| | | | >10 | | | **No Recovery 44.4-46.0'** | |
| 45 -2.7 | | | NR | | | | |
| | 46.0 | | | | | | |
| | R7-NQ 5 ft 68% | 0 | 5 | 46.0-47.7' - Fractures (8), 20 deg, rough, undulating, to smooth and undulating, face angles parallel, open to 1/16" | | **Limestone** 46.0-48.2' - pale yellowish brown, (10YR 6/2), fine grained, moderate HCl reaction, extremely weak (R0), friable, trace organics | |
| | | | 4 | | | | |
| | | | >10 | 47.9' - Fracture, horizontal, smooth, undulating, open to 3/16" | | 48.2-48.6' - pale yellowish brown, (10YR 6/2), fine grained, moderate HCl reaction, very weak (R1), voids <1/16" on 40-50% of surface, laminations of organic material <1/16" | |
| | | | >10 | 48.2, 48.4, 48.6' - Fracture (3), 0-20 deg, rough, undulating | | | |
| 50 -7.7 | | | NR | 48.6-49.4' - Fracture zone, rough, undulating, rock fragments to 1" | | 48.6-49.4' - Same as 46.0-48.2' **No Recovery 49.4-51.0'** | |
| | 51.0 | | | | | | |
| | R8-NQ 5 ft 90% | 35 | >10 | 51.3' - Fracture, 20 deg, smooth, undulating, open to 3/16" | | **Limestone** 51.0-52.5' - Same as 46.0-48.2' except laminations of organic material <1/16" from 51.0'-51.5' | |
| | | | 4 | 51.4-52.0' - Fracture zone, 0-90 deg, rough, undulating, to smooth and undulating, fragments <3/16"-1-1/2" | | 52.5-55.5' - Same as 48.2-48.6' except few voids <1/16", organics more abundant | |
| | | | 1 | 52.1, 53.4, 53.6, 54.0, 54.9' - Mechanical break (5) | | | |
| | | | 2 | 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" | | | |
| 55 -12.7 | | | 1 | 53.1' - Fracture, 40 deg, smooth, undulating, open to 1/16" | | | |
| | 56.0 | | NR | 54.3, 54.5' - Fractures or mechanical break (2), 10-20 deg, smooth, undulating, open to 3/16" | | **No Recovery 55.5-56.0'** | |
| | R9-NQ 5 ft 84% | 38 | 3 | 55.4' - Fracture, 20 deg, rough, planar, open to 1/16" | | **Limestone** 56.0-57.5' - Same as 52.5-55.5' | 56.0-76.0' re-logged by C. Dougherty |
| | | | >10 | 56.1' - Fracture, horizontal, smooth, undulating, open to 1/16" | | | Casing advanced to 60.0' |
| | | | 2 | 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 | | 57.5-60.2' - light olive gray, (5Y 5/2), fine grained, mild HCl reaction, strong (R4), laminated bedding, voids <1/16" on 0-30% of surface, voids concentrated in zone from 58.4'-59.4', cavities to 3/4"x3/8" (fossil molds), trace organics, some laminated bedding inclined 10 deg | |
| | | | >10 | 57.5-58.1' - Fracture zone, 0-65 deg, smooth, undulating, trace silt and/or clay sized infilling, black staining on 65 deg fracture faces, fragments from 1/2"-2" | | | |
| 60 -17.7 | | | >10 | | | | |

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|---|---|---|
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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 ORIENTATION : Vertical

WATER LEVELS : 2.5 ft bgs on 4/10/07 START : 4/9/2007 END : 4/18/2007 LOGGER : A. Teal, N. Jarzyniecki, M. Faurote

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 61.0 | | NR | 58.75' - Fracture, 25 deg, rough, planar, tight<br>58.9-59.0' - Fracture, horizontal, 2 fragments, open | | **No Recovery 60.2-61.0'** | |
| | R10-NQ<br>5 ft<br>58% | 30 | 2 | 59.2-59.5' - Fracture zone, 70 deg, black staining on face, closed | | **Limestone**<br>61.0-62.7' - Same as 57.5-60.2' except intervals of laminated bedding, voids <1/16" and cavities up to 3/8" diameter from 61.5-62.7 | |
| | | | 8 | 59.7' - Fracture, 35 deg, closed<br>59.8-60.2' - Fracture zone, 0-65 deg, rough, undulating, dark staining | | 62.7-63.9' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, medium strong (R3), voids <1/16" on 25% of surface, very fossiliferous, molds up to 3/8"diameter | |
| | | | >10 | 61.1-61.3' - Fracture, 80 deg, dark staining, tight<br>61.5' - Fracture, 45 deg, smooth, planar, tight | | **No Recovery 63.9-66.0'** | |
| 65<br>-22.7 | | | NR | 62.05' - Fracture, 10 deg, smooth, undulating, tight<br>62.3' - Fracture, 30 deg, fracture not completely through core<br>62.65' - Fracture, 15 deg, smooth, undulating, tight | | | |
| | 66.0 | | | | | | |
| | R11-NQ<br>5 ft<br>100% | 50 | >10 | 62.8-63.0' - Fracture zone, smooth to rough, undulating, fragments 3/8"-1"<br>63.3' - Fracture, 10 deg, smooth, undulating, loose | | **Limestone**<br>66.0-69.5' - moderate olive brown to light olive gray, (5Y 4/4 to 5Y 5/2), fine grained, mild HCl reaction, weak to medium strong (R2 to R3), voids <1/16" on 15% surface, cavities to 3/8" over <5%, moderately fossiliferous, trace organics | SC-1 collected at 66.4-67.6' |
| | | | >10 | 63.3-63.9' - Fracture zone, 0-90 deg, rough, undulating, dark staining, fragments <1/16"-2-1/2", staining on one 45 deg face | | | |
| | | | >10 | 66.0-66.4' - Fracture zone, smooth, undulating, some dark staining, fragments to 3/8" | | | |
| | | | >10 | 67.6-68.9' - Fracture zone, 0-90 deg, rough, undulating, fragments <1/16"-2", some organic material on some fragment faces | | 69.5-71.0' - moderate yellowish brown, (10YR 5/4), fine grained, mild to moderate HCl reaction, weak (R2), laminated bedding, inclined 30 deg, organics present along bedding, moderately fossiliferous at 70.5-71.0' | |
| 70<br>-27.7 | | | >10 | 69.15' - Fracture, 75 deg, rough, planar, tight<br>69.4-70.4' - Fracture zone, similar to 67.6-68.9' | | | |
| | 71.0 | | | | | | |
| | R12-NQ<br>5 ft<br>100% | 100 | 1 | | | 71.0-76.0' - Same as 69.5-71.0' except voids <1/16" on 5% of surface, laminated bedding with 30-45 deg angles, more pronounced | SC-2 collected at 71.0-71.9' |
| | | | 1 | 71.9' - Fracture, horizontal, smooth, undulating, tight<br>72.35' - Fracture, 50 deg, smooth, planar, loose | | | |
| | | | 0 | 72.8' - Mechanical break<br>73.1, 73.6, 75.5' - Mechanical break (3) | | | |
| | | | 0 | | | | |
| 75<br>-32.7 | | | 0 | | | | |
| | 76.0 | | | | | | |
| | R13-NQ<br>5 ft<br>52% | 33 | 0 | 76.6' - Mechanical break | | 76.0-78.6' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, very weak (R1), thinly laminated (1/4"), inclined 5-10 deg, voids <1/16" on 15% of surface and trace organics predominately along bedding, trace 1/16"-1/8" gray clasts | |
| | | | 3 | 77.0' - Fracture, 55 deg, smooth, planar, tight<br>77.65' - Fracture, 20 deg, rough, undulating, loose | | | |
| | | | 3 | 77.9' - Fracture, 30 deg, smooth, undulating, tight | | **No Recovery 78.6-81.0'** | |
| 80<br>-37.7 | | | NR | 78.3' - Fracture, 25 deg, smooth, undulating, tight<br>78.4' - Fracture, horizontal, smooth, undulating, loose | | | Casing advanced to 80.0' end of day 4/10/07 at 101.0' |

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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 ORIENTATION : Vertical

WATER LEVELS : 2.5 ft bgs on 4/10/07 START : 4/9/2007 END : 4/18/2007 LOGGER : A. Teal, N. Jarzyniecki, M. Faurote

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | | | | 78.5' - Fracture, 45 deg, smooth, undulating, loose | | | |
| 81.0 | | | | | | | |
| | R14-NQ 5 ft 55% | 20 | >10 | 81.5-81.9' - Fracture zone, rough, undulating, fragments <3/16-1-1/2" | | **Limestone** 81.0-81.5' - grayish orange, (10YR 7/4), fine grained, moderate HCl reaction, very weak to weak (R1 to R2), voids <1/16" on 25% of surface 81.5-83.75' - very pale orange to grayish orange, (10YR 8/2 to 10YR 7/2), fine grained, moderate HCl 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 | |
| | | | >10 | 82.2' - Mechanical break 82.5-82.8' - Fracture zone, same as 81.5-81.9' | | | |
| | | | >10 | 82.8' - Fracture, 60 deg, rough, planar, loose 83.1' - Fracture, 40 deg, rough, undulating, tight | | | |
| 85 -42.7 | | | NR | 83.35-83.75' - Fracture zone, same as 81.5-81.9' | | **No Recovery 83.75-86.0'** | |
| 86.0 | | | | | | | |
| | R15-NQ 5 ft 98% | 80 | 3 | 86.75' - Fracture, 45 deg, rough, planar, tight | | **Limestone** 86.0-90.9' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, medium strong (R3), voids <1/16" on 25-30% of surface, trace cavities to 3/16" except 5% at 89.4-90.9', very fossiliferous from 89.4-90.9' | |
| | | | 10 | 86.95-87.3' - Fracture zone, 0-60 deg, smooth, undulating, fragments 3/8"-1-1/2" 87.75, 88.2' - Fractures (2), 20-30 deg, smooth, undulating, tight | | | SC-3 collected at 88.2-89.35' |
| | | | 2 | | | | |
| | | | 0 | 89.35' - Fracture, 20 deg, rough, undulating, loose, clay seam 1/32" thick | | | |
| 90 -47.7 | | | 2 | 90.5' - Fracture, 30 deg, smooth, undulating, tight , clay seam 1/4" thick | | | |
| 91.0 | | | NR | | | **No Recovery 90.9-91.0'** | |
| | R16-NQ 5 ft 64% | 25 | >10 | 90.6' - Fracture, 15 deg, smooth, undulating, loose | | **Limestone** 91.0-91.5' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, medium strong to strong (R3 to R4) 91.5-94.2' - moderate yellowish brown, (10YR 4/2), fine grained, moderate HCl reaction, laminated organics 1/16" thick at 91.7' and 92.4' with trace laminated organics elsewhere, voids <1/16" on 25% of surface,few larger cavities along apparent healed fracture planes | |
| | | | 1 | 91.0-91.7' - Fracture zone, 0-90 deg, fragments <3/8"-1-1/2", clay films 92.5' - Mechanical break | | | |
| | | | >10 | 92.9' - Fracture, 60 deg, rough, planar, open to 1/16" 93.15' - Fracture, 80 deg, rough, planar, tight | | | |
| | | | >10 | 93.25' - Fracture, 75 deg, smooth, planar, tight | | | |
| 95 -52.7 | | | NR | 93.5-94.2' - Fracture zone, 0-70 deg, smooth, undulating, fragments 3/8"-2-1/2" | | **No Recovery 94.2-96.0'** | |
| 96.0 | | | | | | | |
| | R17-NQ 5 ft 40% | 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 grained, mild to moderate HCl reaction, strong (R4), few voids <1/16" over 20% from 97.0-97.5' | |
| | | | >10 | | | | |
| | | | NR | | | **No Recovery 98.0-101.0'** | |
| 100 -57.7 | | | | | | | Casing advanced to 100.0' |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: A-17 | SHEET 7 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 ORIENTATION : Vertical

WATER LEVELS : 2.5 ft bgs on 4/10/07 START : 4/9/2007 END : 4/18/2007 LOGGER : A. Teal, N. Jarzyniecki, M. Faurote

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | 101.0 | | | | | | |
| | R18-NQ 5 ft 100% | 82 | >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), voids <1/16" on 15% of surface, trace cavities to 3/8" predominately fossil molds and casts, very fossiliferous | Water level at 1.9' below ground surface SC-4 collected at 102.15-103.5' |
| | | | 1 | 102.15' - Fracture, 60 deg, rough, planar to undulating, tight | | | |
| | | | 1 | 103.5' - Fracture, 50 deg, smooth, undulating to planar, tight | | | |
| | | | 1 | 104.0, 105.4' - Fractures (2), 15 deg, rough, undulating, tight | | | |
| 105 -62.7 | | | 2 | 105.6' - Fracture, 70 deg, smooth, planar, tight | | | |
| | 106.0 | | | | | | |
| | R19-NQ 5 ft 100% | 77 | 3 | 106.1-106.4' - Fracture, 60 deg, rough, undulating, tight to open to 1/16" | | 106.0-111.0' - Same as 101.0-106.0' except olive gray mottling (5Y 4/1), at 107.0' laminated bedding from 109.6-110.2' inclined 40 deg | |
| | | | 2 | 106.4-106.7' - Fracture, apparent healed fractures | | | SC-5 collected at 107.25-108.5' |
| | | | 1 | 106.5' - Fracture, 40 deg, rough, undulating, tight; 106.8' - Fracture, horizontal, rough, undulating, tight | | | |
| | | | >10 | 107.0, 107.25, 108.5' - Fractures (3), 60 deg, smooth, planar, tight | | | |
| 110 -67.7 | | | 3 | 109.0-109.3' - Fracture zone, 0-80 deg, rough, undulating, fragments 3/16"-2"; 109.8' - Fracture, 60 deg, rough, undulating, open to 1/16", organic material on faces | | | |
| | 111.0 | | | | | | |
| | R20-NQ 5 ft 100% | 100 | 0 | 110.15' - Fracture, 45 deg, smooth, undulating | | 111.0-116.0' - Same as 101.0-106' except trace organics from 113.6-114.3', cavities to 3/8"x1-3/16" from 113.6-114.3' | SC-6 collected at 111.0-112.1' |
| | | | 1 | 110.25' - Fracture, 50 deg, rough, undulating, open to 1/16"; 110.65' - Fracture, 60 deg, rough, undulating, open to 1/8" | | | |
| | | | 0 | 112.1' - Fracture, 75 deg, rough, undulating, tight; 113.6, 114.45' - Mechanical break (2) | | | |
| | | | 0 | | | | |
| 115 -72.7 | | | 0 | | | | |
| | 116.0 | | | | | | |
| | R21-NQ 5 ft 70% | 50 | 0 | | | 116.0-119.5' - Same as 101.0-106.0' | |
| | | | 1 | 117.6' - Fracture, 25 deg, smooth, undulating, charcoal gray staining on 30%, tight | | | |
| | | | 7 | 118.0-118.2' - Fracture zone, 0-50 deg, rough, planar, open to 1/16" | | | |
| | | | >10 | 118.2' - Fracture, 50 deg, rough, planar, tight; 118.65' - Fracture, 30 deg, smooth, undulating, tight | | | |
| 120 -77.7 | | | | | | **No Recovery 119.5-121.0'** | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
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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 ORIENTATION : Vertical

WATER LEVELS : 2.5 ft bgs on 4/10/07 START : 4/9/2007 END : 4/18/2007 LOGGER : A. Teal, N. Jarzyniecki, M. Faurote

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 121.0 | | NR | 118.9' - Fracture, 10 deg, smooth, undulating, loose | | | |
| | R22-NQ 5 ft 22% | 12 | >10 | 119.05' - Fracture, 25 deg, smooth, undulating, loose | | **Limestone** 121.0-122.1' - grayish orange, (10YR 7/4), fine grained, moderate HCl reaction, medium strong (R3), voids <1/16" on 40% of surface, trace cavities to 3/8" diameter predominately fossil casts/molds **No Recovery 122.1-126.0'** | |
| | | | 0 | 119.2' - Fracture, 15 deg, smooth, undulating, loose | | | |
| | | | NR | 119.3-119.5' - Fracture zone, rough, undulating, to smooth and planar, fragments 3/8"-1" 121.0-122.2' - Fracture zone, 0-90 deg, rough, undulating, fragments <3/16"-2" 121.3-121.9' - Fracture, vertical, rough, undulating, dark gray staining, open to 1/16" | | | |
| 125 -82.7 | | | | | | | |
| | 126.0 | | | | | | |
| | R23-NQ 5 ft 86% | 18 | >10 | 126.0-126.6' - Fracture, 80 deg, rough, undulating, open to 1/16" | | **Limestone** 126.0-128.0' - moderate yellowish brown with light olive gray laminations 1/4" thick, (10YR 5/4 with 5Y 4/2), fine grained, moderate HCl reaction, medium strong (R3), voids <1/16" over 20% of surface trace cavities to 3/16", moderately fossiliferous, trace organics 128.0-130.3' - light olive gray, (5Y 5/2), fine grained, mild HCl reaction, medium strong (R3), voids over 20% of surface, few cavities to 3/16" predominately fossil casts/molds, moderately fossiliferous **No Recovery 130.3-131.0'** | |
| | | | >10 | 126.3' - Fracture, 45 deg, rough, undulating, tight | | | |
| | | | 4 | 126.6-128.0' - Fracture zone, 0-75 deg, smooth, planar, to rough and undulating, fragments 3/8"-3" 128.3' - Fracture, 35 deg, rough, undulating, tight | | | |
| | | | 2 | 128.4' - Fracture, 35 deg, rough, undulating, tight, intersects fracture at 128.3' | | | |
| 130 -87.7 | | | 2 | 128.5' - Fracture, 15 deg, smooth, undulating, open | | | |
| | 131.0 | | NR | 128.5-128.9' - Fracture, 60-70 deg, smooth, undulating, tight | | | |
| | R24-NQ 5 ft 50% | 25 | >10 | 129.25' - Fracture, 60 deg, rough, undulating, tight | | **Limestone** 131.0-133.5' - Same as 128.0-33.5' except less cavities to 3/16" diameter | |
| | | | >10 | 129.4' - Fracture, 20 deg, rough, undulating, tight to open to 3/8" 130.0, 130.1' - Fractures (2), 30 deg, smooth, undulating, open, intersecting 130.1' | | | |
| | | | 0 | 131.3-131.6' - Fracture zone, up to 70 deg, rough, undulating, to smooth and undulating, fragments 3/8"-1" | | **No Recovery 133.5-136.0'** | |
| | | | NR | 131.9-132.2' - Fracture zone, 0-90 deg, rough, undulating, fragments 3/8"-1" 132.2' - Fracture, 25 deg, smooth, undulating, open 132.7' - Fracture, 50 deg, rough, undulating, tight | | | |
| 135 -92.7 | | | | | | | |
| | 136.0 | | | | | | |
| | R25-NQ 5 ft 60% | 38 | >10 | 136.0-136.8' - Fracture, 60 deg, smooth, planar, loose | | **Limestone** 136.0-139.0' - moderate yellowish brown, (10YR 5/4), fine grained, mild to moderate HCl reaction, medium strong (R3), voids <1/16" on 20% of surface, moderately fossiliferous, trace molds to 3/8"x3/16", possible healed fractures at 136.4' and 136.7' **No Recovery 139.0-141.0'** | |
| | | | 2 | 137.5' - Fracture, 75 deg, smooth, planar, loose | | | |
| | | | 0 | 137.65' - Fracture, 60 deg, smooth, planar, charcoal gray to black staining on 90-95% of surface, loose | | | |
| 140 -97.7 | | | NR | | | | |

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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 ORIENTATION : Vertical

WATER LEVELS : 2.5 ft bgs on 4/10/07 START : 4/9/2007 END : 4/18/2007 LOGGER : A. Teal, N. Jarzyniecki, M. Faurote

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 141.0 | | | | | | | |
| | R26-NQ 5 ft 72% | 38 | >10 | 141.25-142.7' - Fracture zone, up to 75 deg, rough to smooth, undulating, dark staining, fragments <3/8"-3" | | **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 | |
| | | | >10 | | | | |
| | | | 1 | 143.25' - Fracture, 45 deg, rough, planar, tight | | | |
| | | | 0 | | | | |
| 145 -102.7 | | | NR | | | **No Recovery 144.6-146.0'** | |
| 146.0 | | | | | | | |
| | R27-NQ 5 ft 92% | 77 | 1 | 146.7' - Fracture, horizontal, rough, undulating, open | | **Limestone** 146.0-150.6' - Same as 136.0-139.0' except several healed fractures at 147.0-148.0', inclined 55 deg | |
| | | | 1 | 147.2' - Fracture, 55 deg, rough, undulating, tight | | | |
| | | | 4 | 148.3-148.5' - Fractures (4), 30-70 deg, rough, undulating, 3 fragments to 1-1/2", tight to 1/16" open | | | SC-7 collected at 148.5-149.45' |
| | | | 4 | 149.45' - Fracture, 30 deg, rough, undulating, tight | | | |
| 150 -107.7 | | | 1 | 149.75, 149.8, 149.9' - Fractures (3), 20 deg, rough, undulating, loose | | | |
| 151.0 | | | NR | 150.6' - Fracture, 70 deg, rough, planar, tight | | **No Recovery 150.6-151.0'** | |
| | R28-NQ 5 ft 80% | 63 | 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' | |
| | | | 2 | 151.85' - Fracture, 75 deg, rough, planar, tight<br>152.2' - Fracture, 25 deg, rough, undulating, loose, organics on lower faces | | | |
| | | | 1 | 152.3' - Fracture, 25 deg, rough, undulating, tight to open to 3/8"<br>153.2, 153.5' - Mechanical break (2) | | | |
| | | | >10 | 153.8' - Fracture, 15 deg, rough, undulating, loose | | | |
| 155 -112.7 | | | NR | 154.5-155.0' - Fracture zone, 0-75 deg, rough, undulating, fragments 3/8"-1" | | **No Recovery 155.0-156.0'** | |
| 156.0 | | | | | | | |
| | R29-NQ 5 ft 94% | 60 | >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" | | **Limestone** 156.0-160.7' - light olive gray, (5Y 5/2), fine grained, mild HCl 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 | |
| | | | >10 | | | | |
| | | | 3 | | | | |
| | | | >10 | 158.8' - Fracture, 80 deg, rough, undulating, tight<br>158.95-159.5' - Fracture zone, 20-80 deg, rough, undulating, fragments to 3" | | | |
| 160 -117.7 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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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 ORIENTATION : Vertical

WATER LEVELS : 2.5 ft bgs on 4/10/07 START : 4/9/2007 END : 4/18/2007 LOGGER : A. Teal, N. Jarzyniecki, M. Faurote

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | | | 1 | 160.5' - Fracture, 30 deg, rough, undulating, tight at center, open to 3/8" | | | |
| | 161.0 | | NR | | | **No Recovery 160.7-161.0'** | |
| | | | 1 | | | **Limestone** 161.0-162.4' - moderate yellowish brown, (10YR 5/4), fine grained, mild to moderate HCl reaction, medium strong (R3), laminated bedding at 161.0-161.5', trace organics at 162.0', voids <1/16" on 15% of surface grouped along bedding, trace cavities to 3/4" diameter | |
| | | | >10 | 161.9' - Fracture, 20 deg, rough, undulating, loose<br>162.0' - Fracture, 35 deg, rough, undulating, loose | | | |
| | R30-NQ 5 ft 84% | 67 | 3 | 162.4-162.7' - Fracture zone, rough, undulating, brown staining on some surfaces, fragments 3/16"-1-1/2" | | | |
| | | | 3 | 163.0, 163.9' - Fractures (2), 45 deg, closed, healed | | 162.4-165.2' - light olive gray with moderate yellowish brown, (5Y 5/2 with 10YR 5/4), fine grained, mild HCl reaction, medium strong (R3), some cavities up to 1-9/16" oriented along healed fractures | |
| 165 -122.7 | | | 0 | 163.6' - Fracture, 60 deg, rough, planar, open | | | |
| | | | NR | 164.7' - Fracture, 25 deg, rough, undulating, loose | | | |
| | 166.0 | | | | | **No Recovery 165.2-166.0'** | |
| | | | 2 | 164.7-164.9' - Fracture zone, rough, undulating, small fragments<br>166.3, 166.4' - Fractures (2), 20 deg, smooth, planar, tight | | **Limestone** 166.0-170.8' - moderate yellowish brown and light olive gray, (10YR 5/4 and 5Y 5/2), fine grained, mild HCl reaction, medium strong (R3), laminated bedding at 166.0-166.8' and 169.7-170.1' inclined 30-35 deg with voids <1/16" on 25% of surface, trace cavities to 3/16"x1-3/4" | |
| | | | 3 | 167.55' - Fracture, 85 deg, smooth, planar, tight | | | |
| | R32-NQ 5 ft 96% | 57 | 8 | 167.7' - Fracture, 20 deg, smooth, undulating, tight | | | |
| | | | 1 | 167.85' - Fracture, 80 deg, smooth, planar, tight | | | |
| 170 -127.7 | | | 2 | 168.05' - Fracture, 40 deg, smooth, undulating, tight<br>168.15' - Fracture, 25 deg, smooth, undulating, tight | | | Casing advanced to 110.0' end rock coring 4/12/07 |
| | 171.0 | | NR | 168.4-168.6' - Fracture zone, same as 29.4-30.5' | | **No Recovery 170.8-171.0'** | |
| | | | 0 | 168.85' - Fracture, 25 deg, rough, undulating, loose | | **Limestone** 171.0-175.7' - pale olive to light olive, (10Y 6/2 to 5Y5/2), mild to moderate HCl reaction, medium strong (R3), cavities to 1.2"x2.4"x3.6", fossiliferous (casts/molds) up to 10-15% of surface | 04/17/07 13:10 resume coring<br>R31 Not recorded in field 13:35 casing advanced to 115.0' |
| | | | 3 | 169.65, 170.1' - Fractures (2), 35 deg, rough, undulating, loose | | | |
| | R33-NQ 5 ft 94% | 88 | 2 | 170.6' - Fracture, 50 deg, rough, undulating, loose<br>172.25' - Fracture, 45 deg, rough, flat, angular, dissolution break with healed 45 deg fractures | | | Corehole reamed from 115-171' begin coring at 171.0' |
| | | | 1 | 172.35, 172.8' - Fractures (2), 2-5 deg, rough | | | |
| 175 -132.7 | | | 0 | 173.25' - Mechanical break, 35 deg, smooth<br>174.0' - Fracture, 5-10 deg | | | R33: 10 minutes |
| | 176.0 | | NR | | | **No Recovery 175.7-176.0'** | |
| | | | 3 | 176.3, 176.5, 176.8, 178.1, 178.25, 178.3, 178.55, 178.9-179' - Fractures (8), these fractures are related to breccia clast separations and high angle fractures that were partially healed | | **Limestone** 176.0-178.9' - yellowish pale gray to pale olive, (5Y 7/2 to 10Y 6/2), fine to medium grained, mild HCl reaction, medium strong to strong (R3 to R4), cavities to 1" on 15% of surface associated with healed fracture traces, poorly fossiliferous (casts/molds), trace recrystallization | M. Faurote begins logging at 176.0' |
| | | | 0 | | | | Heavy chatter at 176.0-177.0' |
| | R34-NQ 5 ft 98% | 43 | 10 | | | | |
| | | | 10 | 179-179.2, 179.3, 179.45, 179.8, 180.1, 180.15' - Mechanical break (6) | | | |
| 180 -137.7 | | | | | | | R34: 8 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 ORIENTATION : Vertical

WATER LEVELS : 2.5 ft bgs on 4/10/07 START : 4/9/2007 END : 4/18/2007 LOGGER : A. Teal, N. Jarzyniecki, M. Faurote

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | 181.0 | | 2 | | | 178.9-180.9' - pale olive, (10Y 6/2), very fine grained, mild HCl reaction, medium strong to strong (R3 to R4), 15% voids due to fossil (casts/molds), cavities to 1" long by 1/4"x1/2" | |
| | | | NR | | | **No Recovery 180.9-181.0'** | |
| | | | 2 | 181.25' - Fracture, 7 deg, smooth, planar, minor iron oxide staining | | **Limestone** | |
| | | | >10 | 181.95' - Fracture, 45 deg, rough, angular, solution expanded | | 181.0-184.25' - Same as 178.9-181.0' | |
| | R35-NQ 5 ft 84% | 59 | 1 | 182.55' - Fracture zone, fragments to 1"x1-1/2" | | | R35: 9 minutes |
| | | | 1 | 183.25' - Fracture, 45 deg, planar to slightly undulating, with some carbonate recrystallization | | | SC-8 collected at 183.25-184.2' |
| 185 -142.7 | | | 0 | 184.8' - Fracture, rough, undulating, with carbonate recrystallization on fracture surface, break is at the base of a clast in breccia | | 184.25-185.2' - light brown to medium brown, (5YR 5/6 to 5YR 4/4), fine grained, strong HCl reaction, medium strong (R3), containing very fine to fine grained clasts with <10% fossil void space | |
| | 186.0 | | NR | | | **No Recovery 185.2-186.0'** | |
| | | | >10 | 186.0-187.0' - Fracture zone, moderate to heavy iron oxide, multiple fracture orientations | | **Limestone** 186.0-186.9' - medium brown to dark brown, (5YR 4/4 to 5YR 3/4), heavily iron-oxide stained | |
| | | | 1 | 187.25' - Fracture or mechanical break, very angular surface | | 186.9-187.6' - pale olive, (10Y 6/2), very fine grained, moderate HCl reaction | |
| | R36-NQ 5 ft 32% | 0 | NR | | | **No Recovery 187.6-191.0'** | |
| 190 -147.7 | | | | | | | R36: 18 minutes |
| | 191.0 | | | | | | |
| | | | >10 | 191.0-192.0' - Fracture zone, multiple fractures, random orientations, fragments to 1" | | **Limestone Fragments** 191.0-192.0' - multiple rock fragments | |
| | | | | | | **No Recovery 192.0-196.0'** | |
| | R37-NQ 5 ft 20% | 0 | NR | | | | |
| 195 -152.7 | | | | | | | R37: 11 minutes |
| | 196.0 | | | | | | |
| | | | 2 | 196.3' - Fracture, 20 deg, rough, undulating | | | |
| | | | 3 | 196.95' - Fracture, 40 deg, rough, undulating, <5% recrystallization on surface | | | |
| | R38-NQ 5 ft 86% | 67 | 2 | 197.3' - Fracture, 30 deg, rough, minor recrystallization; 197.65-197.75' - Fracture zone, fragments <1", recrystallization on surfaces, fragments may be from cavity break down | | | |
| | | | 1 | 198.5-198.8' - Fracture zone or bedding plane, 1-3 deg, smooth, planar, minor recrystallization, fragments <1" | | | |
| 200 -157.7 | | | 0 | | | | R38: 4 minutes |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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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 ORIENTATION : Vertical

WATER LEVELS : 2.5 ft bgs on 4/10/07 START : 4/9/2007 END : 4/18/2007 LOGGER : A. Teal, N. Jarzyniecki, M. Faurote

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 201.0 | | NR | 199.05' - Fracture, 1-5 deg, rough, undulating | | **Limestone** 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 HCl reaction, medium strong to strong (R3 to R4), infill along bedding or subsidence planes inclined 65-80 deg, organic material as discontinuous, lenticular to planar accumulations, 196.9-198.4' cavities to 1"x1/2" on 35% of surface, trace recrystallized infill of cavities, trace healed fractures 198.4-198.8' - pale brown, (5YR 5/2), very fine grained, mild to moderate HCl reaction, medium strong to strong (R3 to R4), laminated bedding, irregular discontinuous contact at high angle, and healed 198.8-200.3' - yellowish gray, (5Y 7/2), very fine grained, moderate to strong HCl reaction, medium strong (R3), highly fossiliferous (casts/molds), 20% voids related to fossil molds and casts **No Recovery 200.3-201.0'** **Limestone** 201.0-204.8' - yellowish gray to dusky yellowish, (5Y 8/1 to 5Y 6/4), very fine grained, weak to medium strong (R2 to R3), voids <1/16" on 15% of surface and cavities to 1/2" on 15% of surface, organics up to 10% of surface except 201.7-201.9' and 204.25-204.4' which have 50% and 30% laminar organics, fossiliferous **No Recovery 204.8-206.0'** **Limestone** 206.0-209.9' - light gray from 206.0-208.1' to dusky yellow below, (N7 to 5Y 6/4), very fine grained, medium strong (R3), trace voids to <1/16" except from 208.0-209.0' voids on 30-50% of surface, fossiliferous (casts/molds) **No Recovery 209.9-211.0'** **Limestone** 211.0-213.1' - dusky yellow with yellowish gray and light gray, (5Y 6/4 with 5Y 7/2 and N7), very fine grained, weak to medium strong (R2 to R3), voids <1/16" on up to 50% of surface, fossiliferous, with fragments that are poorly fossiliferous with <15% voids to <1/16" 213.1-213.5' - yellowish gray, (5Y 7/2), very fine grained, trace voids <1/16", poorly fossiliferous, organic laminations throughout | N. Jarzyniecki begins logging at 201.0' SC-9 collected at 203.5-204.4' 204.0-205.0' hard drilling Chatter throughout Chatter throughout R41 |
| | R39-NQ 5 ft 76% | 54 | >10 | 201.1-201.2' - Fracture zone, intersecting fractures, open <1/4" | | | |
| | | | 4 | 201.85' - Mechanical break, 10 deg 202.15, 202.65' - Fractures (2), rough, undulating, open to 1/2" | | | |
| | | | 0 | 202.3, 204.65' - Bedding plane, 40 deg, rough, undulating, open to 1/2" 202.95' - Bedding plane, 10 deg, smooth to rough, undulating, open to 1/4" | | | |
| | | | 2 | 204.1' - Mechanical break | | | |
| 205 -162.7 | 206.0 | | NR | 204.8' - Fracture, 70-80 deg, smooth, undulating, open, organic staining | | | |
| | R40-NQ 5 ft 78% | 37 | >10 | 206-206.4, 209.05-209.9' - Fracture zone (2), organic staining, intersecting fractures, open <1/4" | | | |
| | | | 2 | 206.6' - Bedding plane, 30 deg, smooth, undulating, tight 207.55' - Bedding plane, <5 deg, smooth, undulating | | | |
| | | | 1 | 207.8' - Fracture, 40-45 deg, rough, stepped, open to 1/2" | | | |
| | | | >10 | 208.8' - Fracture, 65 deg, rough, undulating, organic staining, open | | | |
| 210 -167.7 | 211.0 | | NR | | | | |
| | R41-NQ 5 ft 60% | 45 | >10 | 211.0-211.5' - Fracture zone, rough, undulating, some organic staining, open to 1/4" | | | |
| | | | 0 | 212.6' - Mechanical break | | | |
| | | | 3 | 213.4, 213.5' - Bedding plane (2), <10 deg, smooth, undulating, open to 1/4" 213.9' - Bedding plane, 10 deg, rough, undulating, organic staining, open to 1/4" | | | |
| 215 -172.7 | 216.0 | | NR | | | | |
| | R42-NQ 5 ft 98% | 73 | 1 | 216.45, 218.6, 218.85, 219.35, 219.45, 219.6, 219.7, 220.75' - Bedding plane (7), 5-10 deg, rough, undulating, open to 1/4" | | | |
| | | | 0 | 217.4' - Bedding plane, 25 deg, rough, undulating, open to 1/4" | | | |
| | | | 3 | | | | |
| | | | 5 | 218.9' - Bedding plane, rough to smooth, planar, organic staining, open to 1/4" | | | |
| 220 -177.7 | | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: A-17 | SHEET 13 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 ORIENTATION : Vertical

WATER LEVELS : 2.5 ft bgs on 4/10/07 START : 4/9/2007 END : 4/18/2007 LOGGER : A. Teal, N. Jarzyniecki, M. Faurote

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | RQD (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | | | 1 | 220.3' - Mechanical break | | 213.5-214.0' - dusky yellow with pale olive, (5Y 6/4 with 10YR 6/2), weak to medium strong (R2 to R3), voids <1/16" on up to 50% of surface, fossiliferous | |
| | 221.0 | | NR | | | | 10:50 chatter at 223.0-224.0' |
| | R43-NQ 5 ft 86% | 48 | 1 | 221.35' - Fracture, 45 deg, rough, undulating, open to 1/8" | | **No Recovery 214.0-216.0'** | |
| | | | >10 | 221.9, 223.4' - Mechanical break<br>222.35-222.5, 222.8-222.9, 224.0-225.3' - Fracture zone (3), rough, undulating, organic staining, open to <1/8" | | **Limestone**<br>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 219.0-219.65' | |
| | | | 1 | 222.7' - Fracture, 85 deg, smooth, undulating, organic staining, open to 1/2" | | | |
| | | | >10 | 223.65' - Bedding plane, <5 deg, smooth, planar, open to 1/8" | | | |
| 225<br>-182.7 | | | >10 | | | | |
| | | | NR | 225.3' - Fracture zone, rough, undulating, organic staining, intersecting fractures, open to <1/8" | | **No Recovery 220.9-221.0'** | |
| | 226.0 | | | | | **Limestone**<br>221.0-222.35' - dusky yellow with yellowish gray infill, (5Y 6/4 with 5Y 7/2), fine grained, voids <1/16" 15-50% of surface, very fossiliferous (casts/ molds) | |
| | | | 2 | 226.55' - Bedding plane or mechanical break, 30 deg, rough, undulating to stepped | | | |
| | | | 3 | 226.95' - Bedding plane, 15 deg, smooth, undulating, open to 1/4" | | | |
| | R44-NQ 5 ft 64% | 48 | >10 | 227.4' - Bedding plane, 15 deg, rough, undulating, open to 1/4"<br>227.8' - Bedding plane, 15 deg, rough, undulating, tight | | 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<br>223.7-225.3' - Same as 216.0-220.9' except weak to medium strong (R2 to R3) | SC-10 collected at 227.9-228.8' |
| | | | >10 | 227.9' - Bedding plane, 15 deg, rough, undulating, open to 1/2" | | | |
| 230<br>-187.7 | | | NR | 228.8' - Fracture zone, intersecting fractures, open to 1/4" | | **No Recovery 225.3-226.0'** | |
| | 231.0 | | | | | **Limestone**<br>226.0-229.2' - Same as 216.0-220.9' | |
| | | | >10 | 231.0-231.3, 232.1-232.4, 232.75-233.3' - Fracture zone (3), rough, undulating, intersecting fractures, open to 1/4" | | **No Recovery 229.2-231.0'** | |
| | | | >10 | 231.5' - Bedding plane, 10 deg, smooth, undulating, open to 1/4" | | **Limestone**<br>231.0-232.1' - Same as 216.0-220.9' except medium strong (R3), laminations from 231.8'-231.9' | |
| | R45-NQ 5 ft 46% | 10 | >10 | 231.55, 231.66' - Fractures (2), 60 deg, smooth, undulating, open to 1/4"<br>231.75' - Mechanical break | | 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 | |
| | | | | 232.5' - Fracture, 60 deg, smooth, undulating, open to 1/4" | | **No Recovery 233.3-236.0'** | |
| 235<br>-192.7 | | | NR | | | | |
| | 236.0 | | | | | | |
| | | | >10 | 236.35-237.9' - Fracture zone, some organic staining, intersecting fractures, open to 1/4" | | **Limestone**<br>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' | |
| | | | >10 | | | | |
| | R46-NQ 5 ft 38% | 0 | | | | | |
| | | | NR | | | **No Recovery 237.9-241.0'** | |
| 240<br>-197.7 | | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: 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

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

WATER LEVELS : 2.5 ft bgs on 4/10/07 START : 4/9/2007 END : 4/18/2007 LOGGER : A. Teal, N. Jarzyniecki, M. Faurote

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 241.0 | | | | | | |
| | R47-NQ 5 ft 80% | 53 | >10 | 241.0-241.65, 244.4-244.75' - Fracture zone (2), open to 1/4", intersecting fractures | | **Limestone** 241.0-241.65' - Same as 236.0-237.9' except no laminations 241.65-243.6' - Same as 216.0-220.9' | |
| | | | 1 | 241.9' 243.9' - Bedding plane or mechanical break (2), 10 deg, rough, undulating, tight 242.4' - Fracture, 60 deg, rough, undulating, tight | | | |
| | | | 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, rough, undulating, open to 1/4" | | 243.6-245.0' - pale olive, (10Y 6/2), very fine grained, weak (R2), poorly fossiliferous | |
| | | | >10 | 243.8' - Bedding plane or mechanical break, 30 deg, rough, undulating, tight | | | |
| 245 -202.7 | | | NR | | | **No Recovery 245.0-246.0'** | |
| | 246.0 | | | | | | |
| | R48-NQ 5 ft 34% | 13 | >10 | 246.0-246.4, 246.5-246.7, 247.6-247.7' - Fracture zone (3), intersecting fractures, open to 1/8" | | **Limestone** 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 bag hole plug |
| | | | 10 | | | | |
| | | | NR | | | **No Recovery 247.7-251.0'** | |
| 250 -207.7 | | | | | | | |
| | 251.0 | | | | | | |
| | | | | | | Bottom of Boring at 251.0 ft bgs on 4/18/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-18 SHEET 1 OF 11 |

# SOIL BORING 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

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 : 2.0 ft bgs on 3/25/07 START : 2/24/2007 END : 3/8/2007 LOGGER : R. Gomez, C. LeBlanc

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.3 | | | | | | | Water level is based on Ground Water Monitoring at LNP site (FSAR Table 2.4.12.08)<br>Soil relogged by J. Schaffer<br>Rock relogged by C. Dougherty<br>Water levels in boring not recorded |
| | 3.5 | | | | | | |
| | | 0.4 | SS-1 | 2-2-1 (3) | **Silty Sand (SM)**<br>3.5-3.9' - grayish orange, (10YR 7/4), wet, very loose, no HCl reaction, fine silica sand, 25% nonplastic fines | | |
| 5 37.3 | 5.0 | | | | | | |
| | 8.5 | | | | | | |
| | | 0.9 | SS-2 | 2-2-3 (5) | **Clayey Sand (SC)**<br>8.5-9.4' - light bluish gray, (5B 7/1), wet, loose, no HCl reaction, fine silica sand, 40% medium plastic fines | | |
| 10 32.3 | 10.0 | | | | | | |
| | 13.5 | | | | | | |
| | | 1.1 | SS-3 | 3-3-5 (8) | **Clayey Sand (SC)**<br>13.5-14.1' - Same as 8.5-9.4'<br>**Poorly Graded Sand (SP)**<br>14.1-14.6' - white to very light gray, (N9 to N8), wet, loose, no HCl reaction, fine silica sand, trace nonplastic fines, trace black minerals | | |
| 15 27.3 | 15.0 | | | | | | |
| | 18.5 | | | | | | |
| | | 0.0 | SS-4 | 0-0-0 (0) | **No Recovery 18.5-20.0'** | | |
| 20 | 20.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-18 SHEET 2 OF 11 |

# SOIL BORING 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

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 : 2.0 ft bgs on 3/25/07 START : 2/24/2007 END : 3/8/2007 LOGGER : R. Gomez, C. LeBlanc

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.3 | | | | | | | |
| | 23.5 | | | | | | |
| | | 1.5 | SS-5 | 0-0-0 (0) | **Fat Clay (CH)** 23.5-24.2' - light to medium light gray, (N7 to N6), wet, very soft, high plasticity, no dilatancy, no HCl reaction | | |
| 25 17.3 | 25.0 | | | | **Sandy Lean Clay (CL)** 24.2-25.0' - very light to light gray, (N8 to N7), wet, very soft, medium plasticity, no to slow dilatancy, no HCl reaction, 41% fine silica sand | | |
| | 28.5 | | | | | | |
| | 28.9 | 0.4 | SS-6 | 50/5 (50/5") | **Silt With Sand (ML)** 28.5-28.9' - grayish orange, (10YR 7/4), moist to wet, hard, nonplastic, very rapid dilatancy, mild to moderate HCl reaction, 20% fine to medium sand, trace organics in laminar lenses, all carbonate | | |
| 30 12.3 | | | | | | | Change from 3-1/2" drag bit to 3-3/8" tricone roller bit at 30.0' |
| | 33.5 | | | | | | |
| | | 1.5 | SS-7 | 17-29-65 (94) | **Sandy Silt (ML)** 33.5-35.0' - Same as 28.5-29.0' except moderate yellowish brown, (10YR 5/4), moist, rapid dilatancy, 25-30% fine to medium sand, all carbonate | | |
| 35 7.3 | 35.0 | | | | | | |
| | 38.5 | | | | | | Grinding at 38.0' |
| | 38.7 | 0.2 | SS-8 | 50/2.5 (50/2.5") | **Limestone Fragments** 38.5-38.7' - moderate to strong HCl reaction, coarse sand to fine gravel, fine grained, <1/16" voids | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
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| 338884.FL | A-18 SHEET 3 OF 11 |

# SOIL BORING 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

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 : 2.0 ft bgs on 3/25/07 START : 2/24/2007 END : 3/8/2007 LOGGER : R. Gomez, C. LeBlanc

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.3 | | | | | | | Moderate grinding |
| | | | | | | | Driller's Remark: Clay, softer |
| | 43.5 | | | | | | |
| | | 0.6 | SS-9 | 7-9-61 (70) | **Silt With Sand (ML)** 43.5-44.1' - medium dark gray, (N4), moist to wet, hard, nonplastic to low plasticity, rapid dilatancy, moderate HCl reaction, 25% fine to medium silica sand, trace organics, all carbonate, organics in SS-9 appear to be grass | | |
| 45 -2.7 | 45.0 | | | | | | Set HW casing to 30.0' |
| | 48.5 | | | | | | |
| | | 1.3 | SS-10 | 14-38-43 (81) | **Silt With Sand (ML)** 48.5-49.0' - Same as 43.5-44.1' **Sandy Silt (ML)** 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 clayey seams, all carbonate | | |
| 50 -7.7 | 50.0 | | | | | | |
| | 53.5 | | | | | | |
| | 53.9 | 0.4 | SS-11 | 50/5 (50/5") | **Sandy Silt (ML)** 53.5-53.85' - Same as 48.5-49.8' except trace organics | | |
| 55 -12.7 | | | | | | | Trip out 3" casing |
| | 58.5 | | | | | | |
| | 58.8 | 0.2 | SS-12 | 50/4 (50/4") | | | |
| 60 | | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: A-18 | SHEET 4 OF 11 |
|---|---|---|

# SOIL BORING 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

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 : 2.0 ft bgs on 3/25/07 START : 2/24/2007 END : 3/8/2007 LOGGER : R. Gomez, C. LeBlanc

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -17.7 | | | | | **Silt With Sand (ML)** 58.5-58.7' - moderate yellowish brown, (10YR 5/4), wet, hard, nonplastic, rapid dilatancy, mild HCl reaction, 15% fine to medium sand, 10% organics in laminar beds | | Circulation loss at 60.0' |
| | 63.5 63.8 | 0.3 | SS-13 | 50/4 (50/4") | **Silt With Sand (ML)** 63.5-63.8' - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to 10YR 4/2), moist, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 24% fine to medium sand, all carbonate | | |
| 65 -22.7 | | | | | | | Driller's Remark: Hard drilling at 65.5' |
| | 68.5 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% coarse sand to fine gravel-sized limestone in lenticular shapes | | |
| 70 -27.7 | | | | | | | |
| | 73.5 73.7 | 0.0 | SS-15 | 50/2 (50/2") | **No Recovery 73.5-73.7'** | | |
| 75 -32.7 | | | | | | | |
| | 78.5 | 1.2 | SS-16 | 53-50-39 (89) | | | |
| 80 | 80.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-18 SHEET 5 OF 11 |

# SOIL BORING 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

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 : 2.0 ft bgs on 3/25/07 START : 2/24/2007 END : 3/8/2007 LOGGER : R. Gomez, C. LeBlanc

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -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 | | | | | | |
| | 85.0 | 1.3 | SS-17 | 15-11-34 (45) | **Silty Sand With Gravel (SM)** 83.5-84.8' - Same as 78.5-79.7' except black organics in laminar beds from 84.6-84.8' | | |
| 85 -42.7 | | | | | | | |
| | 88.5 | | | | | | HW casing set to 30.0', set NW casing to 55.0' |
| | 89.3 | 0.6 | SS-18 | 22-52/4 (74/10") | **Silty Sand With Gravel (SM)** 88.5-89.1' - Same as 83.5-84.8' | | |
| | | | | | Begin Rock Coring at 88.5 ft bgs<br>See the next sheet for the rock core log | | |
| 90 -47.7 | | | | | | | |
| 95 -52.7 | | | | | | | |
| 100 | | | | | | | |

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# 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 ORIENTATION : Vertical

WATER LEVELS : 2.0 ft bgs on 3/25/07 START : 2/24/2007 END : 3/8/2007 LOGGER : R. Gomez, C. LeBlanc

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | RQD (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | 88.5 | | | | | | |
| | R0-NQ 2.5 ft 60% | 47 | 1 | 88.7' - Fracture, horizontal, rough, undulating | | **Limestone** 88.5-90.0' - dusky yellow, (5Y 6/4), fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), 80% coverage of 1/16" voids on surface, few larger 3/16" voids near lower end of run, moderately fossiliferous (casts), lignite disk 1/8" thick, silty matrix when grains broken down | Core run R0-NQ advanced 88.5-91.0' to set 5-feet stroke for remainder of borehole |
| 90 -47.7 | | | 1 | 89.8' - Fracture, horizontal, rough, undulating, break is along plan of 1-3/16" clam shell fossil | | | SC-1 collected at 89.1-89.8' |
| | | | NR | | | | R0: 4 minutes |
| | 91.0 | | | | | | |
| | | | 1 | 91.7' - Fracture, 25 deg, rough, undulating, 3/16" open, semi-tight | | **No Recovery 90.0-91.0'** | 2/25/08 08:00 Begin inserting NQ rods |
| | | | 1 | 92.8' - Fracture, horizontal, smooth, undulating, open | | **Limestone** 91.0-96.0' - Same as 88.7-89.0' except more abundant cavities (up to 9/16") from 93.5-94.5', cavities appear to be fossil molds, some small (1/16"x1/8") fragments of dark organic material from 94.5-96.0' | |
| | R1-NQ 5 ft 100% | 75 | 0 | | | | |
| | | | >10 | 94.0' - Fractures, 30-50 deg, multiple fractures | | | Driller's Remark: Loss of circulation between 94.0-96.0' |
| 95 -52.7 | | | | | | | R1: 14 minutes |
| | | | 2 | 95.4' - Fractures (2), 45 deg, almost perpendicular, one is smooth and undulating with some dark staining, other is rough and undulating with no staining | | | |
| | 96.0 | | | | | | |
| | | | >10 | 96.0-97.3' - Fractures, 0-90 deg, rough, undulating, slightly weathered, 3/16" relief, open | | **Limestone** 96.0-97.3' - yellowish gray with pale olive (20%), (5Y 7/2 with 10 6/2), fine grained, moderate to strong HCl reaction, weak (R2), 50-60% coverage of 1/16" voids on surface, areas with voids mix irregularly with areas without voids, moderately fossiliferous, few voids >1/16" | |
| | | | >10 | | | | |
| | R2-NQ 5 ft 26% | 0 | NR | | | **No Recovery 97.3-101.0'** | |
| 100 -57.7 | | | | | | | R2: 7 minutes |
| | 101.0 | | | | | | |
| | | | >10 | 101.0-102.8' - Fractures, 0-45 deg, rough, undulating, up to 3/16" relief, open, one 2" fragment shows coring marks in two different directions (at 101.9'), fracture at 102.1' is moderately tight and 30% rough and undulating | | **Limestone** 101.0-102.0' - Same as 96.0-97.3' except up to 20% voids, 6-7 gastropod casts up to 3/16" 102.0-102.3' - dusky yellow, (5Y 6/4), fine grained, moderate to strong HCl reaction, weak (R2), 85% coverage of 1/16" voids on surface 102.3-102.8' - light olive gray, (5Y 5/2), fine grained, moderate to strong HCl reaction, 30% coverage of 1/16" voids on surface | |
| | | | >10 | | | | Driller's Remark: Low recovery possibly from losing inner core from broken pieces during drilling actions |
| | R3-NQ 5 ft 36% | 17 | NR | | | | Drilling head appears loose during coring causing an eccentric advancement, breaking up rock |
| 105 -62.7 | | | | | | **No Recovery 102.8-106.0'** | R3: 11 minutes |
| | 106.0 | | | | | | |
| | | | >10 | 106.3-107.0' - Fractures, 0-60 deg, rough, undulating, fragments range from 3/16" to 1-1/2", open | | | |
| | | | 5 | 107.0-107.4' - Fracture, vertical, rough, undulating, tight | | | |
| | R4-NQ | | | | | | |

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# 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 ORIENTATION : Vertical

WATER LEVELS : 2.0 ft bgs on 3/25/07 START : 2/24/2007 END : 3/8/2007 LOGGER : R. Gomez, C. LeBlanc

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 5 ft 100% | 35 | 2 | 107.4, 107.7, 107.8, 107.10' - Fractures (4), 0-20 deg, rough, undulating, open | | **Limestone** 106.0-111.0' - yellowish gray, (5Y 7/2), fine grained, moderate to strong HCl reaction, weak (R2), 90% coverage of 1/16" voids on surface, <5% coverage of 3/16" fossil molds on surface, particularly in top half of section, some very small fragments of organic material below 110.0' | |
| | | | 2 | 108.3' - Fracture, 10 deg, rough, undulating, open up to 3/16" | | | |
| 110 -67.7 | | | 2 | 108.8' - Fracture, 60 deg, rough, undulating, tight | | | R4: 10 minutes |
| | 111.0 | | | 109.2' - Fracture, 45 deg, rough, undulating, open up to 1/16" | | | |
| | R5-NQ 5 ft 100% | 75 | 1 | 109.7' - Fracture, 10 deg, rough, undulating, open | | 111.0-116.0' - Same as 106.0-111.0' except mild to moderate HCl reaction, moderately fossiliferous from 112.0-114.0', 1/16" voids-molds | SC-2 collected at 111.55-112.35' |
| | | | 3 | 110.6' - Fracture, 65 deg, rough, undulating, tight | | | |
| | | | 2 | 110.8' - Fracture, 10 deg, rough, undulating, open to 1/16" | | | |
| | | | 0 | 111.2' - Fracture, 45 deg, smooth, undulating, dark staining on 60% | | | |
| 115 -72.7 | | | 2 | 112.5, 112.7, 112.8' - Fractures (3), 0-45 deg, rough, undulating, open | | | R5: Run time not recorded |
| | 116.0 | | | 113.2, 113.9' - Fractures (2), horizontal, rough, undulating, 3/16" relief, open | | | |
| | R6-NQ 5 ft 100% | 68 | 2 | 113.8' - Mechanical break | | **Limestone** 116.0-118.0' - Same as 111.0-116.0' | |
| | | | 1 | 115.2' - Fracture, horizontal, rough, undulating, open | | | |
| | | | 4 | 115.7' - Mechanical break, rounded ends | | 118.0-121.0' - light olive gray, (5Y 5/2), fine grained, moderate to strong HCl reaction, weak (R2), fine grain, 50-60% coverage of 1/16" voids on surface, few larger voids <1/16", voids are fossil casts | |
| | | | 1 | 116.4' - Fracture, 60 deg, rough, undulating, tight to 1/16" open | | | |
| 120 -77.7 | | | 3 | 116.9' - Fracture, 5 deg, smooth, undulating, open | | | R6: Run time not recorded |
| | 121.0 | | | 117.8' - Fracture or mechanical break, 5 deg, rough, undulating, tight to open 1/16" | | | |
| | R7-NQ 5 ft 40% | 18 | 1 | 118.1, 118.9' - Fractures (2), horizontal, smooth, undulating, dark staining, open | | **Limestone** 121.0-121.9' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, <30% coverage of <1/16" voids on surface, poorly fossiliferous 121.9-122.5' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, very weak to weak (R1 to R2), 85% coverage of <1/16" voids on surface, remainder is larger 3/8" cavities, moderately fossiliferous, grades into below 122.5-123.0' - light olive gray, (5Y 5/2), fine grained, mild to moderate HCl reaction, weak (R2), 90% coverage of 1/16" voids on surface, moderately fossiliferous **No Recovery 123.0-126.0'** | SC-3 collected at 121.0-121.9' From 122.0-125.0' coring increased with loss of circulation, possibly a void or unconsolidated sands Lack of recovery may have occurred from 122.0-125.0' based upon a drop in the drilling head that stopped at 125.0' followed by hard drilling Core barrel having trouble pulling out of casing Inner/outer core barrels lodged in borehole R7: Run time not recorded |
| | | | >10 | 118.3, 118.5' - Fractures or mechanical break (2), 10 deg and 20 deg, rough, undulating, tight | | | |
| | | | | 119.7' - Fracture or mechanical break, 10 deg, rough, undulating, tight to open 1/16" | | | |
| | | | | 120.1-120.4' - Fractures, 0-45 deg, dark staining at 120.4', open | | | |
| | | | | 121.9' - Fracture, horizontal, rough, undulating, rounded surface, open | | | |
| | | | | 122.0-122.4' - Fractures, 0-90 deg, rough, undulating, open | | | |
| 125 -82.7 | | | NR | 122.7' - Fracture or mechanical break, 20 deg, rough, undulating, open to 1/16" | | | |
| | 126.0 | | | | | | |
| | R8-NQ | | 4 | 126.3-126.5' - Fractures, 0-45 deg, open, fragments up to 1-1/2" | | | |
| | | | 1 | 126.6' - Fracture, horizontal, rough, undulating, relief 3/16" open | | | |
| | | | >10 | | | | |

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# 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 ORIENTATION : Vertical

WATER LEVELS : 2.0 ft bgs on 3/25/07 START : 2/24/2007 END : 3/8/2007 LOGGER : R. Gomez, C. LeBlanc

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 5 ft 66% | 40 | NR | 126.9' - Fracture or mechanical break, horizontal, rough, undulating, tight to 1/16" open | | **Limestone** 126.0-126.9' - light olive gray, (5Y 5/2), mild to moderate HCl reaction, weak (R2), 75% coverage of 1/16" voids on surface, <5% coverage of larger voids (up to 3/16") on surface, moderately fossiliferous | After substantial downtime due to casing/core barrel lock, the borehole has been reamed inside HW casing with 3-7/8" tricone bit to 126.0', HW casing spun to 126.0' (NQ is at 126.0' also) |
| | | | 2 | 127.9' - Fracture, horizontal, rough, undulating, open to 3/8" | | | |
| 130 -87.7 | | | NR | 128.1-128.5' - Fracture zone, 0-90 deg, open, fragments up to 1-1/2" | | | |
| | 131.0 | | | | | | |
| | | | 0 | 129.1' - Fracture, horizontal, rough, undulating, open, thin layer of carbonate derived silt face | | 126.9-128.5' - dusky yellow, (5Y 6/4), moderate to strong HCl reaction, very weak to weak (R1 to R2), 90% coverage of 1/16" voids on surface, poorly fossiliferous | C. LeBlanc begins logging |
| | | | NR | | | | Driller's Remark: Soft drilling at 128.5' |
| | | | >10 | 129.8' - Fracture, horizontal, rough, undulating, open | | | |
| | | | >10 | 131.2-131.7' - Fracture zone, 0-70 deg, rough, undulating, open | | **No Recovery 128.5-129.1'** | Driller's Remark: Soft drilling below 130.0' |
| | R9-NQ 5 ft 53% | 40 | NR | 132.1' - Mechanical break | | **Limestone** 129.1-129.8' - light olive gray, (5Y 5/2), moderate HCl reaction, weak (R2), 85% coverage of 1/16" voids on surface, few larger (up to 1/8") at 129.1-129.3' | R8: 9 minutes |
| | | | >10 | 132.7' - Fracture, 60 deg, rough, undulating | | | No recovery intervals at 131.2-131.5' and 132.7-133.6' based on drilling rate |
| | | | 0 | 133.6' - Fracture, horizontal, smooth, undulating, open, film of carbonate derived silt infill | | | |
| 135 -92.7 | | | NR | 133.9' - Mechanical break | | **No Recovery 129.8-131.0'** | Driller's Remark: Soft drilling |
| | 136.0 | | | | | **Limestone** 131.0-131.2' - dusky yellow, (5Y 6/4), moderate HCl reaction, very weak to weak (R1 to R2), 90% coverage of 1/16" voids on surface | Driller's Remark: Soft drilling |
| | | | 3 | 136.2, 136.5, 136.6' - Fractures (3), horizontal, rough, undulating, open | | | R9: 7 minutes |
| | | | NR | | | **No Recovery 131.2-131.5'** | |
| | | | 2 | 137.4' - Fracture, horizontal, smooth, planar to stepped, open | | **Limestone** 131.5-132.7' - Same as 131.0-131.2' | |
| | R10-NQ 5 ft 30% | 10 | 3 | 137.9' - Fracture, 5 deg, rough, undulating, dark staining, open up to 1/16" | | **No Recovery 132.7-133.6'** | |
| | | | | 138' - Fracture, 45 deg, smooth, undulating, dark staining, open up to 3/16" | | **Limestone** 133.6-134.7' - Same as 131.0-131.2' except with fossil molds and casts up to 3/8" over <5% of surface | |
| | | | NR | 138.1, 138.9' - Fractures (2), horizontal, rough, undulating, open | | **No Recovery 134.7-136.0'** | |
| 140 -97.7 | | | | | | **Limestone** 136.0-136.6' - Same as 131.0-131.2' except more abundant larger voids (1/16"-3/16"), moderately fossiliferous | R10: 6 minutes |
| | 141.0 | | | | | | |
| | | | >10 | 141.0-141.8' - Fracture zone, 0-75 deg, black staining on some surfaces, open | | **No Recovery 136.6-137.4'** | |
| | | | 0 | | | **Limestone** 137.4-138.2' - yellowish gray and light olive gray, (5Y 7/2 and 5Y 5/2), moderate to strong HCl reaction, medium strong to strong (R3 to R4), laminated layers, laminations are at angle of 10 deg, some have 1/16" voids, otherwise small voids are limited to a few small areas, few fossil molds | |
| | R11-NQ 5 ft 30% | 13 | NR | | | | |
| 145 -102.7 | | | | | | **No Recovery 138.2-141.0'** | R11: 3 minutes |
| | 146.0 | | | | | **Limestone** 141.0-141.2' - Same as 138.9-139.0' 141.2-141.8' - dusky yellow, (5Y 6/4), moderate to strong HCl reaction, weak (R2), 85% coverage of 1/16" voids on surface | |
| | | | >10 | 146.0-146.9' - Fracture zone, 0-60 deg, rough, undulating | | | |
| | | | 3 | 147.2, 147.4, 147.8' - Fractures (3), horizontal, rough, undulating, black staining, open, faces don't match | | | |
| | R12-NQ | | | | | | |

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# 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 ORIENTATION : Vertical

WATER LEVELS : 2.0 ft bgs on 3/25/07 START : 2/24/2007 END : 3/8/2007 LOGGER : R. Gomez, C. LeBlanc

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 5 ft 66% | 18 | 3 | 148.2' - Fracture or mechanical break, 25 deg, rough, undulating, tight to open 3/16" | | 141.8-142.5' - yellowish gray, (5Y 7/2), moderate HCl reaction, weak (R2), 80% coverage of 1/16" voids on surface, fossil molds (3/16") from 141.8-142.1', layer without voids from 142.3-142.5' | |
| | | | 0 | 148.3' - Fracture, 25 deg, smooth, undulating, open | | | |
| 150 -107.7 | | | NR | 148.6' - Fracture or mechanical break, 45 deg, rough, undulating, tight to 3/8" open | | **No Recovery 142.5-146.0'** | R12: 13 minutes |
| | 151.0 | | | | | **Limestone** | |
| | R13-NQ 5 ft 82% | 71 | 1 | 151.8' - Fracture, 10 deg, rough, undulating, open | | 146.0-146.9' - yellowish gray, (5Y 7/2), fine grained, moderate to strong HCl reaction, weak (R2), 75% coverage of <1/16" voids on surface, larger voids (up to 9/16") over 10% of surface | |
| | | | 2 | 152.1' - Fracture or mechanical break, 10 deg, rough, planar, tight to open up to 3/16" | | | |
| | | | 1 | 152.8' - Fracture, horizontal, rough, undulating, open up to 3/16" | | 146.9-149.3' - light olive gray, (5Y 5/2), mild to moderate HCl reaction, medium strong (R3), <5% coverage of 1/16" voids on surface, most being below 148.5', few larger <3/16" voids (fossil molds) below 148.5' | |
| | | | 2 | 153.3' - Fracture, horizontal, rough, undulating, dark staining on lower face, open<br>154.1' - Mechanical break | | | |
| 155 -112.7 | | | 0 | 154.6' - Fracture, horizontal, rough, undulating, open to 3/16" | | **No Recovery 149.3-151.0'** | R13: 12 minutes |
| | 156.0 | | NR | | | **Limestone** | |
| | R14-NQ 5 ft 90% | 50 | 2 | 156.75, 156.85' - Fractures (2), horizontal, rough, undulating, open | | 151.0-155.1' - dusky yellow to light olive gray, (5Y 6/4 to 5Y 5/2), fine grained, moderate HCl reaction, weak (R2), 90% coverage of 1/16" voids on surface to 154.2', then only over 40% of surface, cavities (fossil molds) up to 3/8" up to 5% of surface throughout interval | |
| | | | >10 | 157.2-157.9' - Fracture zone, horizontal, rough, undulating, every 0.05-0.1' is a fracture, open to 3/16", rock fragments from 157.6-157.8' | | | |
| | | | 4 | 158.2, 158.7, 158.9, 159.1' - Fractures (4), horizontal, rough, undulating, olive brown staining on face at 158.7', open, faces do not match | | **No Recovery 155.1-156.0'** | |
| | | | 3 | | | **Limestone** | |
| 160 -117.7 | | | 1 | 159.2, 159.9, 160.0' - Fractures (3), horizontal, rough, undulating, rounded at 159.2', faces match poorly | | 156.0-158.1' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, weak (R2), 60% coverage of 1/16" voids on surface, most are present from 156.5-157.0' and 157.4-158.1' | R14: 14 minutes |
| | 161.0 | | NR | | | | |
| | R15-NQ 5 ft 46% | 28 | 0 | | | 158.1-158.9' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, weak (R2), laminated with dusky yellow 5Y 6/4, laminations are irregular and uneven, <1/16" voids present along laminations | |
| | | | 4 | 162.0, 162.3' - Fractures (2), horizontal and 10 deg, undulating, black staining on lower face at 162.0', rough at 162.3', smooth at 162.6', faces poorly match | | | |
| | | | 4 | | | 158.9-160.5' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, weak (R2), <1/16" voids, few fossil molds (up to 3/16") | |
| | | | NR | 162.7' - Fracture, 5 deg, planar, coarse grained bedding plane<br>163.0' - Fracture, horizontal, rough, planar, open | | **No Recovery 160.5-161.0'** | |
| 165 -122.7 | | | | 163.0-163.3' - Fractures, horizontal, rough, dark staining on upper face at 163.2', planar to undulating, faces match poorly | | **Limestone** | |
| | 166.0 | | | 163.7' - Fracture or mechanical break, horizontal, rough, undulating, tight to 3/16" open | | 161.0-162.0' - Same as 158.9-160.5' except 20% coverage of <1/16" voids on surface, larger voids (3/16"), fossil molds also visible | R15: 5 minutes |
| | | | 3 | 166.1, 166.4, 166.8' - Fractures (3), horizontal, rough, undulating, faces match poorly, open up to 3/8" | | 162.0-163.3' - dusky yellow, (5Y 6/4), fine grained, moderate to strong HCl reaction, weak (R2), 95% coverage of <1/16" voids on surface, cavities (up to 3/16") on remaining 5% | |
| | | | >10 | | | **No Recovery 163.3-166.0'** | |
| | R16-NQ | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-18 SHEET 10 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 ORIENTATION : Vertical

WATER LEVELS : 2.0 ft bgs on 3/25/07 START : 2/24/2007 END : 3/8/2007 LOGGER : R. Gomez, C. LeBlanc

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 5 ft 62% | 23 | 2 | 167.0-167.6' - Fracture zone, 0-90 deg, black staining on vertical faces, fragments from 3/16" to 3-1/2", faces match poorly | | **Limestone** 166.0-169.1' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, medium strong (R3), 10% coverage of 1/16" voids on surface, few larger (up to 3/16") voids and fossil molds, except from about 166.9-167.4', zone from 167.5-167.9' has no voids but is laminated with darker zone from 167.7-167.9', brass colored to dark colored staining on broken surface across darker zone | R16: 18 minutes |
| | | | 0 | 167.9' - Fracture zone, horizontal, rough, undulating, open to 3/16" | | | |
| 170 -127.7 | | | NR | 168.3' - Fracture, horizontal, rough, undulating, open | | | |
| | 171.0 | | | 168.5' - Fracture, horizontal, rough, undulating on upper face, smooth and planar on lower, open, some 3/8" fragments | | | |
| | | | 3 | 169.0' - Mechanical break | | | |
| | | | 3 | 171.1, 171.2' - Fractures (2), horizontal, smooth, planar, open up to 3/16" | | | SC-4 collected at 171.2-173.0' |
| | R17-NQ 5 ft 88% | 34 | 2 | 172.0' - Fracture or mechanical break, 45 deg, rough, undulating | | **No Recovery 169.1-171.0'** **Limestone** 171.0-172.0' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, medium strong (R3), some <3/16" fossil molds | |
| | | | | 172.2' - Fracture or mechanical break, horizontal, rough, undulating, open up to 3/8" | | | |
| | | | 5 | 172.3-172.7' - Mechanical break or fractures, 0-65 deg, open to 3/16" | | 172.0-173.5' - yellowish gray, (5Y 7/2), moderate HCl reaction, weak to medium strong (R2 to R3), 50% coverage of 1/16" voids on surface, larger (up to 3/8") voids up to 5%, moderately fossiliferous | |
| 175 -132.7 | | | 1 | 173.4, 173.6' - Fractures (2), horizontal, smooth, planar, open to 3/16" | | | R17: 16 minutes |
| | 176.0 | | NR | 174.1, 174.2, 174.3' - Fractures (3), 0-5 deg, smooth, planar, open up to 3/16" | | 173.5-175.4' - Same as 171.0-172.0' **No Recovery 175.4-176.0'** **Limestone** 176.0-180.7' - Same as 172.0-173.5' except fewer large voids and fossil molds, poorly fossiliferous | |
| | | | 3 | 174.6' - Fracture or mechanical break, horizontal, rough, undulating, open up to 1/16" | | | |
| | | | 8 | 174.8, 175.1' - Fractures (2), horizontal, rough, undulating on upper face and planar on lower face | | | |
| | R18-NQ 5 ft 94% | 46 | 2 | 176.4, 176.6' - Fractures (2), horizontal, rough, undulating, open to 3/16" | | | |
| | | | | 176.7' - Fracture, horizontal, smooth, planar, open to 1/16" | | | |
| | | | 5 | 177.1, 177.15, 177.2, 177.4, 177.7, 177.75, 177.8, 177.9' - Fractures (8), horizontal, smooth, planar to slighty undulating, open 1/16" to 3/16" | | | |
| 180 -137.7 | | | 2 | | | | R18: 19 minutes |
| | 181.0 | | NR | 178.3' - Fracture, horizontal, rough, undulating, open, fragments up to 1/2" | | **No Recovery 180.7-181.0'** **Limestone** 181.0-182.0' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), few voids <1/16", voids are present in thin bands about 20-50 deg from horizontal, few larger voids 182.0-183.7' - Same as 176.0-180.7' **No Recovery 183.7-186.0'** | |
| | | | >10 | 178.9-179.4' - Fractures (4), 0-45 deg, rough, undulating, open, fragments up to 1" | | | |
| | | | 0 | 179.8, 179.9' - Fractures (2), horizontal, rough, undulating, open to 3/16" | | | |
| | | | | 180.3' - Fracture, horizontal, smooth, planar to stepped, open to 3/16" | | | |
| | R19-NQ 5 ft 54% | 18 | >10 | 180.4' - Fracture, horizontal, rough, undulating, open, rounded faces | | | |
| | | | NR | 181.0-182.0' - Fracture zone, 0-90 deg, rough, undulating, some slight dark staining at 181.6' | | | |
| 185 -142.7 | | | | 182.0-183.0' - Mechanical break | | | R19: 15 minutes |
| | 186.0 | | | 183.0-183.7' - Fracture zone, 0-90 deg, rough, undulating, fragments up to 1-1/2" | | | |
| | | | 3 | 186.0-186.4' - Fractures, horizontal, multiple 1" fragments, open | | **Limestone** 186.0-186.5' - dusky yellow, (5Y 6/4), fine grained, moderate HCl reaction, weak (R2), 90% coverage of <1/16" voids on surface, few cavities (up to 9/16") | |
| | | | 1 | | | | |
| | R20-NQ 4.5 ft | 37 | | 187.8' - Fracture, horizontal, smooth, planar, open to 1/16" | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: 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

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

WATER LEVELS : 2.0 ft bgs on 3/25/07 START : 2/24/2007 END : 3/8/2007 LOGGER : R. Gomez, C. LeBlanc

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 69% | | >10 | 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 | |
| | | | >10 | | | | |
| 190 -147.7 | | | NR | | | | R20: 14 minutes |
| | 190.5 | | | | | **No Recovery 189.1-190.5'** | R21: 52 minutes |
| | | | 3 | 190.7, 190.9, 191.5' - Fractures (3), horizontal, rough, undulating, black staining on face at 190.9', open up to 3/8" | | **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' | 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' |
| | | | 3 | 191.7, 192.5' - Fractures (2), horizontal, rough, undulating, open to 3/16" | | | |
| | R21-NQ 5 ft 76% | 17 | >10 | 191.9' - Fracture, 45 deg, rough, undulating, open | | | |
| | | | >10 | 192.7-194.3' - Fracture zone, 0-45 deg, rough, undulating, open, fragments up to 2" long | | | |
| 195 -152.7 | | | NR | | | **No Recovery 194.3-195.5'** | |
| | 195.5 | | | | | **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 | |
| | | | 5 | 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" | | | |
| | | | 2 | 196.9' - Fracture or mechanical break, rough, undulating, open 3/8" | | | |
| | R22-NQ 5 ft 80% | 20 | >10 | 197.4-197.6' - Fractures, open, fragments up to 1" | | 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 | |
| | | | >10 | 197.8-199.5' - Fracture zone, rough, undulating, numerous fragments, up to 1-1/2" | | | |
| 200 -157.7 | | | NR | | | **No Recovery 199.5-200.5'** | R22: 17 minutes |
| | 200.5 | | | | | Bottom of Boring at 200.5 ft bgs on 3/8/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-18A SHEET 1 OF 6 |

# SOIL BORING 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

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 : 2.0 ft bgs on 3/25/07 START : 6/14/2007 END : 6/15/2007 LOGGER : D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.1 | | | | | | | 06/14/07 Drill 10.0' pilot hole, install 10.0' of SW (6") casing<br>Blind drill to 25.0'<br><br>Water level obtained from boring A-18 |
| 5<br>37.1 | | | | | | | |
| 10<br>32.1 | | | | | | | |
| 15<br>27.1 | | | | | | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-18A SHEET 2 OF 6 |

# SOIL BORING 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

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 : 2.0 ft bgs on 3/25/07 START : 6/14/2007 END : 6/15/2007 LOGGER : D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.1 | | | | | | | |
| 25 | 25.0 | | | | | | |
| 17.1 | | 1.3 | SS-1 | 20-24-23 (47) | **Fat Clay With Sand (CH)** 25.0-25.05' - light bluish gray, (5B 7/1), wet, very stiff, high plasticity, no dilatancy, no HCl reaction, 15% very fine to fine silica sand, (slough) | | |
| | 26.5 | | | | **Silty Sand (SM)** 25.05-26.35' - yellowish gray, (5Y 8/1), wet, dense, fine to coarse grained sand-sized, moderate HCl reaction, 24% nonplastic fines, all carbonate | | 06/15/07 Install 5' more of SW casing<br>Begin split spoon sampling at 25.0'<br>09:00 Pull out split spoon 25.0-26.5' |
| 30 | 30.0 | | | | | | |
| 12.1 | | 0.5 | SS-2 | 50/5.5 (50/5.5") | **Silty Sand (SM)** 30.0-30.5' - Same as 25.05-26.35' except grayish orange, (10YR 7/4) | | 09:15 Pull out 30.0-31.5' interval SPT; decide to start rock coring |
| | | | | | Begin Rock Coring at 30.5 ft bgs<br>See the next sheet for the rock core log | | |
| 35<br>7.1 | | | | | | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
| 338884.FL | 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

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

WATER LEVELS : 2.0 ft bgs on 3/25/07 START : 6/14/2007 END : 6/15/2007 LOGGER : D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (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 |
| | R1-NQ 5 ft 0% | 0 | NR | | | | Driller's Remark: Sand layer that washed out (30.5-35.5') - felt resistance during drilling |
| 35 7.1 | 35.5 | | | | | | R1: 4 minutes |
| | R2-NQ 5 ft 80% | 60 | 2 | 36.2' - Fracture (2), 60 deg and 70 deg, rough, undulating, open (1/8"), intersecting | | **Limestone** 35.5-39.5' - pale olive, (10Y 6/2), very fine to fine grained, moderate to strong HCl reaction, very weak (R1), 15% surface voids (<1/16") 35.5-38.5', 40% surface voids from 38.5-38.5', many cavities up to 3/16"x9/16", many fossil molds with minor silt infill, sporadic black (organic) material up to 3/16", trace (few) fossil casts | |
| | | | >10 | 37.12-37.45' - Fracture zone | | | SC-1 collected at 37.45-38.55' |
| | | | 0 | | | | |
| | | | >10 | 38.55-38.75' - Fracture zone 38.95' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | | |
| 40 2.1 | 40.5 | | NR | | | **No Recovery 39.5-40.5'** | R2: 8 minutes |
| | R3-NQ 5 ft 48% | 31 | 0 | | | **Limestone** 40.5-42.9' - yellowish gray, (5Y 7/2), fine to medium grained, strong HCl reaction, weak (R2), extremely weak 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 diameter, few fossil molds and casts, moderately fossiliferous, 42.2-42.9' 5% surface voids and 1/16" infill into void space, few fossil molds **No Recovery 42.9-45.5'** | |
| | | | >10 | 41.65' - Bedding plane or mechanical break, 5 deg, rough, undulating, open (1/8") 42.1-42.53' - Fracture zone | | | Core run times not recorded beyond run R2-NQ |
| | | | 2 | 42.67' - Fracture, horizontal, rough, stepped, open (1/2"), intersecting | | | |
| | | | NR | | | | |
| 45 -2.9 | 45.5 | | | | | | |
| | R4-NQ 5 ft 98% | 63 | 2 | | | **Limestone** 45.5-50.4' - yellowish gray, (5Y 7/2), strong HCl reaction, extremely weak (R0), 25-40% surface voids (<1/16") variable over core, void infill, many cavities up to 3/16"x3/8", many black (organic) oblong and spherical fossils up to 3/16" in diameter, horizontal black laminations from 47.4-47.8' varying in size up to 3/16" thick, fine grained with local medium grained accumulations | |
| | | | 2 | 46.4, 45.9, 46.95, 47.5, 48.3, 48.5, 49.1, 49.45, 50.15' - Mechanical break, <5 deg, rough, planar, silt infilling, tight | | | |
| | | | 2 | | | | |
| | | | 3 | | | | |
| 50 -7.9 | 50.5 | | 1 | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
| 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

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

WATER LEVELS : 2.0 ft bgs on 3/25/07 START : 6/14/2007 END : 6/15/2007 LOGGER : D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | NR | | | **No Recovery 50.4-50.5'** | |
| | | | 0 | | | **Limestone** | |
| | | | 2 | 51.5, 53.8' - Mechanical break, 60 deg, tight<br>51.85' - Mechanical break, 50 deg, tight | | 50.5-55.3' - pale yellowish brown, (10YR 4/2), moderate HCl reaction, extremely weak (R0), small surface voids (<1/16") 15-25% variable over core length, many cavities up to 9/16"x3/16", trace black elongate shaped material (organics) up to 9/16"x1/16", trace black lineations from 51.65-51.85', fine grained with local medium grained accumulations | |
| | R5-NQ<br>5 ft<br>96% | 73 | 3 | 52.85, 53.85, 53.95, 54.5' - Mechanical break, horizontal, tight | | | |
| | | | 3 | | | | |
| 55<br>-12.9 | | | 1 | | | | |
| | 55.5 | | NR | | | **No Recovery 55.3-55.5'** | |
| | | | 3 | 55.75, 55.9, 56.15, 56.63, 57.02, 57.4, 57.9, 58.4, 59.08' - Mechanical break, <10 deg, rough, planar, tight | | **Limestone**<br>55.5-60.5' - Same as 50.5-55.3' except 5-15% surface voids (<1/16"), many black lineations throughout, few cavities up to 1/8" diameter | |
| | | | 3 | | | | |
| | R6-NQ<br>5 ft<br>100% | 82 | 3 | 57.6' - Mechanical break, 50 deg, rough, planar, tight | | | |
| | | | 1 | | | | |
| 60<br>-17.9 | | | 0 | | | | |
| | 60.5 | | | | | **Limestone**<br>60.5-61.1' - pale yellowish brown, (10YR 4/2), moderate HCl reaction, weak (R2), hard, moderate density, fossiliferous, small voids and fossil molds (1/16"-1/8") over 10-15% of surface<br>**Limestone**<br>61.1-65.5' - pale yellowish brown, (10YR 4/2), moderate HCl reaction, extremely weak to weak (R0 to R2), hard, localized zones of small voids (1/16"-1/8") up to 15% of surface, very sparse black organic inclusions | |
| | | | 3 | 61.0' - Bedding plane or mechanical break, horizontal, rough, undulating, tight<br>61.1' - Mechanical break, 40 deg, rough, undulating, tight<br>61.5, 61.9, 62.46, 63.05, 64.0, 64.6, 65.23' - Mechanical break, <10 deg, rough, planar to undulating, tight | | | |
| | | | 2 | | | | |
| | R7-NQ<br>5 ft<br>100% | 88 | 2 | | | | |
| | | | 2 | | | | |
| 65<br>-22.9 | | | 1 | | | | |
| | 65.5 | | | | | **Limestone**<br>65.5-70.5' - moderate yellowish brown, (10YR 5/4), moderate to strong HCl reaction, extremely weak to very weak (R0 to R1), some of the rock from 68.0-70.5' poorly fossiliferous, up to 3/16" thick, sparse very thin (<1/16" thick) lineations, few cavities up to 1/16"x1/8", few black blebs up to 3/16" diameter, mostly fine grained | |
| | | | 1 | | | | |
| | | | 3 | 66.5' - Fracture (2), 50 deg, rough, stepped, tight, intersecting<br>66.9, 67.13, 67.8, 69.13, 70.2' - Bedding plane or mechanical break, <5 deg, rough, planar to undulating, tight to open (up to 1/4") | | | |
| | R8-NQ<br>5 ft<br>100% | 86 | 1 | | | | |
| | | | 1 | | | | SC-2 collected at 69.12-70.23' |
| 70<br>-27.9 | | | 2 | | | | |
| | 70.5 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-18A 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

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

WATER LEVELS : 2.0 ft bgs on 3/25/07 START : 6/14/2007 END : 6/15/2007 LOGGER : D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R9-NQ 5 ft 85% | 52 | 2 | 70.25' - Fracture, 70 deg, rough, planar | | **Limestone** 70.5-74.75' - moderate yellowish brown, (10YR 5/4), strong HCl reaction, weak (R2), 25% surface voids (<1/16") from 70.5-73.0', 50% surface voids (<1/16") from 73.0-74.75', many cavities up to 3/8", very fossiliferous, many molds, casts, trace black (organics) lineations | 11:40 20.0' More HW casing put in to 50.0' |
| | | | 2 | 71.1, 72.15, 72.25' - Fracture, 50 deg, smooth, undulating, open (up to 1/4") 71.2' - Bedding plane, horizontal, rough, planar, black staining, open (1/8" ) | | | |
| | | | 3 | 72.6' - Fracture (2), 60 deg and 5 deg, rough, undulating, tight, intersecting 73.03' - Mechanical break or bedding plane, rough, planar, tight to open (1/16") | | | |
| | | | 6 | 73.9, 74.0, 74.15, 74.3, 74.5, 74.6' - Bedding plane, <10 deg, rough, undulating to stepped, open (up to 3/4") | | | |
| | | | >10 | | | | |
| 75 -32.9 | | | NR | 74.6-74.75' - Fracture zone | | **No Recovery 74.75-75.5'** | |
| | 75.5 | | | | | | |
| | R10-NQ 5 ft 67% | 33 | 2 | 75.5-75.6' - part of core is fractured 75.9, 76.6' - Fracture (2), 50 deg, rough, planar, open (up to 3/4") | | **Limestone** 75.5-78.85' - Same as 70.5-74.75' except extremely weak (R0), black organic material up to 1"x1/8" | |
| | | | >10 | 76.95-77.3' - Fracture zone | | | |
| | | | 5 | 78.05, 78.2, 78.3' - Bedding plane or mechanical break, horizontal, smooth, undulating, tight to open (1/16") 78.45' - 20 deg and 70 deg, rough, undulating, tight to open (1/8"), intersecting | | | |
| | | | NR | | | **No Recovery 78.85-80.5'** | |
| 80 -37.9 | | | | | | | |
| | 80.5 | | | | | | |
| | R11-NQ 5 ft 8% | 0 | >10 | 80.5-80.9' - Fracture zone | | **Limestone** 80.5-80.9' - Same as 75.5-78.85' except pale olive, (10Y 6/2) **No Recovery 80.9-85.5'** | |
| | | | NR | | | | |
| 85 -42.9 | | | | | | | |
| | 85.5 | | | | | | |
| | R12-NQ 5 ft 52% | 43 | 1 | 86.15' - Mechanical break or bedding plane, 30 deg, rough, undulating, tight | | **Limestone** 85.5-88.1' - light olive gray to dusky yellow, (5Y 5/2 to 5Y 6/4), strong HCl reaction, weak (R2), 87.7-88.1' extremely weak rock (R0), 40-50% surface voids (<1/16") many cavities up to 3/8"x3/16", highly fossiliferous, many (>5) molds, few casts, minor recrystallization **No Recovery 88.1-90.5'** | |
| | | | 1 | 86.9' - Mechanical break or bedding plane, horizontal, rough, undulating, tight | | | SC-3 collected at 86.9-87.72' |
| | | | >10 | 87.72-88.1' - Fracture zone | | | |
| | | | NR | | | | |
| 90 -47.9 | | | | | | | |
| | 90.5 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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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

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

WATER LEVELS : 2.0 ft bgs on 3/25/07 START : 6/14/2007 END : 6/15/2007 LOGGER : D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R13-NQ 5 ft 90% | 57 | >10 | 90.78' - Mechanical break or bedding plane, horizontal, rough, stepped, tight | | **Limestone** 90.5-95.0' - Same as 85.5-88.1' except very fossiliferous with many cavities up to 1-3/4"x1-3/16", minor silt infill, secondary carbonate crystals within cavities and voids space present, minor black staining in some cavities | |
| | | | >10 | 91.3-92.4' - Fracture, 85 deg, rough, undulating, fragments along fracture plane | | | |
| | | | 4 | 91.3, 91.8' - Bedding plane or mechanical break, 35 deg, rough, stepped, tight<br>91.9' - Fracture, smooth, stepped, missing part of fracture | | | |
| | | | 2 | 92.6, 92.7, 93.4, 94.25' - Bedding plane, <25 deg, rough, stepped, fragments in fractures, open (up to 1") | | | |
| 95<br>-52.9 | | | 0 | 93.8' - Bedding plane or mechanical break, 30 deg, rough, undulating, tight | | | |
| | 95.5 | | NR | | | **No Recovery 95.0-95.5'** | |
| | R14-NQ 5 ft 37% | 32 | 1 | 95.95' - Bedding plane or mechanical break, 10 deg, smooth, undulating, tight | | **Limestone** 95.5-97.35' - Same as 85.5-88.1' except 15-25% surface voids (<1/16") | |
| | | | 1 | 96.6' - Bedding plane, smooth, undulating, open (3/4-2"), fragments in fracture, also 50 degree fracture smooth, undulating, black staining | | | |
| | | | NR | | | **No Recovery 97.35-100.5'** | |
| 100<br>-57.9 | 100.5 | | | | | | 6/15/07 15:30, Total depth of boring 100.5' |
| | | | | | | Bottom of Boring at 100.5 ft bgs on 6/15/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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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 bgs on 3/23/07 START : 3/23/2007 END : 3/26/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 43.1 | 0.0 | 1.5 | SS-1 | 3-3-3-3 (6) | **Poorly Graded Sand With Silt And Gravel (SP-SM)** 0.0-0.5' - grayish yellow, (5Y 8/4), dry, loose, fine to coarse grained sand and gravel, 11% fines, limestone road base | | |
| | 2.0 | 1.2 | SS-2 | 2-4-4-6 (8) | **Poorly Graded Sand (SP)** 0.5-1.5' - dusky brown to pale yellowish brown, (5YR 2/2 to 10YR 6/2), moist, loose, fine grained, trace nonplastic fines, up to 25% organics, wood fragments 0.5-0.8' **Silty Sand (SM)** 2.0-2.5' - grayish brown, (5YR 5/2), wet, loose, fine grained, 20% nonplastic fines, fines may be organics | | Water level at 2.0' below ground surface |
| 5 38.1 | 4.0 | 1.4 | SS-3 | 3-3-4-4 (7) | **Poorly Graded Sand With Silt (SP-SM)** 2.5-3.2' - grayish orange, (10YR 5/6), wet, loose, fine grained, 5-10% nonplastic fines **Silty Sand (SM)** 4.0-5.4' - light gray, (N8), wet, loose, fine grained, 20-25% low plastic fines, trace fine sand-sized black minerals | | |
| | 6.0 | 1.6 | SS-4 | 2-2-1-0 (3) | **Silty Sand (SM)** 6.0-7.2' - light gray to medium gray, (N7 to N6), wet, very loose, fine grained, 20% low plastic fines | | |
| | 8.0 | 0.9 | SS-5 | 2-3-7-12 (10) | **Lean Clay With Sand (CL)** 7.2-7.6' - medium gray to dark gray, (N4 to N3), wet, soft, low to medium plasticity, slow dilatancy, 15% fine grained sand, 5% wood and organics **Fat Clay With Sand (CH)** 8.0-8.4' - medium gray to dark gray, (N4 to N3), wet, stiff, high plasticity, no dilatancy, 15-20% fine grained sand, 5% wood fragments | | |
| 10 33.1 | 10.0 | 0.9 | SS-6 | 3-47-11-9 (58) | **Silt With Sand (ML)** 8.4-8.9' - grayish orange, (10YR 7/4), wet, stiff, nonplastic, rapid dilatancy, moderate HCl reaction, 18% fine grained sand **Silty Gravel With Sand (GM)** 10.0-10.9' - grayish orange, (10YR 7/4), moist, very dense, moderate to strong HCl reaction, fine to coarse gravel-sized up to 2", 25% fine to coarse grained sand, 15-20% low plastic fines | | |
| | 12.0 | 0.9 | SS-7 | 6-12-8-10 (20) | **Silt With Sand (ML)** 12.0-12.9' - grayish orange, (10YR 7/4), moist to wet, very stiff, nonplastic, rapid dilatancy, moderate HCl reaction, 5-10% fine grained sand, 5% medium to coarse grained sand | | |
| 15 28.1 | 14.0 | 0.7 | SS-8 | 3-8-9-8 (17) | **Limestone And Silt (ML)** 14.0-14.7' - moderate olive brown, (5Y 4/4), moderate HCl reaction, coarse sand to coarse gravel-sized, angular to subrounded limestone fragments, with silt that is grayish yellow (5Y 8/4), wet, very stiff, 10-15% fine grained sand, moderate to strong HCl reaction | | |
| | 16.0 | 1.3 | SS-9 | 9-13-18-30 (31) | **Silt (ML)** 16.0-17.3' - yellowish gray, (5Y 7/2), wet, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 6% fine grained sand | | |
| 20 | 18.0 | 1.4 | SS-10 | 12-18-25-13 (43) | **Limestone Fragments** 18.0-18.2' - moderate to dark yellowish orange, (10YR 5/4 to 10YR 6/6), strong HCl reaction, fine to coarse gravel-sized, angular fragments up to 2" **Silt (ML)** 18.2-19.4' - Same as 16.0-17.3' | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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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 bgs on 3/23/07 START : 3/23/2007 END : 3/26/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 23.1 | 20.0 – 22.0 | 1.4 | SS-11 | 12-19-17-17 (36) | **Silt (ML)** 20.0-21.4' - Same as 16.0-17.3' except 10-15% fine grained sand, trace medium to coarse grained sand | | |
| | 22.0 – 24.0 | 1.7 | SS-12 | 38-43-38-44 (81) | **Sandy Silt (ML)** 22.0-22.5' - grayish orange, (10YR 7/4), moist, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 33% very fine to coarse grained sand<br>**Silt (ML)** 22.5-23.7' - Same as 22.0-22.5' except 10-15% fine grained sand | | |
| 25<br>18.1 | 24.0 – 26.0 | 1.4 | SS-13 | 37-27-20-31 (47) | **Silt (ML)** 24.0-25.4' - Same as 22.5-23.7' | | |
| | 26.0 – 28.0 | 1.4 | SS-14 | 21-18-16-11 (34) | **Sandy Silt (ML)** 26.0-27.4' - Same as 22.0-22.5' | | |
| 30<br>13.1 | 28.0 – 30.0 | 1.7 | SS-15 | 4-3-2-17 (5) | **Sandy Silt (ML)** 28.0-29.7' - yellowish gray, (5Y 7/2), moist to wet, medium stiff, nonplastic, rapid dilatancy, moderate HCl reaction, 32% fine to coarse grained sand | | |
| | 30.0 – 31.8 | 1.4 | SS-16 | 10-20-21-50/3 (41) | **Sandy Silt To Silt (ML)** 30.0-31.4' - yellowish gray, (5Y 7/2), wet, hard, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 25-30% fine to coarse grained sand, decreasing to 10-15% fine grained sand at 30.0-30.3', thin laminae, white calcareous stringers <1/16" thick, oriented horizontal to 30 deg | | |
| | 32.0 – 34.0 | 0.3 | SS-17 | 50/5 (50/5") | **Sandy Silt With Limestone (ML)** 32.0-32.3' - dark yellowish orange, (10YR 6/6), wet, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 25-30% very fine to coarse grained sand, 20% disc-shaped limestone fragments up to 1/10" thick | | |
| 35<br>8.1 | 34.0 – 36.0 | 0.4 | SS-18 | 50/5 (50/5") | **Limestone And Sandy Silt (GM)** 34.0-34.4' - Same as 32.0-32.3' except low plasticity, mild to moderate HCl reaction, 75% fine to coarse grained sand and fine to coarse gravel-sized; 25% silt | | |
| | 36.0 – 36.1 | 0.1 | SS-19 | 50/1 (50/1") | **Limestone Fragments** 36.0-36.1' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, 3 coarse gravel-sized pieces recovered<br>Begin Rock Coring at 36.0 ft bgs<br>See the next sheet for the rock core log | | SPT discontinued at 36.0'<br>Surface casing set to 36.0' |
| 40 | | | | | | | |

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

WATER LEVELS : 2.0 ft bgs on 3/23/07 START : 3/23/2007 END : 3/26/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 36.0 | | | | | | |
| | | | >10 | 36.0-37.0' - Fracture zone, rough, undulating, rounded limestone fragments, some surface staining | | **Limestone**<br>36.0-36.5' - yellowish brown, (10YR 6/2), fine grained, strong HCl reaction, very weak to weak (R1 to R2) | |
| | R1-HQ<br>5 ft<br>20% | 0 | NR | | | 36.5-37.0' - pale yellowish brown, (10YR 6/2), fine to very fine grained, mild HCl reaction, extremely weak (R0), friable, voids over 80-90% of surface<br>**No Recovery 37.0-41.0'** | Driller's Remark: Soft at 40.0-41.0' |
| 40<br>3.1 | | | | | | | R1: 7 minutes |
| | 41.0 | | | | | | |
| | | | 4 | 41.1' - Fracture, horizontal, smooth, planar, open 3/8" | | **Limestone**<br>41.0-43.5' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, extremely weak (R0), thin bedding, very friable, thinly laminated from 41.3-41.55' | |
| | | | 2 | 41.35' - Fracture, <5 deg, smooth, undulating, open 3/4"<br>41.6-41.9' - Fracture zone, 0 to <5 deg, rough, stepped | | | |
| | R2-HQ<br>5 ft<br>78% | 35 | 3 | 42.3' - Fracture, <5 deg, smooth, undulating, open 3/4"<br>42.7' - Fracture, horizontal, rough, planar, open 3/4"-1-3/16" | | 43.5-44.9' - yellowish gray, (5Y 7/2), fine grained, no to mild HCl reaction, weak to extremely weak (R2 to R0), trace organics, voids over 40-50% of surface becoming larger with depth, trace organic material | |
| | | | 3 | 43.0, 43.9' - Fractures (2), horizontal, rough, undulating, open 3/16" at 43.0', open 3/8" at 43.9' | | | |
| 45<br>-1.9 | | | NR | 44.4, 44.6' - Fractures (2), horizontal, rough, undulating, open 3/16"-3/8" | | **No Recovery 44.9-46.0'** | R2: 2 minutes |
| | 46.0 | | | | | | |
| | | | 4 | 44.7' - Fracture, <5 to 40 deg, rough, undulating<br>46.2' - Fracture, horizontal, smooth, planar, open 1/16" | | **Limestone**<br>46.0-50.4' - yellowish gray, (5Y 7/2), fine grained, no to mild HCl reaction, extremely weak (R0), trace organics, voids over 10-15% of surface | |
| | | | 3 | 46.4' - Fracture, horizontal, rough, undulating, open 3/16" | | | |
| | R3-HQ<br>5 ft<br>88% | 20 | 3 | 46.6' - Fracture, horizontal, smooth, planar, tight<br>46.9, 47.15' - Fractures (2), horizontal, rough, undulating, open 1/16"-3/16" | | | |
| | | | 2 | 47.30' - Fracture, <5 deg, rough, undulating, tight | | | |
| 50<br>-6.9 | | | 3 | 47.85' - Fracture, horizontal, smooth, undulating, open <1/16" | | | R3: No runtime recorded |
| | | | NR | 48.03, 48.55' - Fractures (2), horizontal, smooth, planar, tight | | **No Recovery 50.4-51.0'** | |
| | 51.0 | | | | | | |
| | | | >10 | 48.85, 49.35' - Fractures (2), smooth, planar to undulating, tight | | **Limestone**<br>51.0-53.3' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, very weak to weak (R1 to R2), voids on 15-25% of surface, cavity up to 3/8" length at 52.3' | |
| | | | >10 | 49.60' - Fracture, <5 deg, smooth, stepped, tight | | | |
| | R4-HQ<br>5 ft<br>46% | 0 | >10 | 50.0' - Fracture, <5 to 30 deg, rough, stepped, open 3/8"<br>50.2' - Fracture, rough, planar to undulating, open 3/8" | | **No Recovery 53.3-56.0'** | |
| | | | NR | 50.4' - Fracture, horizontal, smooth, planar, open<br>51.0-51.7' - Fracture zone | | | |
| 55<br>-11.9 | | | | 51.7' - Fracture, 80 deg, rough, undulating, 0.4' long, open | | | R4: 4 minutes |
| | 56.0 | | | | | | |

| PROJECT NUMBER: | 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

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

WATER LEVELS : 2.0 ft bgs on 3/23/07 START : 3/23/2007 END : 3/26/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | | | 1 | 52.9' - Fracture zone, <5 to 90 deg, rough, undulating<br>56.6' - Fracture zone, 80 to 90 deg, rough, undulating | | **Limestone**<br>56.0-60.9' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, very weak to weak (R1 to R2), voids variable from 1-2% to 20-25% of surface | |
| | | | 1 | | | | |
| | R5-HQ<br>5 ft<br>98% | 87 | 0 | 58.0' - Fracture, 30 deg, smooth, planar, open | | | SC-1 collected at 58.0-59.3' |
| | | | 2 | 59.3' - Fracture, horizontal, smooth, planar, open | | | |
| 60<br>-16.9 | | | 1 | 59.9' - Fracture, horizontal, smooth, planar, open <1/16"<br>60.5' - Fracture, horizontal, smooth, stepped, open 3/8" | | | R5: 4 minutes |
| | 61.0 | | NR | | | **No Recovery 60.9-61.0'** | |
| | | | 3 | 61.3, 61.75' - Fractures (2), horizontal, smooth, planar, open 3/16" | | **Limestone**<br>61.0-66.0' - Same as 56.0-60.9' except cavities vary from 15-20% decreasing with depth, trace organics as thin discontinuous laminae | |
| | | | 2 | | | | |
| | R6-HQ<br>5 ft<br>100% | 90 | 0 | 62.8' - Fracture, horizontal, smooth, planar, tight<br>63.0' - Fracture, horizontal, smooth, stepped, tight | | | |
| | | | 1 | 64.4' - Fracture, 50 deg, smooth, stepped, open | | | SC-2 collected at 64.5-65.5'<br>R6: 4 minutes |
| 65<br>-21.9 | | | 1 | 65.5' - Fracture, horizontal, smooth, undulating, open | | | |
| | 66.0 | | | | | **Limestone**<br>66.0-68.5' - Same as 61.0-66.0' | |
| | | | 2 | 66.1' - Fracture, horizontal, smooth, planar, open | | | |
| | | | 3 | 66.8' - Fracture, <5 deg, smooth, stepped, open<br>67.03' - Fracture, <5 deg, smooth, undulating, tight | | | |
| | R7-HQ<br>5 ft<br>97% | 65 | 1 | 67.35' - Fracture, horizontal, smooth, planar, open | | 68.5-70.85' - yellowish gray, (5Y 7/2), very fine to fine grained, no to moderate HCl reaction, very weak to weak (R1 to R2), some strong hydrochloric acid reaction in some cavities, voids over 20-25% of surface, trace cavities to 3/8"x3/16" | |
| | | | 2 | 67.9' - Fracture, 0 to 50 deg, rough, stepped, open<br>68.45' - Fracture, 70 deg, smooth, planar, tight | | | |
| 70<br>-26.9 | | | 0 | 69.6, 69.7' - Fracture (2), 0 to 50 deg, rough, undulating, open | | | SC-3 collected at 69.7-70.85'<br>R7: No runtime recorded |
| | 71.0 | | NR | | | **No Recovery 70.85-71.0'** | |
| | | | 2 | 71.25' - Fracture, horizontal, smooth, undulating, tight to open 3/16" | | **Limestone**<br>71.0-71.3' - Same as 68.5-70.85'<br>71.3-73.5' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), very fine to fine grained, mild to moderate HCl reaction, very weak to weak (R1 to R2), laminated in zones with black organic material, fossil plant impression along fracture and bedding planes, voids <5%, trace cavities | |
| | | | 0 | 71.8' - Fracture, horizontal, smooth, stepped, tight, organic black covering 15-20% of surface | | | |
| | R8-HQ<br>5 ft<br>100% | 88 | 1 | 73.55' - Fracture, horizontal, smooth, planar, open | | | |
| | | | 1 | | | | |
| 75<br>-31.9 | | | 2 | 74.8' - Fracture, horizontal, smooth, undulating, tight | | 73.5-76.0' - Same as 68.5-70.85' | SC-4 collected at 74.9-75.7'<br>R8: 9 minutes |
| | 76.0 | | | | | | |

| PROJECT NUMBER: | 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

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

WATER LEVELS : 2.0 ft bgs on 3/23/07 START : 3/23/2007 END : 3/26/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R9-HQ 5 ft 67% | 30 | >10 | 75.6, 75.9' - Fractures (2), <5 deg, rough, stepped<br>76.0-77.5' - Fracture zone | | **Limestone**<br>76.0-77.5' - yellowish gray, (5Y 7/2), very fine to fine grained, mild to moderate HCl reaction, very weak to weak (R1 to R2), voids on 15-25% of surface, friable<br>**No Recovery 77.5-78.5'** | |
| | | | >10 | | | | |
| | | | NR | | | | |
| | | | 1 | | | **Limestone**<br>78.5-80.35' - yellowish gray, (5Y 7/2), fine to very fine grained, no to mild HCl reaction, becoming very soft (clay like) at base, organic material in clayey to sandy limestone material<br>**No Recovery 80.35-81.0'** | SC-5 collected at 78.5-79.65' |
| | | | 1 | | | | |
| 80<br>-36.9 | | | NR | 79.65, 80.0' - Fractures (2), <5 deg, rough, stepped, open 3/8-3/4" | | | R9: 3 minutes |
| | 81.0 | | | | | | |
| | R10-HQ 5 ft 100% | 46 | 0 | | | **Limestone**<br>81.0-86.0' - yellowish gray, (5Y 7/2), very weak to weak (R1 to R2), voids over 30-40% of surface, rare cavities up to 3/16", friable at 83.5-85.6', with interbedded clay to sand sized carbonate grains, some organic material | SC-6 collected at 81-82.75' |
| | | | 1 | 82.7' - Fracture, 45 deg, rough, stepped, open, dark brown clay over 50% surface | | | |
| | | | >10 | 82.9-83.1' - Fracture zone, <5 deg, undulating, thin brown clay lined <1/16", thick covering 100% surface | | | |
| | | | >10 | 83.7-86.0' - Fracture, <5 deg, rough, stepped, open, various fractures having different orientations | | | |
| 85<br>-41.9 | | | >10 | | | | R10: 7 minutes |
| | 86.0 | | | | | | |
| | R11-HQ 5 ft 79% | 48 | 3 | 86.1' - Fracture, 30 to 40 deg, smooth, planar, open<br>86.4' - Fracture, horizontal, rough, stepped | | 86.0-89.0' - Same as 81.0-86.0' except cavities up to 3/4" over 1-5% of surface | |
| | | | 0 | 86.95' - Fracture, 30 deg, rough, stepped, tight | | | SC-7 collected at 87.3-88.7' |
| | | | 10 | 88.65' - Fracture, 60 deg, rough, planar | | | |
| | | | >10 | 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 5/6), mild to moderate HCl reaction, voids on 5-10% of surface, rare small cavities, friable<br>**No Recovery 89.95-91.0'** | |
| 90<br>-46.9 | | | NR | 89.4' - Fracture zone, 0 to 60 deg, rough, undulating, tight | | | R11: 9 minutes |
| | 91.0 | | | | | | |
| | R12-HQ 5 ft 100% | 56 | 2 | 91.1' - Fracture, horizontal, smooth, planar, open<br>91.3' - Fracture, 10 deg, smooth, planar, tight | | **Limestone**<br>91.0-91.3' - moderate olive brown to olive gray, (5Y 4/4 to 5Y 3/2), fine to very fine grained, moderate HCl reaction, extremely weak (R0), organics<br>91.3-94.5' - Same as 86.0-89.0' except thinly laminated at 91.3-91.4', with organics | |
| | | | 1 | 92.8' - Fracture, 90 to 80 deg, rough, planar, tight | | | |
| | | | 2 | 93.5' - Fracture, horizontal, smooth, planar, open | | | |
| | | | 2 | 93.9' - Fracture, horizontal, rough, planar, open | | | |
| 95<br>-51.9 | | | 10 | 94.6' - Fracture, 80 deg, rough, planar<br>95.1-95.65' - Fracture, horizontal, smooth, planar, open | | | SC-8 collected at 94.6-95.4'<br>R12: 9 minutes |
| | 96.0 | | | | | | |

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

WATER LEVELS : 2.0 ft bgs on 3/23/07 START : 3/23/2007 END : 3/26/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R13-HQ 5 ft 96% | 70 | 3 | 96.4' - Fracture, 0 to 90 deg, rough, undulating, open | | **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 (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** 101.0-103.5' - Same as 99.1-100.8' except fine grained, mild HCl reaction 103.5-105.3' - yellowish gray, (5Y 7/2), fine grained, mild HCl 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' | |
| | | | 1 | 96.7' - Fracture, horizontal, smooth, planar 96.8' - Fracture, continuation of 96.4' | | | |
| | | | 2 | 97.8' - Fracture, 30 deg, smooth, planar 98.1' - Fracture, horizontal, smooth, planar, tight | | | |
| | | | 1 | 98.85' - Fracture, horizontal, rough, undulating, tight | | | SC-9 collected at 99.35-100.35' |
| 100 -56.9 | | | 2 | 99.35, 100.35' - Fractures (2), horizontal, rough, undulating, open, silty infilling covering 2-3% | | | R13: 9 minutes |
| | 101.0 | | NR | 100.65' - Fracture, horizontal, rough, undulating, open | | | |
| | R14-HQ 5 ft 86% | 36 | 0 | | | | SC-10 collected at 101.0-102.35' |
| | | | 2 | 102.35' - Fracture, 30 deg, rough, undulating, open | | | |
| | | | 1 | 102.5' - Fracture, 60 deg, rough, planar, tight 103.0' - Fracture, <5 deg, rough, stepped, open | | | |
| | | | >10 | | | | |
| 105 -61.9 | | | >10 | | | | R14: No runtime recorded |
| | 106.0 | | NR | | | | |
| | R15-HQ 5 ft 100% | 64 | 3 | 106.1' - Fracture, horizontal, rough, undulating, open | | | |
| | | | 3 | 106.6, 106.95' - Fractures (2), <5 deg, rough, stepped, open 107.1' - Fracture, 70 deg, rough, planar, open | | | |
| | | | 2 | 107.4' - Fracture, horizontal, rough, undulating, open 107.6' - Fracture, 70 deg, rough, undulating, tight | | | SC-11 collected at 108.35-109.8' |
| | | | 1 | 108.2, 108.5, 109.0, 110.1' - Fractures (4), <5 deg, rough, undulating, open | | | |
| 110 -66.9 | | | | | | | R15: No runtime recorded |
| | 111.0 | | 2 | 110.45' - Fracture, 60 deg, rough, planar, tight | | | |
| | R16-HQ 5 ft 100% | 78 | 2 | | | | |
| | | | 2 | 111.7, 111.9' - Fractures (2), 80 deg, rough, undulating, tight fracture, extends to 112.3' 112.3' - Fracture, <5 deg, rough, undulating, open | | | |
| | | | 0 | 112.45' - Fracture, 60 deg, rough, undulating, tight | | | SC-12 collected at 113.5-114.7' |
| | | | 1 | | | | |
| 115 -71.9 | | | 2 | 114.65' - Fracture, <5 deg, smooth, undulating, open 115.02' - Fracture, 30 deg, rough, undulating, open | | | R16: No runtime recorded |
| | 116.0 | | | | | | |

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

WATER LEVELS : 2.0 ft bgs on 3/23/07 START : 3/23/2007 END : 3/26/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R17-HQ 5 ft 50% | 17 | 2 | 115.55' - Fracture, <5 deg, rough, undulating, open<br>116.2, 116.4' - Fractures (2), horizontal, rough, undulating, open | | **Limestone**<br>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<br>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<br>116.0-117.5' - Same as 103.5-105.3' except possible voids | SC-13 collected at 116.4-117.2'<br>Driller's Remark: Possible void from 117.5-120.0' Lost circulation at 118.0' |
| | | | >10 | 117.2-117.5' - Fracture zone, 0 to <5 deg, smooth to rough, planar to stepped, open | | | |
| | | | NR | | | | |
| 120<br>-76.9 | | | >10 | | | | R17: 5 minutes |
| 121.0 | | | | | | **No Recovery 117.5-120.0'** | |
| | R18-HQ 5 ft 100% | 63 | 2 | 121.2' - Fracture, horizontal, rough, stepped, open<br>121.4' - Fracture, stepped | | **Limestone**<br>120.0-121.0' - Same as 103.5-105.3' except light olive brown, 15-20% cavities up to 3/8"<br>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'<br>123.1-124.9' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), very fine grained, strong HCl reaction, weak to medium strong (R2 to R3), thinly laminated with <5% voids (up to 10-15%)<br>124.9-130.15' - light olive gray, (5Y 5/2), fine grained, moderate to mild HCl reaction, weak (R2) | |
| | | | 1 | 122.75' - Fracture, 75 deg, rough, stepped, tight | | | |
| | | | 1 | 123.10' - Fracture, 40 deg, rough, undulating, tight | | | |
| | | | 2 | 124.4, 124.92' - Fractures (2), horizontal, smooth, planar, tight | | | SC-14 collected at 123.10-124.4' |
| 125<br>-81.9 | | | 1 | 125.45' - Fracture, <5 deg, rough, undulating, tight | | | R18: 10 minutes |
| 126.0 | | | | | | | |
| | R19-HQ 5 ft 88% | 82 | 1 | 126.9' - Fracture, 60 deg, rough, undulating, tight | | | |
| | | | 0 | | | | |
| | | | 1 | 128.5' - Fracture, horizontal, rough, stepped, open | | | Driller's Remark: Softer at 130.0' and below<br>SC-15 collected at 128.6-130.15' |
| | | | 0 | | | | |
| 130<br>-86.9 | | | NR | | | **No Recovery 130.15-130.75'** | R19: 8 minutes<br>Driller's Remark: Lost core from 130.15-130.75' |
| 131.0 | | | 1 | 130.9' - Fracture, horizontal, smooth, undulating, open | | **Limestone**<br>130.75-131.8' - Same as 124.9-130.15'<br>131.8-133.35' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), no to mild HCl reaction, very weak to weak (R1 to R2), voids on 20-25% of surface, <10% cavities, trace fossils<br>133.35-133.5' - yellowish gray, (5Y 7/2), strong HCl reaction, weak to medium strong (R2 to R3), <2% voids, trace cavities<br>133.5-133.85' - Same as 133.35-133.5' except very weak (R1), laminated bedding | |
| | R20-HQ 5 ft 100% | 28 | 3 | 131.15' - Fracture, vertical, rough, planar, tight | | | |
| | | | 10 | 131.5' - Fracture, <5 deg, rough, undulating, open | | | |
| | | | 6 | 131.7' - Fracture, 40 deg, rough, undulating, tight<br>132.0-133.0' - Fracture zone<br>133.15, 133.18, 133.22, 133.40, 133.70, 133.80' - Fracture zone, <5 deg, rough, planar | | | SC-16 collected at 133.75-134.84' |
| | | | 1 | | | | |
| 135<br>-91.9 | | | 10 | 135.22, 135.52, 135.6' - Fractures (3), horizontal, smooth, planar, tight to open | | | R20: 6 minutes |
| 136.0 | | | | | | | |

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

WATER LEVELS : 2.0 ft bgs on 3/23/07 START : 3/23/2007 END : 3/26/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | 0 | | | **Limestone**<br>133.85-135.25' - Same as 133.35-133.5'<br>135.25-137.3' - Same as 131.85-133.35'<br>137.3-137.9' - yellowish gray, (5Y 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 | SC-17 collected at 136.0-137.3' |
| | | | 3 | 137.3, 137.5' - Fractures (2), horizontal, rough, stepped, open | | | |
| | R21-HQ 5 ft 64% | 40 | NR | 137.9' - Fracture, 50 deg, rough, stepped, open | | | |
| 140 -96.9 | | | 1 | 139.70' - Fracture, 50 deg, rough, stepped, open | | **No Recovery 137.9-139.7'** | |
| | 141.0 | | 4 | 140.4' - Fracture, 15 deg, rough, stepped, tight | | **Limestone**<br>139.7-141.0' - light gray to very light gray, (N7 to N6), very fine grained, weak (R2), 2-3% voids over surface, cavities over 5-10%, voids and cavities more common with depth, cavities up to 1/16"-1/8"<br>141.0-142.05' - Same as 139.7-141.0' except voids up to 10-15% of surface cavities up to 3/16", cavities interconnected<br>142.05-142.5' - yellowish gray to light gray, (5Y 5/2 to N7), strong HCl reaction, weak to medium strong (R2 to R3) | R21: 6 minutes |
| | | | 1 | 140.55' - Fracture, <5 deg, rough, stepped, tight<br>140.56' - Fracture, horizontal, rough, undulating, tight | | | |
| | | | >10 | 140.72' - Fracture, 40 deg, rough, stepped, tight | | | |
| | R22-HQ 5 ft 100% | 72 | 2 | 141.6' - Fracture, <5 deg, rough, stepped, tight<br>142.05-142.35' - Fracture zone, horizontal, rough, stepped, open | | | |
| | | | 1 | 142.5' - Fracture, horizontal, rough, undulating, tight | | | SC-18 collected at 144.15-145.05' |
| 145 -101.9 | | | 3 | 142.65' - Fracture, horizontal, rough, stepped, tight | | 142.5-142.6' - moderate olive brown, fine to very fine grained, extremely weak (R0) | R22: 10 minutes |
| | 146.0 | | | 143.65' - Fracture, 0 to 20 deg, rough, planar, tight | | | |
| | | | 0 | 143.95' - Fracture, 20 deg, rough, undulating, tight | | 142.6-143.5' - Same as 142.05-142.5' | SC-19 collected at 146.0-147.3' |
| | | | 1 | 144.25' - Fracture, horizontal, rough, stepped, open<br>145.05' - Fracture, horizontal, rough, undulating, open | | 143.5-144.65' - yellowish gray, (5Y 5/2), strong HCl reaction, weak (R2), voids over 15% of surface | |
| | R23-HQ 5 ft 100% | 70 | 1 | 145.85, 145.90' - Fractures (2), 20 deg, rough, undulating, open | | 144.65-145.05' - yellowish gray, (5Y 5/2), very fine to fine grained, mild to moderate HCl reaction, voids rare to absent | |
| | | | 1 | 147.3' - Fracture, 0 to 20 deg, rough, undulating, open | | 145.05-145.4' - light olive gray, (5Y 5/2), moderate to strong HCl reaction, weak (R2), voids over 30-40% of surface, cavities over 5-10% of surface, angular to round limestone clasts of very fine grained limestone | |
| 150 -106.9 | | | 2 | 148.55' - Fracture, 50 deg, rough, undulating, tight<br>149.9' - Fracture, 60 deg, rough, planar, tight | | | R23: 5 minutes |
| | 151.0 | | | 150-150.5' - Fracture, 70 deg, rough, undulating, tight | | | |
| | | | 2 | 150.95' - Fracture, 0 to 90 deg, rough, undulating, tight | | 145.4-148.1' - light olive gray, (5Y 5/2), mild to moderate HCl reaction, very weak (R1), voids on 5-15% of surface | |
| | | | 0 | 151.0-151.4' - Fracture, 70 deg, rough, stepped, tight<br>151.95' - Fracture, 50 deg, rough, undulating, tight | | 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 | |
| | R24-HQ 5 ft 100% | 82 | 2 | | | 151.0-153.35' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), mild to moderate HCl reaction, medium strong to weak (R3 to R2), voids over 5-15% of surface | |
| | | | 3 | 153.75' - Fracture, horizontal, rough, planar, open<br>154.15' - Fracture, horizontal, smooth, undulating, open | | | |
| 155 -111.9 | | | 0 | 154.30, 154.55' - Fractures (2), horizontal, smooth, undulating, tight | | 153.35-154.7' - fine grained, no to mild HCl reaction, very weak (R1), thinly laminated below 154.0' | SC-20 collected at 154.7-156'<br>R24: 6 minutes |
| | 156.0 | | | | | | |

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

WATER LEVELS : 2.0 ft bgs on 3/23/07 START : 3/23/2007 END : 3/26/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | 0 | | | 154.7-156.0' - Same as 151.0-153.35' | |
| | | | 1 | 157.15' - Fracture, 20 deg, smooth, planar, tight, open <1/16", brown clay infilling <1/16" over 10% | | **Limestone** 156.0-158.03' - moderate olive brown, (5Y 4/4), fine grained, very weak to weak (R1 to R2), voids on 15-20% of surface with interlaminate zones of finer grained limestone with <5% voids, rare cavities | |
| | R25-HQ 5 ft 100% | 74 | >10 | 158.02-159.0' - Fracture zone, horizontal, rough to smooth, planar to undulating, open to tight | | 158.03-158.5' - yellowish gray, (5Y 7/2), fine grained, mild to moderate HCl reaction, weak (R2), <3% voids, thinly laminated | |
| | | | 2 | 159.4' - Fracture, horizontal, smooth, planar, tight | | | SC-21 collected at 159.5-160.3' |
| 160 -116.9 | | | 2 | 160.3' - Fracture, horizontal, rough, planar, open | | 158.5-159.4' - yellowish gray, (5Y 7/2), strong HCl reaction, medium strong (R3), <1% voids, thinly laminated | R25: 7 minutes |
| | 161.0 | | | | | | |
| | | | 5 | 160.4' - Fracture, horizontal, rough, undulating, tight | | 159.4-161.65' - light olive gray to light olive brown, (5Y 5/2 to 5Y 5/6), fine grained, very weak to weak (R1 to R2), voids on 25-30% of surface, 3/8" voids up to 3-5%, very thinly laminated | |
| | | | 3 | 161.2, 161.25' - Fractures (2), 30 deg, rough, stepped, open | | | |
| | R26-HQ 5 ft 100% | 8 | >10 | 161.55' - Fracture, 40 deg, rough, stepped, open | | 161.65-161.87' - light olive gray, (5Y 5/2), fine to very fine grained, weak (R2), voids over 5-10% of surface | |
| | | | >10 | 161.65' - Fracture, <5 deg, rough, undulating, open | | 161.87-162.2' - olive gray to medium olive brown, (5Y 3/2 to 5Y 4/4), fine to very fine grained, extremely weak (R0), thinly laminated | |
| | | | | 161.9' - Fracture, horizontal, smooth, planar, open | | | |
| | | | >10 | 162.6' - Fracture, horizontal, rough, undulating, open | | | |
| 165 -121.9 | | | 4 | 162.75' - Fracture zone, 30 to 90 deg, rough, stepped, tight | | | R26: 6 minutes |
| | 166.0 | | | 162.9' - Fracture, <5 deg, rough, stepped, open | | 162.2-162.72' - Same as 159.4-161.65' | |
| | | | >10 | 162.9-163.5' - Fracture zone, <5 to 90 deg, rough, undulating to stepped, open | | 162.72-166.0' - yellowish gray, (5Y 5/2), fine grained, moderate to strong HCl reaction, weak (R2), voids over 5-10% of surface | |
| | | | 1 | 163.5-165.1' - Fracture zone, horizontal, smooth to rough, planar, open | | | |
| | | | | 165.1' - Fracture, 0 to 50 deg, smooth, planar, open | | 166.0-166.95' - dusky yellow to light olive brown, (5Y 6/4 to 5Y 5/6), fine grained, moderate HCl reaction, very weak (R1), thin laminae of extremely weak rock (R0), voids over 5-10% of surface | |
| | R27-HQ 5 ft 100% | 64 | 1 | 165.3' - Fracture, 30 deg, smooth, stepped, tight | | | SC-22 collected at 168.7-169.7' |
| | | | 3 | 165.5, 165.8' - Fractures (2), 0 to 90 deg, rough, stepped, open | | | |
| 170 -126.9 | | | 10 | 166.0-167.0' - Fracture zone, 0 to 40 deg, smooth to rough | | 166.95-168.5' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), fine to very fine grained, laminated with very fine grained limestone with <1% voids, rest of rock up to 15-20% voids, rare cavities | R27: 8 minutes |
| | 171.0 | | | 167.15' - Fracture, 50 deg, rough, planar, tight | | | |
| | | | | 167.85' - Mechanical break | | | |
| | | | 2 | 168.70' - Fracture, horizontal, rough, undulating, tight | | | |
| | | | 2 | 169.7' - Fracture, horizontal, rough, undulating, open | | 168.5-169.9' - yellowish gray, (5Y 7/2), fine grained, very weak to weak (R1 to R2), voids over 5-10% of surface | |
| | | | | 169.7-170.1' - Fracture zone, 0 to 90 deg, rough, undulating, tight | | | |
| | R28-HQ 5 ft 100% | 74 | 2 | 170.1' - Fracture, <5 deg, rough, undulating, open | | 169.9-171.0' - yellowish gray, (5Y 7/2), fine grained, weak (R2), voids over 15-25% of surface, 1/8"-3/16" cavities over 5% of surface | |
| | | | | 170.65' - Fracture, 5 deg, rough, undulating, tight | | | |
| | | | 5 | 171.55' - Fracture, horizontal, rough, stepped, tight | | | R28: 8 minutes |
| 175 -131.9 | | | 1 | 171.85' - Fracture, 60 deg, rough, undulating, tight | | | |
| | 176.0 | | | | | | |

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

WATER LEVELS : 2.0 ft bgs on 3/23/07 START : 3/23/2007 END : 3/26/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| 180 -136.9 | R29-HQ 5 ft 72% | 28 | 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 grained, moderate to strong HCl reaction, weak (R2), generally <3-5% voids, voids up to 10-15% of surface from 174.0-174.7', rare cavities up to 3/4" to 1-3/16" | End drilling on 3/24/07 at 176.0' at 17:00 hrs |
| | | | 7 | 172.70' - Fracture, horizontal, smooth, planar, infilling, tight, brown silty infilling over 5% | | | Water level at 2.0' below ground surface |
| | | | 2 | 173.1' - Fracture, horizontal, rough, undulating, tight | | | Begin coring at 176.0' on 3/25/07, continuing to have lost circulation |
| | | | >10 | 173.3' - Fracture, <5 deg, rough, undulating, open | | **Limestone** | |
| | | | NR | 174.05' - Fracture, horizontal, rough, undulating, black stain over 5% | | 177.4-178.5' - light olive gray, (5Y 5/2), mild to moderate HCl reaction, weak (R2), voids on 10% of surface, 3/4" to 1-3/16" cavities on 3-5% of surface, thin organic laminae at 177.8' inclined at 30-40 deg | R29: 8 minutes |
| | 181.0 | | | 174.45' - Fracture, 10 deg, rough, planar, tight | | | |
| | | | | 174.7' - Fracture, <5 deg, rough, stepped, open | | | |
| | | | | 174.82' - Fracture, 10 deg, smooth, planar, dark brown clay over 80%, open | | 178.5-179.6' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, weak (R2), voids over 5-10% of surface, cavities over 5-10% of surface, typically 3/8" long, fossiliferous | |
| | R30-HQ 5 ft 96% | 14 | 2 | 174.87' - Fracture, 10 deg, smooth, planar, dark brown clay over 80%, open | | | |
| | | | >10 | 175.4-176.0' - Fracture, vertical, rough, undulating to stepped, tight | | | Driller's Remark: Soft at 183.0-184.0' |
| | | | >10 | 176.3-176.8" - Fracture, 0 to 90 deg, rough, undulating to stepped, open | | **No Recovery 179.6-181.0'** | |
| | | | 4 | 177.15, 177.25, 177.3' - Fractures (3), 20 deg, smooth, planar, open | | **Limestone** | |
| 185 -141.9 | | | 2 | 177.5' - Fracture, <5 deg, rough, undulating, tight | | 181.0-183.0' - yellowish gray, (5Y 7/2), fine grained, moderate to strong HCl reaction, weak (R2), voids on 3-5% of surface, some cavities up to 3/4" to 1-3/16" long | |
| | 186.0 | | NR | 177.6' - Fracture, <5 deg, smooth, undulating, open | | 183.0-183.5' - moderate olive brown, (5Y 4/4), fine grained, very weak (R1), voids on 5-10% of surface | R30: 8 minutes |
| | | | | 177.75, 177.85' - Fractures (2), 20 deg, rough, planar, open | | 183.5-184.2' - yellow gray to light olive gray, (5Y 7/2 to 5Y 5/2), strong HCl reaction, weak (R2) | |
| | R31-HQ 5 ft 100% | 68 | 3 | 178.3' - Fracture, 30 deg, rough, undulating, tight | | 184.2-185.3' - yellowish gray, moderate to strong HCl reaction, weak (R2), voids over 28-30% of surface, cavities over 5-10% of surface, fossiliferous | |
| | | | 2 | 178.85' - Fracture, 60 deg, rough, undulating, open | | | SC-23 collected at 187.3-188.6' |
| | | | 3 | 181.7' - Fracture, <5 deg, rough, stepped, tight | | 185.3-185.8' - Same as 183.5-184.2' | |
| | | | 3 | 181.8' - Fracture, vertical, smooth, undulating, tight | | **No Recovery 185.8-186.0'** | |
| 190 -146.9 | | | 1 | 181.95' - Fracture, <5 deg, rough, stepped, tight | | **Limestone** | |
| | 191.0 | | | 182.5-182.75' - Fracture zone, rough to smooth, various fracture plane orientations | | 186.0-187.0' - yellowish gray, (5Y 7/2), very fine grained, moderate to strong HCl reaction, weak (R2), voids on 1-3% of surface | |
| | | | | 182.5' - Fracture, <5 deg, rough, undulating, open | | | R31: 7 minutes |
| | | | | 182.75' - Fracture, <5 deg, rough, undulating, open | | 187.0-187.3' - Same as 186.0-187.0' except voids increase to 15-20% with some cavity infilling and staining on vertical fractures | |
| | R32-HQ 5 ft 100% | 40 | 3 | 183.0' - Fracture, <5 deg, rough, undulating, open | | | SC-24 collected at 191.55-192.55' |
| | | | 1 | 183.2' - Fracture, 30 deg, rough, undulating, open | | 187.3-189.2' - yellowish gray, (5Y 7/2), strong HCl reaction, weak (R2), voids over 1-3% of surface | |
| | | | 4 | 183.45-183.65' - Fracture zone | | 189.2-190.0' - moderate olive brown, (5Y 5/6), fine grained, no to mild HCl reaction, extremely weak to very weak (R0 to R1), voids over 40-50% of surface, irregular cavities up to 3/8"-3/4" | |
| | | | | 183.65-185.7' - Fracture, vertical, undulating to planar, tight | | | |
| | | | | 184.2' - Fracture, horizontal, rough, planar to stepped | | | |
| | | | >10 | 184.3' - Fracture, 50 deg, rough, stepped, open | | | |
| 195 -151.9 | | | >10 | 184.6, 185.1' - Fracture (2), 0 to 90 deg, rough, undulating | | | R32: 9 minutes |
| | 196.0 | | | 186.0-186.9' - Fracture, vertical, rough, stepped, tight | | | |

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

WATER LEVELS : 2.0 ft bgs on 3/23/07 START : 3/23/2007 END : 3/26/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | | | 1 | 186.25' - Fracture, horizontal, smooth, planar<br>186.8' - Fracture, <5 deg, rough, stepped, tight | | 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 | SC-25 collected at 196.0-196.9' |
| | | | 0 | 187.3, 187.4, 187.55' - Fractures (3), 50 deg, rough, undulating, tight | | **Limestone** | |
| | R33-HQ<br>5 ft<br>96% | 75 | 0 | 188.6' - Fracture, <5 deg, smooth, undulating, open<br>188.7' - Fracture, <5 to 90 deg, rough, stepped, open | | 191.0-193.5' - yellowish gray, (5Y 7/2), fine to very fine grained, moderate to strong HCl reaction, weak (R2), trace cavities up to 3/8"-3/4" in length, voids on 10-15% of surface | |
| | | | 3 | 189.35' - Fracture, horizontal, rough, planar, open, black organics over 95% | | | |
| 200<br>-156.9 | | | 4 | 189.5' - Fracture, horizontal, rough, undulating, open<br>189.95, 190.0' - Fractures (2), horizontal, rough, planar, open | | 193.5-193.65' - light olive brown, (5Y 5/6), moderate HCl reaction, very weak (R1), voids over 1-5% of surface, thinly laminated at base, trace organics | R33: 9 minutes |
| | 201.0 | | NR | | | | |
| | | | 4 | 191.1' - Fracture, 50 deg, rough, undulating, open | | 193.65-195.0' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, very weak (R1), voids over 1-5% of surface | |
| | | | 4 | 191.25' - Fracture, <5 deg, rough, undulating, open<br>191.5' - Fracture, 50 deg, rough, stepped, tight | | 195.0-196.0' - dusky yellow, (5Y 6/4), fine grained, moderate to strong HCl reaction, very weak (R1), voids on 1-5% of surface | |
| | R34-HQ<br>5 ft<br>98% | 52 | 2 | 192.55' - Fracture, 40 deg, rough, undulating, tight<br>193.55, 193.65' - Fractures (2), <5 deg, rough, undulating, open | | 196.0-196.9' - yellowish gray, (5Y 7/2), fine grained, mild to strong HCl reaction, very weak (R1), voids on 15-20% of surface, cavities over 10% | |
| | | | 2 | 193.8' - Fracture, 40 deg, smooth, undulating, open | | 196.9-197.8' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, very weak to weak (R1 to R2), voids over 1-5% of surface, cavities rare | |
| 205<br>-161.9 | | | 0 | 193.95-196.0' - Fracture zone, various orientations, rough, open<br>196.9' - Fracture, <5 deg, rough, stepped | | 197.8-199.4' - Same as 196.0-196.9' | R34: 10 minutes |
| | 206.0 | | NR | | | | |
| | | | 2 | 199.74' - Fracture, horizontal, rough, stepped, open<br>199.8' - Fracture, horizontal, rough, undulating, open | | 199.4-200.2' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), fine grained, strong HCl reaction, very weak (R1), voids over 5-10% of surface, trace cavities | SC-26 collected at 206.6-207.65' |
| | | | 4 | 199.95, 200.03' - Fractures (2), horizontal, rough, stepped, open | | 200.2-200.8' - yellowish gray, very fine grained, very weak to weak (R1 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-HQ<br>5 ft<br>100% | 42 | 4 | 200.20' - Fracture, 20 deg, smooth, undulating, open<br>200.5, 200.65' - Fractures (2), horizontal, rough, stepped, open | | **No Recovery 200.8-201.0'** | |
| | | | 10 | 201.05' - Fracture, <5 deg, rough, stepped, open | | **Limestone** | |
| 210<br>-166.9 | | | >10 | 201.3' - Fracture, 0 to 90 deg, rough, undulating, open<br>201.4, 201.5' - Fractures (2), <5 deg, rough, undulating, open | | 201.0-202.5' - Same as 200.2-200.8' | R35: 9 minutes |
| | 211.0 | | | | | | |
| | | | >10 | 202.2-202.35' - Fractures (2), 50 deg, rough, planar, tight | | 202.5-203.0' - light olive gray, (5Y 5/2), fine grained, very weak (R1), voids on 1-3% of surface, laminated organics in lower section | |
| | | | 10 | 202.75-203.1' - Fracture zone, 50 to 60 deg, rough, planar, tight<br>203.85, 204.55' - Fractures (2), <5 deg, rough, undulating, tight | | | |
| | R36-HQ<br>5 ft<br>46% | 14 | >10 | 204.8-205.5' - Fracture zone, 50 to 60 deg, rough, undulating, open | | | |
| | | | NR | 206.25, 206.6' - Fractures (2), <5 deg, rough, undulating, tight<br>207.65, 207.85' - Fractures (2), <5 deg, smooth, planar, open, organic material over 30% | | | |
| 215<br>-171.9 | | | | | | | 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

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

WATER LEVELS : 2.0 ft bgs on 3/23/07 START : 3/23/2007 END : 3/26/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 220<br>-176.9 | R37-HQ<br>5 ft<br>37%<br>221.0 | 0 | 4<br>>10<br>NR | 207.98, 208.1' - Fractures (2), horizontal, smooth, planar, organic material over 40%<br>208.13' - Fracture, 40 deg, smooth, planar, open<br>208.4-208.55' - Fracture, rock has semi-circular fracture pattern, discontinuous, unbroken fracture plane<br>208.55' - Fracture, 10 deg, smooth, planar, tight<br>208.80' - Fracture, horizontal<br>209.05' - Fracture, horizontal, smooth, planar, open<br>209.20' - Fracture, <5 deg, rough, undulating, open<br>209.85-211.0' - Fracture zone, numerous fractures of different orientations | | 203.0-205.9' - yellowish gray to light olive yellow, (5Y 7/2 to 5Y 5/2), very fine grained, mild to moderate HCl reaction, weak (R2), voids over 40-50% of surface, cavities up to 1-3/16"-1-9/16" penetrating into core, some recrystallization infilling with very fine grained limestone in cavities, trace fossil casts<br>**No Recovery 205.9-206.0'**<br>**Limestone**<br>206.0-207.65' - Same as 203.0-205.9'<br>**Limestone**<br>207.65-209.75' - yellowish gray, (5Y 5/2), very fine grained, very weak (R1), voids over 10-15% of surface, trace cavities (up to 3/8"x3/16") ellipsoidal in shape<br>209.75-212.0' - light olive gray, (5Y 7/2), fine grained, mild HCl reaction, very weak (R1), voids on 20-30% of surface<br>212.0-213.3' - very fine grained, mild to moderate HCl reaction, voids on 15-20% of surface, 10-15% cavities up to 3/4" to 1-3/16" in length | R37: 8 minutes |
| 225<br>-181.9 | R38-HQ<br>5 ft<br>76%<br>226.0 | 21 | >10<br>>10<br>>10<br>2<br>NR | 211.0-212.05' - Fracture zone, numerous fractures of different orientations<br>212.75, 212.9' - Fractures (2), 10 deg, rough, planar, tight<br>212.9-212.15' - Fracture zone, various orientations<br>216.0-216.2' - Fracture zone, horizontal, rough, planar, open<br>216.55' - Fracture, <5 deg, rough, undulating, open<br>216.75' - Fracture<br>216.9' - Fracture, horizontal, smooth, undulating, open<br>217.05-217.3' - Fracture zone, horizontal, smooth, planar, open | | **No Recovery 213.3-216.0'**<br>**Limestone**<br>216.0-216.8' - yellowish gray, (5Y 7/2), moderate HCl reaction, weak (R2), fossiliferous, laminated with black organic material,voids over 20% of surface, cavities up to 3/8" on 5% of surface<br>216.8-216.9' - yellowish gray, (5Y 7/2), very fine grained, moderate HCl reaction, weak (R2)<br>216.9-217.85' - Same as 216.8-216.9' except color is lighter<br>**No Recovery 217.85-221.0'**<br>**Limestone** | R38: 8 minutes |
| 230<br>-186.9 | R39-HQ<br>5 ft<br>56%<br>231.0 | 0 | 10<br>>10<br>>10<br>NR | 217.3' - Fracture, horizontal, rough, planar, open<br>217.57-217.8' - Fracture zone, rough, planar, various orientations<br>221.0' - Fracture, horizontal, rough, undulating, open<br>221.6-222.05' - Fracture zone, horizontal, rough, undulating, open<br>221.7-222.0' - Fracture zone<br>222.3' - Fracture, horizontal, rough, stepped, open<br>222.5' - Fracture zone, 20 deg, rough, undulating, open<br>222.7-223.6' - Fracture zone | | 221.0-222.3' - yellowish gray, (5Y 7/2), fine to very fine grained, very weak (R1), rounded to subrounded rock fragments, voids on 5-10% of surface, 3/4"-3/16" cavities on 10% of surface<br>222.3-223.4' - yellowish gray, (5Y 7/2), very fine grained, mild to moderate HCl reaction, very weak (R1)<br>223.4-223.5' - Same as 221.0-222.3'<br>223.5-224.8' - pale gray, (5Y 6/2), fine grained, mild HCl reaction, very weak (R1), fossiliferous, voids on 20-25% of surface, cavities (<3/8") over 1-3% of surface<br>**No Recovery 224.8-226.0'** | R39: 10 minutes |
| 235<br>-191.9 | R40-HQ<br>5 ft<br>64%<br>236.0 | 9 | >10<br>>10<br>>10<br>1<br>NR | 224.05, 224.3' - Fractures (2), 60 to 70 deg, rough, undulating, open<br>224.65' - Fracture, <5 deg, rough, undulating, open<br>226.4' - Fracture, <5 deg, rough, undulating, open<br>226.4-226.65' - Fracture zone, rough, undulating, gravel-sized limestone fragments, open<br>226.5' - Fracture, horizontal, rough, undulating, open<br>227.05-228.8' - Fracture zone, <5 deg, rough, stepped, open<br>231.0-232.0' - Fracture zone, various orientation, gravel-sized rock fragments, black coating on fragments from 231.0-231.2' | | | R40: 9 minutes |

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

WATER LEVELS : 2.0 ft bgs on 3/23/07 START : 3/23/2007 END : 3/26/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R41-HQ 5 ft 30% | 0 | >10 | 232.4-232.8' - Fracture, vertical, rough, undulating, tight | | **Limestone** 226.0-228.8' - yellowish gray, (5Y 7/2), fine grained, mild to moderate HCl 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' | |
| | | | >10 | 233.0-233.6' - Fracture zone, various orientations | | | |
| | | | NR | 233.7' - Fracture, 0 to 90 deg, smooth, planar, open<br>234.2' - Fracture, horizontal, rough, undulating, open<br>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'<br>237.0-237.5' - Fracture zone, gravel-sized rock fragments | | **No Recovery 228.8-231.0'**<br>**Limestone** 231.0-231.8' - light olive brown, (5Y 5/6), fine grained, very weak (R1), voids over 15-20% of surface | |
| 240 -196.9 | | | | | | | R41: 8 minutes |
| | 241.0 | | | | | **Limestone** 231.8-233.5' - yellowish gray, (5Y 7/2), very fine grained, very weak (R1), gravel-sized limestone fragments, trace voids | |
| | R42-HQ 5 ft 40% | 0 | >10 | 241.0-243.0' - Fracture, 0-90 deg, rough, planar, open | | | |
| | | | >10 | | | 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' | |
| | | | NR | | | **No Recovery 234.2-236.0'**<br>**Limestone** 236.0-236.75' - yellowish gray, (5Y 7/2), fine grained, no to mild HCl reaction, very weak (R1), sandy texture with inclined fracture traces | |
| 245 -201.9 | | | | | | | R42: 9 minutes |
| | 246.0 | | | | | 236.75-237.5' - Same as 233.5-234.2' | |
| | R43-HQ 5 ft 46% | 0 | >10 | 246.0-247.0' - Fracture zone | | **No Recovery 237.5-241.0'**<br>**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 | |
| | | | 10 | 247.1' - Fracture, horizontal, smooth, planar, open | | | |
| | | | 3 | 247.4' - Fracture, 80 deg, rough, stepped, open | | | |
| | | | NR | 247.6' - Fracture, horizontal, rough, undulating to stepped, open<br>248.05, 248.25, 248.35' - Fracture (3), horizontal, rough, undulating, open | | **No Recovery 243.0-246.0'**<br>**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' | |
| 250 -206.9 | | | | | | | R43: 9 minutes |
| | 251.0 | | | | | **No Recovery 248.3-251.0'**<br>**No Recovery 251.0-256.0'** | |
| | R44-HQ 5 ft 0% | 0 | NR | | | | |
| 255 -211.9 | | | | | | | R44: 6 minutes |
| | 256.0 | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: A-19 | SHEET 14 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

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

WATER LEVELS : 2.0 ft bgs on 3/23/07 START : 3/23/2007 END : 3/26/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | >10 | 256.0-257.0, 261.0-261.5' - Fracture zone, various orientations, gravel-sized rock fragments | | **Limestone**<br>256.0-257.0' - yellowish gray, (5Y 7/2), fine grained, no to mild HCl reaction, extremely weak to very weak (R0 to R1), poorly fossiliferous, some organic staining<br>**No Recovery 257.0-261.0'** | |
| | R45-HQ<br>5 ft<br>20% | 0 | NR | | | | |
| 260<br>-216.9 | | | | | | | R45: 13 minutes |
| | 261.0 | | | | | | |
| | | | >10 | | | **Limestone**<br>261.0-261.5' - Same as 256.0-257.0'<br>**No Recovery 261.5-266.0'** | |
| | R46-HQ<br>5 ft<br>10% | 0 | NR | | | | |
| 265<br>-221.9 | | | | | | | R46: 9 minutes |
| | 266.0 | | | | | | |
| | | | | | | Bottom of Boring at 266.0 ft bgs on 3/26/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-20 SHEET 1 OF 14 |

# 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 START : 4/24/2007 END : 5/1/2007 LOGGER : C. Dougherty, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 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 | | |
| | 2.0 | 1.0 | SS-2 | 3-6-8-4 (14) | **Silty Sand (SM)** 1.0-1.6' - grayish brown, (5YR 3/2), moist, loose, fine grained, 20% nonplastic fines, fines may be organics<br>**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 | | |
| 5 37.3 | 4.0 | 2.0 | SS-3 | 1-1-0-1 (1) | **Poorly Graded Sand With Silt (SP-SM)** 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) | | Water level is based on Ground Water Monitoring at LNP site (FSAR Table 2.4.12.08)<br>Driller's Remark: Spoon fell through 3rd 6 inches |
| | 6.0 | 0.4 | SS-4 | 0-0-0-0 (0) | **Silty Sand (SM)** 6.0-6.4' - Same as 4.0-6.0' except 10% nonplastic fines | | Driller's Remark: Spoon fell through entire 2' interval |
| 10 32.3 | 8.0 | 1.4 | SS-5 | 1-2-6-15 (8) | **Lean Clay With Sand (CL)** 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. | | |
| | 10.0 | 1.6 | SS-6 | 12-33-46-50/5" (79) | **Silt (ML)** 8.8-9.4' - grayish orange, (10YR 7/4), wet, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 5-10% very fine sand, all carbonate<br>**Silt (ML)** 10.0-11.6' - grayish orange, (10YR 7/4), wet, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 5-10% very fine sand, all carbonate | | |
| | 11.6 12.0 | 1.3 | SS-7 | 22-46-50/4" (96/10") | **Silt (ML)** 12.0-13.3' - Same as 10.0-11.6' | | |
| | 13.4 | | | | | | |
| | 14.0 | | | | | | |
| 15 27.3 | 16.0 | 1.7 | SS-8 | 29-41-46-50 (87) | **Silt (ML)** 14.0-15.7' - Same as 12.0-13.3' except trace sand | | |
| | 18.0 | 1.7 | SS-9 | 29-18-14-12 (32) | **Silt With Sand (ML)** 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. | | |
| 20 | | 2.0 | SS-10 | 21-41-40-19 (81) | **Silt With Sand (ML)** 18.0-20.0' - Same as 16.0-17.7' except moist | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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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 START : 4/24/2007 END : 5/1/2007 LOGGER : C. Dougherty, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.3 | 20.0 – 22.0 | 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 | | |
| | 22.0 – 24.0 | 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 – 24.5 | 0.5 | SS-13 | 50/5" (50/5") | **Sandy Silt To Silt With Sand (ML)** 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 grains decreasing with depth to 10-15%, all carbonate | | |
| 25 / 17.3 | 24.5 – 26.0 | 1.4 | SS-14 | 43-44-50/3" (94/9") | **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 clay in stringers <1/16" thick | | |
| | 26.0 – 28.0 | 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 / 12.3 | 28.0 – 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' | | |
| | 30.0 – 32.0 | 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 | | Driller's Remark: Some drill chatter 32.0-34.0' |
| | 32.0 – 34.0 | 0.0 | SS-18 | 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 | | Apparent top of rock at 34' |
| 35 / 7.3 | 34.0 – 40 | | | | **No Recovery 34.0'** Begin Rock Coring at 35.0 ft bgs See the next sheet for the rock core log | | 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 stroke |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 7.3 | 35.0 | | | | | | |
| | R1-HQ 5 ft 94% | 77 | 1 | 35.4' - Fracture, horizontal, rough, undulating | | **Limestone** 35.0-39.7' - light olive gray, (5Y 5/2), moderate to strong HCl reaction, medium strong (R3), small voids (1/16") over 20% of surface, few cavities up to 3/8", moderately fossiliferous | Rock coring begins at 35' below ground surface, continuing after soil boring from surface to 34' Water level at 07:35 hrs on 4/25/07 |
| | | | 1 | 36.2' - Fracture, 20 deg, rough, undulating, thin (1/16") infill of carbonate derived silt | | | |
| | | | 3 | 37.2' - Mechanical break, horizontal, rough, undulating, open up to 3/4" | | | |
| | | | 0 | 37.5' - Fracture, 50 deg, rough, undulating, black staining on faces, open 1/4-1/2", fossil cast on surface | | | |
| | | | 0 | 37.85' - Fracture, 10 deg, rough, undulating, fossil casts on surface, tight | | | R1: 9 minutes |
| 40 | 40.0 | | NR | | | **No Recovery 39.7-40.0'** | |
| 2.3 | | | | | | **Silt (ML)** 40.0-43.2' - dusky yellow, (5Y 6/4), wet, high dilatancy, fine sand up to 15%, very weakly indurated 40.8-41.2' | |
| | R2-HQ 5 ft 64% | 0 | NA | | | | |
| | | | NR | | | **No Recovery 43.2-45.0'** | R2: 5 minutes |
| 45 | 45.0 | | | | | | |
| -2.7 | | | 4 | 45.1, 45.2, 45.4' - Fractures or mechanical break (3), horizontal, rough, undulating, open 1/4" to 1/2" | | **Limestone** 45.0-49.2' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, extremely weak (R0), trace organics from 48.0-49.0' | Layers up to few inches thick of apparently non indurated material at 48.0-48.9' |
| | | | 4 | 45.9' - Mechanical break<br>46.15' - Mechanical break<br>46.4' - Fracture, 15 deg, rough, undulating, 1/16" of carbonate derived silt infilling | | | |
| | R3-HQ 5 ft 84% | 22 | 3 | 46.6' - Fracture, horizontal, rough, undulating, 1/16" of carbonate derived silt infilling | | | |
| | | | 1 | 46.7' - Mechanical break<br>47.2' - Mechanical break<br>47.7' - Mechanical break | | | |
| | | | 0 | 47.95' - Mechanical break | | | R3: 4 minutes |
| | | | NR | 48.4' - Mechanical break | | **No Recovery 49.2-50.0'** | |
| 50 | 50.0 | | | | | | |
| -7.7 | | | 2 | 50.5' - Fracture, 10-70 deg, rough, undulating, multiple fragments up to 1", 1/2-3" open | | **Limestone** 50.0-51.7' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, very weak (R1), trace organics, small voids (1/16") over 20% of surface, few larger (3/16"x3/8") cavities (molds/casts) | |
| | | | 0 | 50.95' - Fracture, horizontal, rough, undulating, open up to 1" | | | |
| | R4-HQ 5 ft 34% | 22 | NR | | | **No Recovery 51.7-55.0'** | R4: 7 minutes |
| 55 | 55.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-20 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -12.7 | | | 1 | | | **Limestone**<br>55.0-57.7' - Same as 50.0-51.7' | SC-1 collected at 55.0-55.8' |
| | | | 1 | 55.8' - Mechanical break<br>56.5' - Mechanical break, for special core | | 57.7-59.4' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, very weak to weak (R1 to R2), small (1/16") voids over about 30% of surface, few larger (up to 3/16") voids and fossil molds | |
| | R5-HQ<br>5 ft<br>94% | 60 | 3 | 57.5, 57.7' - Fractures (2), horizontal, rough, undulating, organic material on faces, open up to 1/2" | | | |
| | | | 3 | 57.7-58.0' - Fracture, vertical, rough, undulating, tight | | | |
| | | | >10 | 58.3' - Mechanical break | | | R5: 5 minutes |
| 60 | 60.0 | | NR | 58.8-59.5' - Fracture, vertical, rough, undulating, tight | | **Silty Sand (SM)**<br>59.4-59.7' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, carbonate derived<br>**No Recovery 59.7-60.0'** | |
| -17.7 | | | 3 | 58.8-59.3' - Fracture, 75 deg, rough, undulating, open to 1/4" | | | |
| | | | 1 | 60.1' - Fracture, horizontal, smooth, undulating, open to 1/4"<br>60.35' - Mechanical break | | **Limestone**<br>60.0-60.5' - Same as 55.0-57.7' except no organics | SC-2 collected at 60.9-61.95' |
| | R6-HQ<br>5 ft<br>84% | 57 | 1 | 60.9' - Fracture, 45 deg, rough, undulating, tight<br>61.95' - Fracture, 5 deg, smooth, undulating, open up to 1/4" | | 60.5-62.0' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, very weak to weak (R1 to R2), small (1/16") voids over up to 15% of surface | |
| | | | 2 | 62.4' - Fracture, horizontal, rough, undulating, carbonate derived silt infill about 0.1" thick | | | |
| | | | >10 | 63.0, 63.6' - Fractures (2), horizontal, rough, undulating, open up to 1/2" | | 62.0-62.8' - yellowish gray, (5Y 7/2), fine grained, moderate to strong HCl reaction, extremely weak (R0) | R6: 5 minutes |
| 65 | 65.0 | | NR | | | | |
| -22.7 | | | >10 | 65.3-65.7' - Fracture zone, fragments up to 2" | | 62.8-63.4' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, medium strong (R3), small (<1/16") voids over about 10% of surface<br>63.4-63.9' - Same as 62.0-62.8' | |
| | | | 3 | 65.7-66.15' - Mechanical break, vertical, rough, undulating, tight<br>66.15' - Mechanical break, 15 deg, rough, undulating, open up to 1/2" | | **Sand With Silt (SP-SM)**<br>63.9-64.2' - yellowish gray, (5Y 7/2), fine grained, carbonate derived<br>**No Recovery 64.2-65.0'** | |
| | R7-HQ<br>5 ft<br>90% | 58 | 1 | 66.5-66.95' - Mechanical break, 25 deg, rough, undulating<br>66.95' - Fracture, smooth, undulating, open up to 1/2" | | | SC-3 collected at 68.1-69.4' |
| | | | 1 | 67.4' - Fracture, horizontal, rough, undulating, open up to 1/2" | | **Limestone**<br>65.0-66.9' - pale yellowish brown, (10YR 6/2), fine grained, moderate HCl reaction, medium strong (R3), small (<1/16") voids cover about 25% of surface, few larger voids or cavities except in zones from 65.7-65.9' and 66.7-66.9' (about 10% coverage, voids up to 1/16" diameter), moderately fossiliferous, trace organics | |
| | | | 0 | 68.1' - Mechanical break | | | R7: 8 minutes |
| 70 | 70.0 | | NR | | | | |
| -27.7 | | | 0 | | | | |
| | | | 1 | | | | |
| | R8-HQ<br>5 ft<br>100% | 92 | 1 | 71.9' - Mechanical break<br>72.5' - Mechanical break, horizontal, smooth, undulating, along bedding plane, tight, organic material on faces | | 66.9-67.4' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, extremely weak (R0), trace organics<br>67.4-69.5' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, very fossiliferous, voids (fossil molds) up to 3/8" over about 30% of core surface<br>**No Recovery 69.5-70.0'** | |
| | | | 1 | 73.2' - Fracture, horizontal, smooth, undulating, coating of carbonate derived silt on faces | | | |
| | | | 1 | | | | R8: 7 minutes |
| 75 | 75.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-20 SHEET 5 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -32.7 | R9-HQ 5 ft 84% | 48 | 2<br>2<br>1<br>>10<br>>10<br>NR | 74.6' - Fracture, horizontal, smooth, undulating, coating of carbonate derived silt on faces<br>75.0-75.3' - Fracture zone, multiple fragments, possible mechanical break<br>75.3-75.5' - Fracture, 70 deg, rough, undulating, possible mechanical break<br>76.3-76.5' - Fracture zone, multiple fragments<br>76.9' - Fracture, horizontal, rough, undulating, tight<br>77.4-77.8' - Fracture, 65 deg, rough, undulating, coating of carbonate derived silt<br>78.2-79.2' - Fracture zone | | **Limestone**<br>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<br>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. Slightly harder zones from 73.6-74.2' and 74.7-75.0', with small (<1/16") voids covering about 25% of surface<br>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<br>78.2-79.2' - light olive gray, (5Y 5/2), moderate HCl reaction, extremely weak (R0), mixed with carbonate derived fine sand and silt<br>**No Recovery 79.2-80.0'** | R9: 8 minutes |
| 80 | 80.0 | | | | | | |
| -37.7 | R10-HQ 5 ft 90% | 43 | >10<br>>10<br>1<br>0<br>0<br>NR | 80.0-80.7' - Fracture zone, multiple fragments, up to 1-1/2"<br>81.8-82.7' - Fracture zone (2), multiple fragments, up to 2"<br>82.9-83.4' - Fracture, vertical, tight | | | SC-4 collected at 80.7-81.8'<br>R10: 6 minutes |
| 85 | 85.0 | | | | | | |
| -42.7 | R11-HQ 5 ft 100% | 70 | 3<br>0<br>1<br>0<br>>10 | 85.5' - Fracture, horizontal, rough, undulating, coating of carbonate derived silt<br>85.7' - Fracture, 45 deg, rough, undulating, open up to 1/2"<br>86.0' - Fracture, horizontal, rough, undulating, open up to 1/2"<br>87.4' - Mechanical break<br>87.8' - Mechanical break<br>89.1-90.0' - Fracture zone, multiple fragments up to 3" | | **Limestone**<br>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.<br>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<br>**No Recovery 84.5-85.0'** | SC-5 collected at 87.8-89.1'<br>R11: 8 minutes |
| 90 | 90.0 | | | | | | |
| -47.7 | R12-HQ 5 ft 62% | 10 | >10<br>>10<br>>10<br>>10<br>NR | 90.3-91.3' - Fracture zone, multiple fragments up to 2", most are 1/2-3/4", some fragments with organic material and coating of brown silt and fine sand<br>91.75-93.1' - Fracture zone | | **Limestone**<br>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<br>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<br>**No Recovery 93.1-95.0'** | R12: 7 minutes |
| 95 | 95.0 | | | | | | |

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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 : 1.61 ft bgs on 6/14/07 START : 4/24/2007 END : 5/1/2007 LOGGER : C. Dougherty, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -52.7 | | | >10 | 95-95.9' - Fracture zone | | **Limestone** 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 | |
| | | | 2 | 95.9-96.3' - Fracture, vertical, rough, undulating, open up to 1/4" | | | |
| | R13-HQ 5 ft 98% | 58 | 0 | 96.6' - Fracture, horizontal, rough, undulating, multiple fragments<br>97.5' - Mechanical break | | 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' | |
| | | | 2 | 98.1, 98.5' - Fractures (2), 65 deg, rough, undulating, tight | | | |
| | | | 2 | 99.1-99.7' - Fracture, 60 deg, rough, undulating, tight | | | R13: 10 minutes |
| 100 | 100.0 | | NR | 99.2' - Fracture, 60 deg, rough, undulating, tight | | | |
| -57.7 | | | 3 | 100.2' - Fracture, horizontal, smooth, undulating, open to 1/2", black staining on surface (70%) | | 99.5-99.9' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), laminated bedding , few small (<1/16") voids | |
| | | | 0 | 100.7-100.9' - Fracture zone<br>101.35' - Mechanical break | | **No Recovery 99.9-100.0'** | |
| | R14-HQ 5 ft 94% | 53 | 1 | 102.5' - Mechanical break | | **Limestone** 100.0-100.9' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, very weak (R1), trace organics | SC-6 collected at 101.35-102.5' |
| | | | 1 | 103.0-104.0' - Fracture, 70 deg, rough, undulating | | 100.9-104.7' - light olive gray, (5Y 5/2), fine grained, medium strong (R3), small (1/16") voids over 30% of surface, larger cavities (3/16" to 1-3/16") over <5%, moderately fossiliferous, a cavity about 1-3/16"x2" is present at about 103.3' | |
| | | | 1 | 104.0-104.7' - Fracture, vertical, rough, undulating | | | R14: 6 minutes |
| 105 | 105.0 | | NR | | | **No Recovery 104.7-105.0'** | |
| -62.7 | | | 1 | | | **Limestone** 105.0-110.0' - Same as 100.9-104.7' except larger cavity (3/16"x1-9/16") at 108.1 and 109.0' | |
| | | | 1 | 105.9' - Mechanical break | | | |
| | R15-HQ 5 ft 100% | 93 | 2 | 106.6' - Fracture, 45 deg, rough, undulating, open up to 1/8"<br>107.0-107.3' - Fracture zone, multiple fragments, up to 1-1/2" | | | |
| | | | 2 | 107.85' - Fracture, 45 deg, rough, undulating, open up to 1/8"<br>108.15' - Fracture, 20 deg, rough, undulating, tight | | | SC-7 collected at 108.85-110.0' |
| | | | 0 | 108.6' - Fracture, 40 deg, rough, undulating, tight | | | R15: 8 minutes |
| 110 | 110.0 | | | | | | |
| -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' |
| | | | 1 | | | | |
| | R16-HQ 5 ft 96% | 82 | 2 | 111.8-112.1' - Fracture, 45 deg, rough, undulating, dark staining on 5% of surface, open <1/8"<br>112.1-112.6' - Fracture, 65 deg, open up to 1/4" | | | R16: 8 minutes |
| | | | 1 | 112.5-112.7' - Fracture, 45 deg, tight<br>113.25-113.45' - Fracture, 55 deg, tight | | | |
| | | | 0 | 113.65, 114.5' - Mechanical break (2) | | | |
| 115 | 115.0 | | | | | | |

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|---|---|
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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 : 1.61 ft bgs on 6/14/07 START : 4/24/2007 END : 5/1/2007 LOGGER : C. Dougherty, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -72.7 | | | NR | | | **No Recovery 114.8-115.0'** | |
| | | | NA | | | **Silty Sand (SM)** | |
| | | | 0 | 115.5-116.3' - Fracture zone | | 115.0-115.5' - light olive gray, (5Y 5/2), fine grained, strong HCl reaction, carbonate derived | |
| | | | 1 | 116.25-116.5' - Fracture, 65 deg, rough, undulating, open | | **Limestone** | |
| | R17-HQ 5 ft 78% | 37 | 1 | 117.5' - Mechanical break<br>117.7' - Mechanical break | | 115.5-118.2' - yellowish gray, (5Y 7/2), moderate HCl reaction, medium strong (R3), fine grained, moderately fossiliferous, (casts and molds), small (<1/16") voids cover about 20% of core surface, several large (3/8"x3/4") voids below 117.5' | |
| | | | NA | | | | |
| | | | NR | | | | R17: 7 minutes |
| 120 | 120.0 | | | | | **Silty Sand (SM)**<br>118.2-118.9' - Same as 115.0-115.5' | |
| -77.7 | | | | | | **No Recovery 118.9-120.0'** | |
| | | | 1 | | | **Limestone** | |
| | | | 0 | 120.8' - Fracture, horizontal, rough, undulating, open up to 1/2" | | 120.0-124.6' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, weak (R2), moderately fossiliferous, particularly from 120.0-121.0, small (1/16") voids over 25% of surface, larger (3/8"x3/4") voids (fossil molds) 5-10% of surface from 120.0-121.0' | |
| | R18-HQ 5 ft 96% | 85 | 2 | 122.4' - Mechanical break<br>122.65' - Fracture, horizontal, smooth, planar, open up to 1/4", coating of carbonate derived sandy silt | | | SC-9 collected at 122.8-123.9' |
| | | | 1 | 122.8' - Fracture, 45 deg, rough, undulating, open up to 1/8", coating of carbonate derived sandy silt | | | |
| | | | 1 | | | | |
| 125 | 125.0 | | NR | 123.9' - Fracture, 30 deg, rough, undulating, open up to 1/2" | | 124.6-124.8' - Same as 120.0-124.6' except medium strong (R3), 3/16" fossil molds/casts on 5% of surface, small (<1/16") voids on 10% of surface | |
| -82.7 | | | 2 | 124.2' - Fracture, horizontal, rough, undulating, open up to 1/4" | | **No Recovery 124.8-125.0'** | |
| | | | 3 | 125.1-125.4, 125.2-125.4' - Fractures (2), 60 deg, rough, undulating, tight | | **Limestone** | |
| | R19-HQ 5 ft 86% | 68 | 1 | 126.45, 126.6' - Fractures (2), horizontal, smooth, undulating, coating of carbonate derived silt on faces, open up to 1/8"<br>126.9' - Mechanical break | | 125.0-129.3' - light olive gray, (5Y 5/2), moderate HCl reaction, medium strong to strong (R3 to R4), laminated bedding with areas of few small voids and light gray (N7) color to 126.5, zone of larger (3/8") cavities from 127.4-127.8 | |
| | | | 2 | 127.7' - Fracture, horizontal, smooth, undulating, coating of carbonate derived silt on faces | | | SC10 collected at 127.7-128.6' |
| | | | 0 | 128.6' - Fracture, 45 deg, rough, undulating, open up to 1/8" | | | R19: 7 minutes |
| 130 | 130.0 | | NR | 128.7' - Fracture, horizontal, smooth, undulating, open up to 1/4" | | **No Recovery 129.3-130.0'** | |
| -87.7 | | | 2 | 130.4' - Mechanical break | | **Limestone**<br>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"<br>131.65' - Fracture or mechanical break, 35 deg, rough, undulating | | | |
| | R20-HQ 5 ft 94% | 40 | >10 | 131.8-132.8' - Fracture zone, multiple fragments | | | |
| | | | 3 | 131.1, 133.6' - Fractures (2), horizontal, smooth, planar, coating of carbonate derived silt, open to 1/4" | | 133.0-134.2' - light olive gray, (5Y 5/2), moderate HCl reaction, very weak (R1), small (1/16" voids) over 50% surface, larger (up to 3/8") over <5% of surface | |
| | | | 4 | 133.9' - Fracture, 15 deg, rough, undulating, coating of silt, open | | | R20: 7 minutes |
| 135 | 135.0 | | NR | | | | |

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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 : 1.61 ft bgs on 6/14/07 START : 4/24/2007 END : 5/1/2007 LOGGER : C. Dougherty, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -92.7 | | | 4 | 134.2, 134.5, 134.6' - Fractures (3), smooth, planar, along bedding planes, coating of silt | | **Limestone** | |
| | | | >10 | 135.2, 135.4, 135.6, 138.8' - Fractures (4), horizontal, smooth, planar, no stains, open 1/8-1/4" | | 134.2-134.7' - yellowish gray and light olive gray, (5Y 7/2 and 5Y 5/2), fine grained, mild to moderate HCl reaction, thinly laminated bedding. Yellowish gray areas are very weak rock (R1) with small (<1/16") voids over 30% of area. Olive gray areas have no small voids, medium strong rock (R3). Cavities up to 3/8"x1-3/16" are along bedding planes. | |
| | R21-HQ 5 ft 98% | 40 | 0 | 136.1-137.0' - Fracture zone, horizontal, smooth to rough, open up to 1/4" 137.0, 137.4, 138.45' - Mechanical break (3) | | | SC-11 collected at 137.4-138.45' |
| | | | 1 | 138.7-139.2' - Fracture, 60 deg, rough, undulating, tight | | **No Recovery 134.7-135.0'** | R21: 8 minutes |
| | | | 1 | 139.3' - Fracture, horizontal, rough, undulating, coating of carbonate-derived silt, open up to 1/2" | | **Limestone** 135.0-139.2' - Same as 133.0-134.2' except with thinly laminated bedding from 135.0-136.1' and predominantly the stronger light olive gray rock 139.2-139.9' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, very weak (R1), small (<1/16") voids over about 25% surface larger (3/16") voids over 5% of surface | |
| 140 | 140.0 | | NR | | | | |
| -97.7 | | | 0 | | | **No Recovery 139.9-140.0'** | Driller's Remark: Loss of circulation at 141' |
| | | | >10 | 141.3-142.7' - Fracture zone, fragments up to 2" | | **Silt (ML)** 140.0-140.5' - light olive gray, (5Y 5/2), carbonate derived | |
| | R22-HQ 5 ft 80% | 25 | >10 | | | | |
| | | | >10 | | | | R22: 9 minutes |
| | | | NR | | | **Limestone** 140.5-141.1' - yellowish gray and medium light gray, (5Y 7/2 and N6), fine grained, strong HCl reaction, medium strong to strong (R3 to R4), very fossiliferous. 141.1-144.0' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, weak (R2), very fossiliferous | |
| 145 | 145.0 | | | | | | |
| -102.7 | | | 3 | | | | |
| | | | 3 | 146.0' - Fracture, horizontal, rough, undulating 146.1' - Fracture, 10 deg, rough, planar, black staining on surface | | | |
| | R23-HQ 5 ft 64% | 42 | 1 | 146.15' - Fracture, 65 deg, rough, undulating, dark staining on surface | | | SC-12 collected at 147.1-148.2' |
| | | | 0 | 146.5, 146.63' - Fractures (2), smooth, planar, dark staining on surface | | **No Recovery 144.0-145.0'** | |
| | | | NR | 147.05' - Fracture, horizontal, rough, undulating, possible mechanical break | | **Limestone** 145.0-146.0' - yellowish gray, (5Y 7/2), strong HCl reaction, weak to medium strong (R2 to R3), few small (1/16") voids, poorly fossiliferous 146.0-147.05' - yellowish gray, (5Y 7/2), moderate HCl reaction, weak to medium strong (R2 to R3), moderately fossiliferous, small (<1/16") voids cover about 10% of core, few larger (3/16") voids, laminated bedding at about 146.5' | R23: 6 minutes |
| 150 | 150.0 | | | | | | |
| -107.7 | | | 2 | 150.35' - Fracture, horizontal, rough, planar, open up to 1/4" | | | |
| | | | 2 | 150.85' - Fracture, 15 deg, rough, planar, tight 151.3-152.1' - Fracture, 60-40 deg, rough, undulating, open up to 1/8" | | | |
| | R24-HQ 5 ft 94% | 70 | 1 | 151.6' - Fracture, horizontal, rough, undulating, open up to 1/8" | | 147.05-148.2' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, small (1/16") voids over 40% of surface | |
| | | | 0 | 152.95' - Fracture, 45 deg, rough, undulating, tight | | **No Recovery 148.2-150.0'** | |
| | | | >10 | 154.0-154.7' - Fracture zone, multiple fragments up to 1-1/2" | | **Limestone** 150.0-151.8' - Same as 147.05-148.2' except gradual contact at bottom | R24: 8 minutes |
| 155 | 155.0 | | NR | | | | |

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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 : 1.61 ft bgs on 6/14/07 START : 4/24/2007 END : 5/1/2007 LOGGER : C. Dougherty, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -112.7 | R25-HQ 5 ft 92% | 58 | 5 | 155.1, 155.4, 155.5, 155.6' - Fractures (4), smooth, planar, staining present on faces at 155.4' and 155.5' | | **Limestone** 151.8-154.0' - light olive gray, (5Y 5/2), fine grained, mild HCl reaction, medium strong to strong (R3 to R4), fossiliferous (casts and molds), small (<1/16") voids cover 15% of surface, few clasts (<3/16") of lighter colored material, laminated bedding from 153.5 -154.0 | SC-13 collected at 155.6-156.5' |
| | | | 2 | 155.2-155.45' - Fracture, 45 deg, rough, undulating | | | |
| | | | 1 | 156.65, 156.7' - Fractures (2), horizontal, smooth, undulating, open up to 1/2" | | | |
| | | | >10 | 157.9-158.1' - Fracture, 45 deg, rough, undulating, dark staining on faces (50% of area) | | 154.0-154.7' - light olive gray, (5Y 5/2), moderate HCl reaction, weak (R2), small (1/16") voids over 20% of surface | |
| | | | 1 | 158.3-158.9' - Fracture zone, most fractures appear to be horizontal | | **No Recovery 154.7-155.0'** | R25: 7 minutes |
| 160 | 160.0 | | NR | 159.5' - Fracture, horizontal, smooth, planar | | **Limestone** | End of drilling for 4/25/07, 160' at 15:45. |
| -117.7 | R26-HQ 5 ft 42% | 27 | 1 | 160.0-160.3' - Fracture zone, multiple fragments up to 1-1/2" | | 155.0-155.5' - Same as 154.0-154.7' except with irregular uneven thinly laminated bedding | Resume coring at about 07:35, 4/26/07 |
| | | | 2 | 161.1' - Fracture, horizontal, smooth, planar, open up to 1/8" | | 155.5-158.0' - light olive gray, (5Y 5/2), moderate HCl reaction, medium strong (R3), poorly fossiliferous, gradual contact below, few small (<1/16") voids | Core barrel was clogged. Barrel was cleared and run completed. |
| | | | 1 | 161.4' - Fracture, horizontal, open up to 1" | | | |
| | | | NR | 162.0' - Mechanical break | | 158.0-158.9' - moderate olive brown, (5Y 4/4), fine grained, mild HCl reaction, weak (R2), small (<1/16") voids cover about 50% of surface | Rock fragments at top of run are probably pieces from first attempt; bit marks in 2 directions are on some fragments |
| | | | | | | 158.9-159.6' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, medium strong to strong (R3 to R4), few small (<1/16") voids, group of healed vertical fractures from 158.9-159.3' | End of R26-HQ fits together with start of R27-HQ |
| 165 | 165.0 | | | | | | R26: 4 minutes |
| -122.7 | R27-HQ 5 ft 84% | 38 | 2 | 165.2' - Fracture, 15 deg, rough, undulating, open to up to 1/4" | | **No Recovery 159.6-160.0'** | |
| | | | 4 | 165.5' - Fracture, horizontal, rough, undulating, open up to 1/2" | | **Limestone** 160.0-161.5' - moderate yellowish brown, (5Y 4/4), fine grained, mild HCl reaction, medium strong (R3), small (<1/16") voids cover about 25% of core surface, thin (1/2") zones have no small voids | |
| | | | 2 | 166.1' - Fracture, horizontal, rough, undulating, open up to 1/2" | | | |
| | | | 3 | 166.55-167.2' - Fracture zone, horizontal, smooth, planar, spaced at about 0.05' | | | |
| | | | 0 | 167.7' - Fracture, horizontal, smooth to planar on one side, rough to undulating on the other, open to about 3/4" | | 161.5-162.1' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, strong (R4), small (<1/16") voids, few fossil molds and casts | R27: 6 minutes |
| | | | NR | 168.3' - Fracture, horizontal, rough, undulating, dark staining on 40% of surface, open to 1/4" | | **No Recovery 162.1-165.0'** | |
| 170 | 170.0 | | | | | **Limestone** | End of core at 169.2' fits together with start of core at 170.0' |
| -127.7 | R28-HQ 5 ft 100% | 85 | 0 | 168.3-168.7' - Fracture, 75 deg, rough, undulating, open <1/4" | | 165.0-168.0' - Same as 161.5-162.1' except except larger voids and fossil molds/casts (3/16") over 5% of area from 165.0-166.3', laminated bedding at 166.0-167.5' | |
| | | | 0 | 168.9' - Mechanical break | | | |
| | | | 2 | 172.1' - Fracture, horizontal, rough, undulating on one face, smooth to planar on the other, open up to 1/2" | | 168.0-169.2' - light olive gray, (5Y 5/2), moderate HCl reaction, weak (R2), small (1/16") voids over 15% of surface, clasts of light gray (N7), limestone up to 3/16"x1-3/16" cover <5% of surface, clasts are oriented horizontally | SC-14 collected at 172.0-172.85' |
| | | | 3 | 172.95' - Fracture, horizontal, rough, undulating, coating of carbonate derived silt on one face, open up to 1/2" | | | |
| | | | 3 | 173.15-173.3' - Fracture, 45 deg, rough, undulating, tight | | | R28: 6 minutes |
| 175 | 175.0 | | | | | **No Recovery 169.2-170.0'** | |

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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 : 1.61 ft bgs on 6/14/07 START : 4/24/2007 END : 5/1/2007 LOGGER : C. Dougherty, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -132.7 | R29-HQ 5 ft 72% | 23 | 5 | 173.7, 173.9' - Fractures (2), horizontal, smooth, planar, open up to 1/4" | | **Limestone** 170.0-172.0' - Same as 168.0-169.2' except moderately fossiliferous (molds and casts), gray clasts now 5% of core, area of 3/16" to 3/8" voids from 171.0-171.6 | |
| | | | 1 | 174.0, 174.4, 174.5' - Fractures (3), horizontal, rough, undulating, coating of silt infill at 174.0', open up to 1/2" | | | |
| | | | >10 | 175.2, 175.3, 175.35, 175.6, 175.7' - Fractures (5), horizontal, rough, planar, open 1/8" to 1/4" | | 172.0-173.7' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, medium strong (R3), small (1/16") voids over 15% of surface | |
| | | | 2 | 175.7-176.2' - Fractures (2), 70 deg, rough, undulating, tight | | 173.7-175.0' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, weak (R2), small (<1/16") voids cover about 20% of core surface | |
| | | | NR | 177.2' - Fracture, horizontal, rough, undulating, tight<br>177.4-178.2' - Fracture zone<br>178.3' - Fracture, smooth, undulating, open up to 1/8" | | | R29: 4 minutes |
| 180 | 180.0 | | | | | | |
| -137.7 | R30-HQ 5 ft 90% | 13 | 2 | 178.4' - Fracture, 45 deg, rough, undulating, open <1/8"<br>180.0-180.6' - soil and rock fragments | | 175.0-178.0' - Same as 173.7-175.0' except with larger (3/8"x3/8") cavities from 175.7-177.4' and fewer small (1/16") voids below 176.0' | |
| | | | >10 | 180.1,180.95' - Fractures (2), horizontal, smooth, planar, coating of carbonate derived silt, open up to 1/8" | | 178.0-178.6' - yellowish gray and light olive gray, (5Y 7/2 and 5Y 5/2), fine grained, mild HCl reaction, medium strong to strong (R3 to R4), thinly laminated bedding with few small (1/16") voids (bedding about 1/2" thick) | |
| | | | 3 | 181.1-181.7' - Fracture zone<br>182.0' - Fracture, 20 deg, rough, undulating, open up to 1/8" | | **No Recovery 178.6-180.0'** | |
| | | | 4 | 182.3' - Fracture, horizontal, rough, undulating, coating of carbonate derived silt, open to 1/4" | | **Silty Sand (SM)** 180.0-180.4' - moderate olive brown, (5Y 4/4), fine grained, mild HCl reaction, carbonate derived | R30: 9 minutes |
| | | | 1 | 182.7' - Fracture, horizontal, rough, undulating, rock fragments up to 1", open | | | |
| 185 | 185.0 | | NR | 183.0, 183.2, 183.4, 183.5' - Fractures (4), horizontal, rough, undulating, open from 1/4 to 1/2" | | | |
| -142.7 | R31-HQ 5 ft 100% | 52 | 1 | 184.3' - Fracture, horizontal, smooth, undulating, open up to 3/8" | | **Limestone** 180.4-181.1' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, medium strong (R3), thinly laminated bedding , few small (<1/16") voids | SC-15 collected at 185.6-186.35' |
| | | | 7 | 185.5' - Fracture, 30 deg, rough, undulating, dark staining on 40% of surface, tight | | 181.1-183.5' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, very weak to strong (R1 to R4), few small (<1/16") voids, few fossil molds/casts (3/16"), large (3/8"x1-3/16") void at 183' | |
| | | | 4 | 186.4-187.0' - Fractures (6), horizontal, smooth, planar, except at 186.4' which is rough and undulating, all are open up to about 1/4" | | | |
| | | | 3 | 186.8-187.0' - Fracture, vertical, rough, undulating, tight | | | |
| | | | 3 | 187.1' - Fracture, horizontal, smooth, planar, open up to 1/4"<br>187.4, 187.5, 187.6' - Fractures (3), horizontal, rough, undulating, open up to 1/2" | | 183.5-184.5' - yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, weak to medium strong (R2 to R3), small (<1/16") voids cover about 25% of surface, larger (3/16") voids and fossil molds are about 5%, moderately fossiliferous | R31: 10 minutes |
| 190 | 190.0 | | | | | | |
| -147.7 | R32-HQ 5 ft 90% | 65 | 3 | 188.0' - Fracture, 15 deg, rough, undulating, coating of carbonate derived silt, dark staining on 50% of surface, open to 1" | | **No Recovery 184.5-185.0'** | |
| | | | 1 | 188.2' - Fracture, horizontal, rough, undulating, open up to 1/2" | | **Limestone** 185.0-186.6' - Same as 183.5-184.5' except few fossil casts/molds, few larger voids. | |
| | | | 1 | 188.8' - Fracture, horizontal, smooth, undulating, open up to 1/2"<br>188.8-189.0' - Fracture, vertical, rough, undulating, tight | | 186.6-187.5' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, strong (R4), laminated bedding (1/2"-1" thick), small (<1/16") voids present in alternating bedding laminations | |
| | | | 3 | 189.7' - Fracture, horizontal, rough, undulating, dark staining on 70% of surface | | | |
| | | | 1 | 189.9' - Fracture, 55 deg, smooth, undulating<br>190.2' - Fracture, horizontal, smooth, undulating, open up to 1/8" | | | R32: 9 minutes |
| 195 | 195.0 | | NR | | | | |

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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 : 1.61 ft bgs on 6/14/07 START : 4/24/2007 END : 5/1/2007 LOGGER : C. Dougherty, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -152.7 | R33-HQ 5 ft 94% | 23 | 1 | 190.6' - Fracture, 5 deg, rough, planar, open up to 1/4" | | **Limestone** 187.5-188.7' - yellowish gray, (5Y 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 | SC-16 collected at 195.5-196.8' |
| | | | 2 | 190.9' - Fracture, horizontal, rough, undulating, fragments, open up to 1" | | | |
| | | | >10 | 191.1-191.3' - Fracture, 45 deg, rough, undulating, tight | | | |
| | | | >10 | 192.1' - Fracture, horizontal, rough, undulating, open up to 1/4" | | | |
| | | | 0 | 193.3' - Fracture, horizontal, rough, undulating, tight | | | |
| 200 | 200.0 | | NR | 193.7, 193.8' - Fractures (2), horizontal, rough, undulating, open up to 3/4" | | | |
| -157.7 | R34-HQ 5 ft 100% | 48 | 6 | 195.0-195.5' - rock fragments with rough and undulating surfaces | | 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 | R33: 7 minutes |
| | | | >10 | 196.8' - Fracture, 45 deg, rough, undulating, tight | | 190.0-190.5' - light olive gray, (5Y 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 | End of drilling, 200', 4/25/07 at 10:57 |
| | | | 4 | 169.9-197.3' - Fracture, 70 deg, rough, undulating, open up to 1/2" | | | Resume drilling 5/1/07 R. McComb is the logging person from 200' to the end of borehole |
| | | | 0 | 197.4-197.8' - Fracture, 60 deg, rough, undulating, open up to 1/8" | | 190.5-191.0' - moderate olive brown, (5Y 4/4), fine grained, mild to moderate HCl reaction, medium 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. | |
| | | | 1 | 197.8-198.5' - Fracture zone, multiple fragments up to 3" long | | | |
| 205 | 205.0 | | | 200.1' - Fracture, <5 deg, rough, undulating, loose | | | |
| -162.7 | R35-HQ 5 ft 97% | 52 | 1 | 200.2' - Fracture, <5 deg, rough, stepped, loose | | 191.0-194.5' - dusky yellow to light olive, (5Y 6/4 to 5Y 5/2), fine grained, mild HCl reaction, weak to medium strong (R2 to R3), with dusky yellow areas being weaker, crenelated 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' | SC-17 collected at 202.95-204.05' |
| | | | 3 | 200.55, 200.82' - Fractures (2), horizontal, rough, undulating, loose | | | R34: 9 minutes |
| | | | 1 | 200.9, 200.95' - Fractures (2), horizontal, smooth, stepped, loose | | | |
| | | | 0 | 200.95-201.85' - Fracture zone, horizontal, rough, stepped to undulating, loose | | | |
| | | | 3 | 202.25' - Fracture, 20 deg, rough, stepped, loose | | | |
| | | | 1 | 202.35' - Fracture, 40 deg, rough, stepped to undulating, loose | | | |
| | | | 0 | 202.8' - Fracture, horizontal, rough, stepped to undulating, loose | | **No Recovery 194.5-195.0'** | |
| | | | 3 | 202.95' - Fracture, horizontal, smooth, planar, loose | | **Limestone** 195.0-198.0' - yellowish gray, (5YR 7/2), moderate HCl reaction, weak to medium strong (R2 to R3), very fossiliferous, small voids (1/16") over 30% of surface, larger (3/16") cavities over < 5% of surface (molds/casts) | SC-18 collected at 207.55-209.04' |
| 210 | 210.0 | | NR | 204.05' - Fracture, 40 deg, rough, stepped, tight | | | R35: 6 minutes |
| -167.7 | R36-HQ 5 ft 80% | 0 | >10 | 205.4' - Fracture, <5 deg, rough, stepped, 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 about 10% coverage | |
| | | | >10 | 206.2' - Fracture, 0-90 deg, rough, stepped, tight | | **No Recovery 199.7-200.0'** | |
| | | | >10 | 206.8, 206.9' - Fractures (2), 40 deg, rough, stepped, loose | | | |
| | | | >10 | 207.7' - Fracture, 70 deg, rough, stepped, loose | | | |
| | | | >10 | 209.01' - Fracture, horizontal, smooth, planar, loose | | | |
| | | | >10 | 209.1, 209.27' - Fracture (2), <5 deg, smooth, undulating, loose | | | |
| | | | >10 | 210.1' - Fractures (2), horizontal, smooth, planar, loose | | | |
| | | | NR | 210.3' - Fracture, 60 deg, smooth, stepped, loose | | | R36: 5 minutes |
| 215 | 215.0 | | | 210.5, 210.6' - Fractures (2), horizontal, smooth, planar, loose | | | |

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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 : 1.61 ft bgs on 6/14/07 START : 4/24/2007 END : 5/1/2007 LOGGER : C. Dougherty, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -172.7 | R37-HQ 5 ft 98% | 55 | 3 | 210.9' - Fracture, <5 deg, rough, stepped, loose<br>210.9-211.5' - Fracture zone, various orientations, rock fragments | | **Limestone**<br>200.0-205.0' - yellowish gray, (5Y 7/2), very fine grained, weak to medium strong (R2 to R3), cavities up to 1/16" over to 40% of surface (more common 204.0-205.0) with zone of cavities interbedded with zones of few cavities. Cavities typically 1/16"x1/16" (casts/molds), largest is 2"x1/2" at 203.55 | |
| | | | 2-10 | 211.5' - Fracture, 20 deg, rough, stepped, loose | | | |
| | | | 3-10 | 212.0, 212.1' - Fractures (2), 40 deg, rough, undulating, loose<br>212.25, 212.55' - Fractures (2), <5 deg, rough, undulating, loose | | | SC-19 collected at 217.45-218.25' |
| | | | >10 | 212.8-213.1' - Fracture zone, 40-0 deg, rough, loose | | | |
| | | | >10 | 213.3, 213.45' - Fractures (2), <5 deg, rough, stepped, loose | | **Limestone**<br>205.0-206.0' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), fine to very fine grained, weak (R2), with angular medium strong (R3) limestone fragments (brecciated), cavities cover 50% in fine grained material, about 3-5% in fine grained angular limestone rock fragments | R37: 6 minutes |
| 220 | 220.0 | | NR | 213.75, 213.85' - Fractures (2), horizontal and vertical, rough, stepped, loose | | | |
| -177.7 | R38-HQ 5 ft 66% | 14 | >10 | 214.0' - Fracture, horizontal, rough, undulating, loose | | 206-208.7' - light olive gray, (5Y 5/2), fine to very fine grained, mild HCl reaction, very weak (R1), cavities of 1/16" to 1/32" covering 40-50% of surface, trace fossil casts/molds | |
| | | | 3 | 215.1' - Fracture, horizontal, smooth, undulating, loose<br>215.6, 215.75' - Fractures (2), <5 deg, rough, stepped, loose | | | |
| | | | >10 | 216.2' - Fracture, <5 deg, rough, undulating, loose | | 208.7-209.85' - yellowish gray, (5Y 7/2), very fine grained, moderate HCl reaction, very weak (R1), voids/cavities up to 3/8"x3/8" covering 30-40% of surface, becoming very thinly laminated with depth | |
| | | | 0 | 216.65' - Fracture, 40 deg, rough, undulating, loose | | | |
| | | | NR | 216.85-217.1' - Fracture zone, 0-90 deg, rough, undulating to stepped, loose<br>217.45' - Fracture, <5 deg, rough, undulating, loose | | | R38: 5 minutes |
| 225 | 225.0 | | | | | | |
| -182.7 | R39-HQ 5 ft 70% | 12 | >10 | 218.3' - Fracture, horizontal, smooth, stepped, loose<br>218.45-219.3' - Fracture zone, 0-90 deg, smooth to rough, undulating, loose | | **No Recovery 209.85-210.0'**<br>**Limestone**<br>210.0-210.6' - Same as 208.7-209.85' except voids <10%<br>210.6-211.4' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, very weak (R1), cobble- to gravel-sized limestone, voids up to 1/16" covering 20-30%, trace fossil mold/casts | |
| | | | 3 | 219.3' - Fracture, <5 deg, rough, stepped, loose | | | |
| | | | >10 | 220.01-220.45' - Fracture zone, various orientations<br>220.85' - Fracture, 50 deg, rough, stepped, loose | | | |
| | | | >10 | 221.2' - Fracture, 20 deg, smooth, planar, loose | | | |
| | | | NR | 221.65' - Fracture, 60 deg, rough, undulating, loose<br>221.85' - Fracture, <5 deg, rough, stepped to undulating, loose | | 211.4-213.3' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), extremely weak (R0), voids and cavities up to 1"x1-3/16" cover 100% of surface, fossil molds/casts | R39: 7 minutes |
| 230 | 230.0 | | | | | | |
| -187.7 | R40-HQ 5 ft 48% | 8 | >10 | 222.3' - Fracture, 0-50 deg, rough, stepped, loose | | 213.3-214.0' - light olive gray to yellowish gray, (5Y 5/2 to 5Y 7/2), fine grained, weak (R2), interlaminated with very fine grained, weak (R2) limestone | |
| | | | >10 | 222.55-222.7, 222.9 - 223.1' - Fracture zone, horizontal, rough, stepped, loose<br>225.0-226.0' - Fracture zone, limestone fragments, various orientations | | **No Recovery 214.0-215.0'**<br>**Limestone**<br>215.0-218.4' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, very weak to weak (R1 to R2), coarser grained limestone with voids and cavities up to 3/8"x3/16" over 30-40% of surface, fossiliferous (molds/casts), | |
| | | | 0 | 226.55' - Fracture, horizontal, rough, stepped, loose | | | |
| | | | NR | 226.7, 226.85' - Fractures (2), horizontal, smooth, planar, loose<br>227.1-227.6' - Fracture zone, 0-90 deg, rough, stepped<br>227.6' - Fracture, horizontal, smooth, loose<br>227.6-227.8' - Fracture, vertical, rough, stepped, tight | | | R40: 5 minutes |
| 235 | 235.0 | | | | | | |

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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 : 1.61 ft bgs on 6/14/07 START : 4/24/2007 END : 5/1/2007 LOGGER : C. Dougherty, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (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 | 227.8-228.8' - Fracture zone, 0-90 deg, rough, stepped to undulating, loose<br>230.1' - Fracture, 0-40 deg, rough, stepped, loose<br>230.7' - Fracture, 30 deg, smooth to rough, stepped, loose<br>230.7-232.4' - Fracture zone, 0-90 deg, smooth to rough, stepped to planar, loose to tight<br>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<br>**No Recovery 219.9-220.0'**<br>**Limestone**<br>220.0-220.1' - yellowish gray, (5Y 7/2), very fine grained, strong HCl reaction, weak (R2), no voids/cavities<br>**Limestone**<br>220.1-220.5' - dusky yellow, (5Y 6/4), moderate HCl reaction, weak to very weak (R2 to R1), cavities/voids up to 3/8"x3/8" over 20-30%, sharp contact with underlying limestone<br>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"<br>221.9-223.3' - yellowish gray, (5Y 7/2), fine grained, mild HCl 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<br>**No Recovery 223.3-225.0'**<br>**Limestone**<br>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'<br>**No Recovery 228.5-230.0'**<br>**Limestone**<br>230.0-232.4' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate to strong HCl reaction, weak to very weak (R2 to R1), trace fossil molds/casts, voids (<1/16") covering 5-10% with occasional 20-30% coverage in fine grained limestone<br>**No Recovery 232.4-235.0'**<br>**Limestone**<br>235.0-236.0' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, very weak (R1), voids <1/16" over 50-60% of surface<br>**No Recovery 236.0-240.0'** | R41: 4 minutes<br>R42: 5 minutes<br>R43: 2 minutes<br>R44: 4 minutes |
| | | | NR | | | | |
| 240 | 240.0 | | | | | | |
| -197.7 | R42-HQ 5 ft 54% | 8 | >10 | 240.0-242.0' - Fracture zone, 0-90 deg, smooth to rough, stepped to planar, loose to tight | | | |
| | | | >10 | | | | |
| | | | 2 | 242.0' - Fracture, 0-30 deg, rough, undulating<br>242.2' - Fracture, 0-30 deg, rough, undulating, loose | | | |
| | | | NR | | | | |
| 245 | 245.0 | | | | | | |
| -202.7 | R43-HQ 5 ft 16% | 0 | >10 | 245.0-245.8' - Fracture zone, various orientations, gravel and cobble sized rock fragments | | | |
| | | | NR | | | | |
| 250 | 250.0 | | | | | | |
| -207.7 | R44-HQ 5 ft 18% | 0 | >10 | 250.0-250.9' - Fracture zone, various orientations, gravel and cobble sized rock fragments | | | |
| | | | NR | | | | |
| 255 | 255.0 | | | | | | |

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|---|---|
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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 : 1.61 ft bgs on 6/14/07 START : 4/24/2007 END : 5/1/2007 LOGGER : C. Dougherty, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -212.7 | | | NA | | | **Limestone**<br>240.0-242.7' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, very weak (R1), voids typically 1/16" or less over 60-70% surface, rare cavities (3/8"x3/8"), fossil casts/molds rare, sandy/friable texture, 1 to 2 thin very fine grained limestone laminae 241.0-242.0<br>**No Recovery 242.7-245.0'**<br>**Limestone**<br>245.0-245.8' - Same as 240.0-242.7'<br>**No Recovery 245.8-250.0'**<br>**Limestone**<br>250.0-250.9' - Same as 245.0-245.8'<br>**No Recovery 250.9-255.0'** | |
| | | | NA | | | | |
| | R45-HQ<br>5 ft<br>54% | 0 | >10 | 257.2-257.7' - Fracture zone, 0-90 deg, smooth to rough, undulating to stepped | | | |
| | | | NR | | | | R45: 4 minutes |
| 260 | 260.0 | | | | | | |
| -217.7 | | | >10 | 260.0-267.7' - Fracture zone, 0-90 deg, rough, stepped to undulating, loose, gravel sized rock fragments | | **Poorly Graded Sand (SP)**<br>255.0-256.8' - dusky yellow to light olive brown, (5Y 6/4 to 5Y 5/6), wet, loose, mild to moderate HCl reaction, very poorly sorted, silty to clayey | |
| | | | >10 | | | | |
| | R46-HQ<br>5 ft<br>34% | 0 | | | | **Silt With Limestone Fragments (ML)**<br>256.8-257.2' - pale greenish yellow, (10Y 8/2), wet, loose | |
| | | | NR | | | **Limestone**<br>257.2-257.7' - yellowish gray, (5Y 7/2), moderate to mild HCl reaction, very weak (R1), fossiliferous, molds and casts, voids and cavities<br>**No Recovery 257.7-260.0'** | |
| 265 | 265.0 | | | | | | |
| -222.7 | | | | | | **Limestone**<br>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)<br>261.0-261.7' - pale greenish yellow, (10Y 8/2), very fine grained, mild to moderate HCl reaction, very weak (R1), becoming silty to sandy, soft, and loose with depth<br>**No Recovery 261.7-265.0'**<br>Bottom of Boring at 265.0 ft bgs on 5/1/2007 | |

| 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 START : 3/11/2007 END : 3/20/2007 LOGGER : C. LeBlanc, M. Faurote

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.4 | | | | | | | Start with 2-7/8" bit<br>J. Schaffer and Le Blanc start logging |
| | 3.5 | | | | | | |
| | | 1.1 | SS-1 | 4-3-3 (6) | **Silty Sand (SM)**<br>3.5-4.6' - yellowish gray, (5Y 7/2), moist to wet, loose, very fine to fine grained, no HCl reaction, trace organics, 20% low plastic fines, trace organics, root fragments, sand is silica | | |
| 5<br>37.4 | 5.0 | | | | | | |
| | 8.5 | | | | | | |
| | | 1.0 | SS-2 | 4-8-13 (21) | **Silt (ML)**<br>8.5-9.5' - dark yellowish orange, (10YR 6/6), wet, very stiff, nonplastic, very rapid dilatancy, mild to moderate HCl reaction, very strong (R5), 5-10% very fine to fine sand, carbonate materials | | |
| 10<br>32.4 | 10.0 | | | | | | Driller's Remark: Harder drilling at 10.5' |
| | 13.5 | | | | | | |
| | 14.3 | 0.8 | SS-3 | 17-50/3 (67/9") | **Silt (ML)**<br>13.5-14.3' - dark yellowish orange, (10YR 6/6), wet, hard, nonplastic, very rapid dilatancy, mild to moderate HCl reaction, 13% very fine to fine sand-sized grains | | |
| 15<br>27.4 | | | | | | | Driller's Remark: Slight circulation loss at 15.0' |
| | 18.5 | | | | | | |
| | 18.9 | 0.1 | SS-4 | 50/5 (50/5") | **Limestone Fragments**<br>18.5-18.6' - yellowish gray, (5Y 8/1), mild to moderate HCl reaction, highly fossiliferous | | |
| 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 START : 3/11/2007 END : 3/20/2007 LOGGER : C. LeBlanc, M. Faurote

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.4 | | | | | | | |
| | 23.5 | | | | | | |
| | 25.0 | 1.5 | SS-5 | 17-26-20 (46) | **Silt With Sand (ML)** 23.5-25.0' - dark yellowish orange, (10YR 6/6), moist to wet, hard, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 15% very fine to medium sand-sized grains, all carbonate | | |
| 25 17.4 | | | | | | | |
| | 28.5 | | | | | | |
| | 30.0 | 1.1 | SS-6 | 3-2-2 (4) | **Silty Sand With Gravel (SM)** 28.5-29.6' - moderate yellowish brown, (10YR 5/4), wet, very loose, fine to coarse grained, mild HCl reaction, 25% fine gravel-sized, 39% nonplastic fines, gravel-sized material appears to be limestone fragments | | |
| 30 12.4 | | | | | | | |
| | 33.5 | | | | | | |
| | 34.7 | 0.8 | SS-7 | 26-36-50/2 (86/8") | **Gravelly Silt With Sand (ML)** 33.5-34.25' - dark yellowish orange to dark olive gray, (10YR 6/6 to 5Y 5/2), wet, hard, nonplastic, very rapid dilatancy, strong HCl reaction, 30% fine gravel-sized limestone fragments, 20% fine to coarse sand, mild to moderate HCl reaction for limestone | | |
| 35 7.4 | | | | | | | |
| | 38.5 | | | | | | |
| | 39.4 | 0.9 | SS-8 | 37-50/5 (87/11") | | | |
| 40 | | | | | | | |

| 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 START : 3/11/2007 END : 3/20/2007 LOGGER : C. LeBlanc, M. Faurote

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.4 | 43.5 | | | | **Silty Sand (SM)** 38.5-39.4' - moderate yellowish brown, (10YR 5/4), moist to wet, very dense, very fine to medium grained, mild to moderate HCl reaction, 35-40% nonplastic fines, trace organics and/or black minerals, appears massive with no bedding, carbonate materials | | |
| | 44.4 | 0.8 | SS-9 | 47-50/5 (97/11") | **Silty Gravelly Sand (SM)** 43.5-44.3' - moderate yellowish brown, (10YR 5/4), moist to wet, very dense, fine to coarse grained, mild to moderate HCl reaction, 30% fine to coarse gravel-sized limestone fragments, 20% nonplastic fines, all carbonate materials | | |
| 45 -2.6 | 48.5 | | | | | | |
| | 50.0 | 0.9 | SS-10 | 2-2-20 (22) | **Silty Sand With Gravel (SM)** 48.5-49.4' - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to 10YR 4/2), wet, medium dense, fine to coarse grained, mild HCl reaction, 25% fine to coarse gravel-sized limestone fragments, 20% nonplastic fines, all carbonate | | |
| 50 -7.6 | 53.5 | | | | | | |
| | 55.0 | 1.5 | SS-11 | 9-22-14 (36) | **Silty Sand With Gravel (SM)** 53.5-55.0' - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to10YR 4/2), wet, dense, fine to coarse grained, mild HCl reaction, 20% fine gravel-sized limestone fragments, 25% nonplastic fines, trace organics, all carbonate | | |
| 55 -12.6 | 58.5 | | | | | | |
| | 58.6 | 0.0 | SS-12 | 50/1 (50/1") | **Limestone Fragments** 58.5' - few coarse sand-sized limestone fragments recovered | | No chatter, smooth drilling |
| 60 | | | | | | | |

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|---|---|
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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 START : 3/11/2007 END : 3/20/2007 LOGGER : C. LeBlanc, M. Faurote

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -17.6 | | | | | | | |
| | 63.5 | | | | | | |
| | 63.9 | 0.4 | SS-13 | 50/5 (50/5") | **Silt With Sand (ML)** 63.5-63.9' - moderate yellowish brown, (10YR 5/4), moist to wet, hard, nonplastic, very rapid dilatancy, mild HCl reaction, 15-20% fine to coarse sand, all carbonate | | SS-13 appears like extremely weak limestone |
| 65 -22.6 | | | | | | | 65-67' Minor drill chatter |
| | | | | | | | Driller's Remark: "Soft" at 67' but maintained circulation |
| | 68.5 | | | | | | |
| | 68.9 | 0.2 | SS-14 | 50/4 (50/4") | **Limestone Fragments With Silt And Sand** 68.5-68.8' - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to10YR 4/2), wet, dense, nonplastic, mild HCl reaction, all carbonate | | |
| 70 -27.6 | | | | | | | Driller's Remark: "Soft" 70-72', but maintained circulation |
| | | | | | | | Minor drill chatter 72-73' |
| | 73.5 | | | | | | |
| | 73.9 | 0.1 | SS-15 | 50/4.5 (50/4.5") | **Limestone Fragments** 73.5-73.6' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, coarse gravel-sized fragments, fossiliferous | | |
| 75 -32.6 | | | | | | | Driller's Remark: "Soft" at 75-77' |
| | | | | | | | Minor drill chatter 77-78' |
| | 78.5 | | | | | | Driller's Remark: "Soft" at 78-78.5' |
| | 78.7 | 0.0 | SS-16 | 50/2 (50/2") | **Limestone Fragments** 78.5' - one coarse sand-sized limestone fragment recovered | | |
| 80 | | | | | | | |

| 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 START : 3/11/2007 END : 3/20/2007 LOGGER : C. LeBlanc, M. Faurote

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -37.6 | | | | | | | Significant drill chatter 80-82' |
| | | | | | | | Driller's Remark: 82-83.5', soft drilling |
| | 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 HCl reaction, 32% fine to coarse gravel-sized limestone fragments, 19% nonplastic fines, all carbonate | | |
| 85 -42.6 | | | | | | | Sporadic drill chatter 85-87' |
| | | | | | | | Drill chatter 87-88' |
| | 88.5 | | | | | | Driller's Remark: "Softened considerably" 88-88.5' |
| | 90.0 | 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 | | |
| 90 -47.6 | | | | | **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" casing (HW); changed to 3-7/8" bit |
| | 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 | | |
| 95 -52.6 | | | | | | | Maintained circulation from 90-115' |
| | 98.5 | | | | | | |
| | 99.3 | 0.8 | SS-20 | 37-50/4 (87/10") | | | |
| 100 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-21 SHEET 6 OF 11 |

# 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 START : 3/11/2007 END : 3/20/2007 LOGGER : C. LeBlanc, M. Faurote

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -57.6 | | | | | **Silty Gravelly Sand (SM)** 98.5-99.3' - moderate yellowish brown, (10YR 5/4), wet, dense, fine to coarse grained, mild HCl reaction, 30% fine to coarse gravel-sized material, 25% fines, sand and gravel-sized material appears to be limestone fragments | | Soft steady drilling with no chatter<br>Slight drill chatter at 102.5' |
| | 103.5 – 104.5 | 0.4 | SS-21 | 10-50/5.5 (60/11.5") | **Silt With Sand And Gravel (ML)** 103.5-103.9' - moderate yellowish brown, (10YR 5/4), wet, hard, nonplastic, mild HCl reaction, interbedded layers of silt and sand-sized and fine to coarse gravel-sized limestone fragments | | |
| 105<br>-62.6 | | | | | | | Driller's Remark: Smooth soft drilling from 105' to 108.5' |
| | 108.5 – 108.9 | 0.2 | SS-22 | 50/5 (50/5") | **Limestone Fragments** 108.5-108.7' - mild HCl reaction, coarse sand-sized and fine to coarse gravel-sized limestone fragments | | Minor chatter at 107' and 108' |
| 110<br>-67.6 | | | | | | | Soft drilling from 110-112' with minor chatter, maintained circulation<br>Driller's Remark: Soft drilling at 112'<br>Minor chatter at 113' |
| | 113.5 – 114.8 | 1.3 | SS-23 | 21-12-20 (32) | **Silt With Sand (SM)** 113.5-115.0' - moderate yellowish brown, (10YR 5/4), wet, hard, nonplastic, rapid dilatancy, mild HCl reaction, 20-25% very fine sand-sized carbonate particles, scattered fine to coarse sand-sized particles, coarse gravel-sized limestone fragments | | Advanced 4" casing from 95' to 115' below ground surface.<br>Ground water level on morning of 3/13/07 is 4.69' below top of casing |
| 115<br>-72.6 | | | | | | | Maintained circulation from 115'<br>115-117' Soft drilling with no chatter<br>117-117.5', Sporadic minor drill chatter<br>Drill chatter 117.5'-118', softened 118'-118.5' |
| | 118.5 – 119.6 | 1.1 | SS-24 | 8-30-50/1.5 (80/7.5") | | | |
| 120 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-21 SHEET 7 OF 11 |

# 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 START : 3/11/2007 END : 3/20/2007 LOGGER : C. LeBlanc, M. Faurote

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, 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' |
| | 123.5 – 123.8 | 0.3 | SS-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 HCl reaction, fine to coarse sand-sized limestone fragments, 20% gravel-sized limestone fragments, 15% nonplastic fines, all carbonate | | |
| 125 -82.6 | | | | | | | Chatter 125-126' Driller's Remark: Softened considerably on 126-128.5', circulation maintained to 136' |
| | 128.5 – 130.0 | 1.1 | SS-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 HCl reaction, fine to coarse sand-sized limestone fragments, 30% gravel-sized limestone fragments, 22% nonplastic fines, all carbonate | | |
| 130 -87.6 | | | | | | | Driller's Remark: Soft 130-132.5' Driller's Remark: Harder 132-133.5', minor chatter observed on 133-133.5' |
| | 133.5 – 133.8 | 0.3 | SS-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 | | |
| 135 -92.6 | | | | | | | Steady chatter 135-138.5' Significant chatter 136-138.5' Circulation loss at 136.5' |
| | 138.5 – 138.7 | 0.2 | SS-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 | | Very hard at 139.0' End of soil boring at 139', begin rock coring |
| 140 | | | | | Begin Rock Coring at 139.0 ft bgs See the next sheet for the rock core log | | |

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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 : 4.72 ft bgs on 3/12/07 START : 3/11/2007 END : 3/20/2007 LOGGER : C. LeBlanc, M. Faurote

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 139.0 | | | 139.0-140.0' - Fracture zone, multiple laminated wavy discontinuities and fractures | | **Limestone** | Ground water level at 4.49' below top of casing |
| 140 -97.6 | R1-NQ 2.5 ft 80% | 14 | >10 | 140.0' - Bedding plane or mechanical break, 10 deg, smooth, planar, tight | | 139.0-141.0' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, medium strong to strong (R3 to R4), 25% unfilled surface voids (< 1/16") spheroidal to irregular shaped, thinly bedded to laminated, poorly fossiliferous (molds/casts) | Le Blanc and T. Stewart start logging at 139' |
| | | | 5 | 140.2' - Bedding plane, 5 deg, smooth, planar, tight | | | HW casing advanced to 138.5' |
| | 141.5 | | NR | 140.7' - Bedding plane, 5 deg, rough, undulating, gray discoloration over 60% of surface, tight | | **No Recovery 141.0-141.5'** | R1: 29 minutes |
| | | | 2 | 140.9' - Bedding plane, 5 deg, rough, undulating, 1/4" fossil molds/casts on fracture surface | | **Limestone** 141.5-142.3' - Same as 139.0-141.0' 142.3-143.9' - light olive gray, (5Y 5/2), medium grained, mild to moderate HCl reaction, 1/16" voids on 40% of surface, fine to medium carbonate subrounded granules, granular/sucrosic texture, traces of fine grain medium dark gray (N4) particles | |
| | | | 2 | 141.0' - Bedding plane or mechanical break, rough, planar, fracture along bedding plane, open 1/16" | | | |
| | R2-NQ 5 ft 48% | 17 | >10 | 141.8' - Fracture, 80 deg, rough, undulating, stains over 20% of surface | | | Slight circulation loss at 144' |
| 145 -102.6 | | | NR | 142.3-142.6' - Fracture zone, 1/4" to 3/4" rock fragments | | **No Recovery 143.9-146.5'** | |
| | | | | 143.1' - Bedding plane or mechanical break, horizontal, rough, undulating, open 2" | | | R2: 46 minutes |
| | 146.5 | | | 143.3' - Fracture, 50 deg, rough, undulating, tight | | | |
| | | | >10 | 143.6' - Fracture, 70 deg, rough, undulating, open | | **Limestone** 146.5-147.6' - Same as 142.3-143.9' | |
| | | | >10 | 143.6-143.9' - Fracture zone, 3/16" - 1-9/16" subangular rock fragments | | 147.6-150.6' - light olive gray, (5Y 5/2), fine to medium grained, moderate HCl reaction, medium strong (R3), 30-40% small (1/16") voids, trace of unfilled elongated (3/16" x 1/16") cavities, stains on 20% of surface, trace to 10% fine to medium grained medium dark gray (N4) particles | Harder drilling at 148' |
| | R3-NQ 5 ft 82% | 20 | >10 | 146.6' - Fracture, 10 deg, rough, undulating, open 1/8" | | | |
| | | | | 147.1' - Mechanical break, 5 deg, rough, undulating | | | |
| 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 | | | |
| | | | NR | 148.2-148.7' - Fracture zone, 30-40 deg | | **No Recovery 150.6-151.5'** | R3: 15 minutes |
| | 151.5 | | | 148.2' - Fracture, 30-40 deg, rough, stepped, tight | | | |
| | | | 2 | 148.7' - Fracture, 5 deg, rough, undulating, open 1/8" | | **Limestone** 151.5-155.8' - light olive gray with medium light gray and very pale orange mottling, (5Y 5/2 with N6 and 10YR 8/2), fine grained, moderate to strong HCl reaction, medium strong (R3), poorly fossiliferous, 1/16" voids on 25% of surface, massive bedding except laminated from 153.4-159.9' | |
| | | | 6 | 148.95' - Fracture, 5-10 deg, rough, undulating, pink discoloration, open 1/4" | | | |
| | | | | 149.2' - Bedding plane, horizontal, rough, undulating, gray stains, open up to 1/2" | | | |
| | R4-NQ 5 ft 86% | 23 | >10 | 149.6' - Fracture, 40-45 deg, rough, undulating, trace black staining | | | |
| 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), horizontal, rough, undulating, tight | | | R4: 28 minutes |
| | 156.5 | | NR | 152.1' - Fracture, 25 deg, rough, undulating, tight | | **No Recovery 155.8-156.5'** | |
| | | | 2 | 152.3' - Fracture, 70 deg, rough, undulating, black stains over 85% of surface | | | |
| | | | 4 | 152.4' - Fracture, horizontal, rough, undulating, open 1/4" | | | |
| | R5-NQ | | | 152.55' - Bedding plane, horizontal, rough, undulating, open 1/4" | | | |

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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 : 4.72 ft bgs on 3/12/07 START : 3/11/2007 END : 3/20/2007 LOGGER : C. LeBlanc, M. Faurote

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 5 ft 84% | 53 | 4 | 152.7' - Bedding plane, horizontal, rough, planar, grayish orange (10YR 7/4) stains on 25% of surface | | **Limestone** 156.5-160.7' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), olive gray (5y 3/2) mottling at 157.3', fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), 3/8" voids on 15% of surface (40-45% at 158.0-159.0'), casts over 45% of surface, trace cavities (3/16-1/8"), voids and cavities have an elongated subhorizontal alignment, cavities concentrated from 156.5 -157.0' and 160.0-160.5' | SC-1 collected at 158.95-159.9' |
| 160 -117.6 | | | 4 | 153.0' - Fracture, 75-80 deg, rough, undulating, black stain over 10-15% of surface | | | R5: 47 minutes |
| | 161.5 | | NR | 153.2, 153.3, 153.4, 153.55, 153.7' - Bedding plane (5), horizontal, rough, planar, open < 1/16" | | | |
| | R6-NQ 5 ft 73% | 27 | 2 | 153.7-153.95' - Fracture zone, fragments <3/4" | | **No Recovery 160.7-161.5'** | |
| | | | 1 | 153.95, 154.1, 154.3, 154.4, 154.6' - Bedding plane (5), 5-10 deg, tight, brownish black staining on surface | | **Limestone** 161.5-165.2' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), fossiliferous (casts/molds, 1/16" and smaller), 30% voids (1/16"), 5-10% elongated cavities (3/16-1/16"), massive/homogeneous fine grained appearance 164.0-164.7' | |
| | | | 5 | 154.9' - Fracture, 80 deg, rough, undulating, tight, 5-10% staining as black speckles | | | |
| 165 -122.6 | | | 3 | 155.2, 155.25' - Bedding plane (2), horizontal, rough, planar, tight | | | |
| | | | NR | 155.4' - Bedding plane or mechanical break, 30-40 deg, rough, undulating, open 1/4" 156.6' - Mechanical break, horizontal, rough, open 1/16" | | | R6: 35 minutes |
| | 166.5 | | | 156.8' - Fracture, 60-70 deg, rough, undulating, tight | | | |
| | R7-NQ 5 ft 50% | 22 | >10 | 157.6' - Bedding plane, 30 deg, rough, undulating, tight | | **No Recovery 165.2-166.5'** | |
| | | | 3 | 157.85' - Bedding plane, horizontal, rough, planar, tight | | **Limestone** 166.5-169.0' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, 35-40% small (1/16") voids concentrated at 166.5-167.3, moderately fossiliferous (molds up to 3/8" x 1-3/8") | SC-2 collected at 167.55-168.25' Significant circulation loss |
| | | | 1 | 158.5, 158.7, 158.8' - Bedding plane (3), horizontal, rough, planar, tight | | | |
| 170 -127.6 | | | NR | 158.95' - Bedding plane, 15-20 deg, rough, undulating, tight 159.9' - Bedding plane, horizontal, rough, planar, open 1/16" | | **No Recovery 169.0-171.5'** | |
| | 171.5 | | | 160.0, 160.4, 160.5' - Bedding plane (3), horizontal, rough, undulating, tight 161.7' - Fracture, 80 deg, rough, undulating, tight | | | R7: 26 minutes |
| | R8-NQ 5 ft 78% | 22 | >10 | 161.9' - Bedding plane, horizontal, rough, undulating, open 1/4" 163.2' - Fracture, 60 deg, rough, undulating, tight | | **Limestone** 171.5-175.4' - light brown to yellowish gray, (5YR 6/4 to 5Y 7/2), fine to medium grained, mild to moderate HCl reaction, medium strong to strong (R3 to R4), laminated bedding 172.6-173.1' with alternating beds of very dark and light crystallized materials (pyrite and hematite), very fossiliferous (35% void spaces from fossil molds) from 173.1-175.4' | End drilling for day (3/14/07) at 171.5' Water level at 4.52' below top of casing 3/15/07 Advanced HW casing to 168' on 3/15/07 Water level is at top of casing when drilling resumed 3/20/07 |
| | | | >10 | 163.5, 163.6' - Bedding plane (2), horizontal, rough, undulating, open 1/16" | | | |
| | | | 2 | 163.8, 163.95' - Bedding plane (2), horizontal, rough, undulating, 1/16" open 164.2' - Fracture, 65-75 deg, rough, undulating, open 1/16", stains on 25% of surface | | | |
| 175 -132.6 | | | 3 | 164.6' - Fracture, 5-10 deg, rough, undulating, 1/4" open | | | |
| | | | NR | 164.75-164.9' - Fracture zone, angular rock fragments | | **No Recovery 175.4-176.5'** | R8: 129 minutes |
| | 176.5 | | | 165.15' - Mechanical break, horizontal, rough, undulating, tight | | **Limestone** 176.5-176.8' - medium grained, mild HCl reaction, medium strong (R3), 35-40% fossil related void spaces | |
| | | | 10 | 166.6' - Mechanical break, horizontal, rough, undulating, tight | | | |
| | | | 6 | 167.1-167.25' - Fracture zone, rock fragments | | | |
| | R9-NQ | | | 167.4' - Mechanical break, horizontal, rough, undulating, tight | | | |

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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 : 4.72 ft bgs on 3/12/07 START : 3/11/2007 END : 3/20/2007 LOGGER : C. LeBlanc, M. Faurote

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 5 ft 78% | 0 | >10 | 167.5' - Fracture, 25 deg, rough, undulating, tight | | 176.8-177.35' - yellowish gray, (5Y 7/2), very fine grained, moderate HCl reaction, medium strong to strong (R3 to R4), thin to laminar bedded | Faurote start logging at 179' to the end of borehole |
| 180 -137.6 | | | >10 | 168.2' - Fracture, 30 deg, rough, undulating, tight | | | |
| | | | NR | 168.45' - Fracture, 80 deg, rough, undulating, black stains on 15% of surface<br>168.65' - Fracture, 20 deg, rough, undulating | | 177.35-180.4' - moderate yellowish brown, (10YR 5/4), fine to very fine grained, moderate to strong HCl reaction, indistinctly bedded and presents about 25% void space due to fossil casts and molds | R9: 67 minutes |
| | 181.5 | | | 171.6' - Fracture, 45 deg, rough | | | |
| | R10-NQ 5 ft 40% | 20 | 0 | 171.75-172.3' - Fracture zone, multiple small fragments | | **No Recovery 180.4-181.5'** | |
| | | | 5 | 172.55, 172.75, 172.8' - Bedding plane (3), smooth, planar<br>172.8-172.95' - Fracture, rough, "L" shaped fracture | | **Limestone**<br>181.5-183.5' - light brown, (5YR 6/4), very fine grained, mild HCl reaction, medium strong (R3), 25% void space from fossil molds and casts | |
| | | | NR | 172.95-173.6' - Fracture zone or mechanical break<br>173.85' - Mechanical break, rough, undulating, irregular, no fill | | **No Recovery 183.5-186.5'** | |
| 185 -142.6 | | | | 174.0' - Fracture, rough<br>174.25' - Fracture or mechanical break, horizontal | | | R10: 23 minutes |
| | 186.5 | | | 174.5-175.35' - Fracture zone, multiple breaks | | | |
| | R11-NQ 5 ft 68% | 0 | >10 | 176.45-177.45' - Fracture zone, horizontal, rough to smooth, undulating, multiple fractures, most appear horizontal | | **Limestone**<br>186.5-188.1' - light brown, (5YR 5/6), very fine grained, mild HCl reaction, medium strong to strong (R3 to R4), exhibits fossil related voids to 35% of the visible rock | |
| | | | 9 | 177.45-178.45' - Fracture zone, mostly horizontal fractures, mechanical breaks that look like shatter cones at 177.80' | | | |
| | | | >10 | 178.45-179.5' - Fracture zone or mechanical break<br>179.5-180.35' - Fracture zone, 2 flat surfaces and a broken zone | | 188.1-188.5' - moderate yellowish brown, (10YR 5/4), very fine grained, mild HCl reaction, medium strong to strong (R3 to R4), thinly to laminar bedded or pseudo bedded | |
| 190 -147.6 | | | NR | 182.45' - Mechanical break, rough<br>182.75-183.05' - Fracture, 80 deg, vertical fracture, not separated, and does not extend beyond this piece | | 188.5-189.9' - pale yellowish brown, (10YR 6/2), mild HCl reaction, weak to medium strong (R2 to R3), highly fossiliferous with large echinoderm and gastropod casts, total void space about 30%, organic traces along some fossil casts | Lost circulation from 189' to 195'<br>R11: 35 minutes |
| | 191.5 | | | 183.0-183.35' - Fracture zone, multiple smooth, planar faces | | | |
| | R12-NQ 5 ft 72% | 7 | >10 | 186.5' - Fracture zone, multiple broken fragments smaller than 1.5", no defined feature | | **No Recovery 189.9-191.5'** | |
| | | | 6 | 187.75-188.35' - Fracture, vertical, rough, undulating | | **Limestone**<br>191.5-191.8' - Same as 188.5-189.9' | |
| | | | >10 | 188.35' - Fracture, rough, planar, iron staining on surface<br>188.40' - Fracture, healed | | 191.8-192.1' - yellowish gray, (5Y 7/2), very fine grained, mild HCl reaction, laminar bedded | |
| 195 -152.6 | | | 3 | 188.65-188.95' - Fracture, vertical, exhibits very heavy solution erosion features and infilling or plating of iron oxides creating a very rough surface | | 192.1-193.5' - mild HCl reaction, medium strong (R3), highly fossiliferous exhibiting 30% void spaces from casts and molds, and numerous shell fragments, apparent clasts of fine grained rock are visible within the fossil rich rock, solution cavities with iron oxide minerals or stains | |
| | | | NR | 191.5-191.9' - Fracture zone, numerous small rock fragments | | | Void at 195.5'<br>R12: 78 minutes |
| | 196.5 | | | 191.7' - Fracture, smooth, planar | | | |
| | R13-NQ 3.8 ft 61% | 9 | >10 | 191.9' - Fracture, slightly rough, planar, iron oxide stains | | | |
| | | | 4 | 192.15' - Fracture, 0-7 deg, rough, staining or minerals on fracture faces | | 193.5-195.1' - Same as 191.8-192.1' | The rock presents an overall picture of subsidence or collapse and reinduration due to the size, shape, and orientation of some of the fragments |
| | | | 1 | 192.55' - Fracture, 60 deg, rough, recrystallization on the face that is very rough | | **No Recovery 195.1-196.5'**<br>**Limestone**<br>196.5-197.0' - Same as 191.8-192.1' | |

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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

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

WATER LEVELS : 4.72 ft bgs on 3/12/07 START : 3/11/2007 END : 3/20/2007 LOGGER : C. LeBlanc, M. Faurote

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 200<br>-157.6 | 200.3 | | NR | 192.55-193.4' - Fracture, 10-80 deg, multiple fractures with crystallization of iron compounds and organics<br>193.4-195.0' - Mechanical break, multiple breaks<br>195.0' - Fracture, 45 deg, recrystallized carbonate microcrystalline masses<br>196.45-197.1' - Fracture zone, numerous small rock fragments, one fragment shows intersecting 45 deg fractures with deposit of recrystallized minerals<br>197.05-198.1' - Fracture, 65-80 deg, rough, irregular edged joint exhibiting dark stains, the surface shows recrystallized minerals including iron oxides<br>198.4' - Fracture, horizontal, planar, iron oxide minerals and some (2-5%) fine grained, silt sized infilling<br>198.7' - Fracture, 65 deg, rough, angular faces with some silt sized infilling | | 197.0-198.1' - moderate yellowish brown to light brown, (10YR 5/4 to 5YR 6/4), mild HCl reaction, medium strong to strong (R3 to R4), solution channels along fracture plans<br>198.1-198.4' - light brown, (5YR 5/6), thin to laminar bedded in regular planes with silt and sand-sized grains in varying proportions<br>198.4-198.8' - pale yellowish brown, (10YR 6/2), moderate HCl reaction, weak to medium strong (R2 to R3), fossil void spaces about 30%<br>**No Recovery 198.8-200.3**<br>Bottom of Boring at 200.3 ft bgs on 3/20/2007 | R13: 4 minutes<br>Shows interrupted bedded and differential compaction, plus a variety of clasts types in less than 1/4" sizes. At 198.4' there is an undulant contact that looks like shallow ripple marks of low amplitude<br>May exhibit healed subsidence features<br>TD=200.3' at 17:48 on 3/20/07<br>Water level at 3' below ground surface on 3/21/07 |

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# SOIL BORING 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

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 : 4.72 ft bgs on 3/12/07 START : 5/22/2007 END : 5/23/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.8 | 0.0 – 1.5 | 0.4 | SS-1 | 4-5-6 (11) | **Fill** 0.0-0.4' - limestone, derived silt, sand and gravel mix | | Water level is based on Ground Water Monitoring at LNP site (FSAR Table 2.4.12.08)<br>A-21A drilled in construction road; road material is silty sand with gravel limestone derived product<br>Relogged by J. Schaeffer and T. Stewart<br>Water levels not recorded during drilling |
| 5 | 5.0 – 6.5 | 0.8 | SS-2 | 1-1-2 (3) | **Clayey Sand (SC)** 5.0-5.75' - light bluish gray with light brown staining, (5B 7/1 with 5YR 5/6), moist, very loose, very fine to fine grained, no HCl reaction, 20% medium to high plasticity fines, sand is silica | | |
| 10 | 10.0 – 11.5 | 1.3 | SS-3 | 12-11-15 (26) | **Silt (ML)** 10.0-11.3' - grayish orange, (10YR 7/4), wet, very stiff, nonplastic, very rapid dilatancy, mild to moderate HCl reaction, 5-10% very fine to fine sand-sized, all carbonate | | |
| 15 | 15.0 – 15.8 | 0.6 | SS-4 | 21-50/3 (71/9") | **Silt With Limestone (ML)** 15.0-15.6' - Same as 10.0-11.3' except scattered lenses of coarse sand- to fine gravel-sized limestone fragments, all carbonate | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-21A SHEET 2 OF 8 |

# SOIL BORING 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

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 : 4.72 ft bgs on 3/12/07 START : 5/22/2007 END : 5/23/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.8 | 20.0 – 21.5 | 1.5 | SS-5 | 19-16-15 (31) | **Silty Sand (SM)** 20.0-21.5' - grayish orange to dark yellowish orange, (10YR 7/4 to 10YR 6/6), wet, dense, fine to coarse grained, mild to moderate HCl reaction, 30% nonplastic fines, all carbonate derived | | |
| 25 / 17.8 | 25.0 – 26.5 | 1.4 | SS-6 | 23-22-26 (48) | **Sandy Silt (ML)** 25.0-26.4' - grayish orange to dark yellowish orange, (10YR 7/4 to 10YR 6/6), wet, hard, nonplastic, 41% fine to medium grained sand | | |
| 30 / 12.8 | 30.0 – 31.1 | 1.1 | SS-7 | 4-20-50/1 (70/7") | **Silty Sand (SM)** 30.0-31.1' - Same as 25.0-26.4' except very dense, 25-30% nonplastic fines | | Heavy grinding and chattering; 10 minutes to drill 33.0-35.0' |
| 35 / 7.8 | 35.0 – 35.1 | 0.0 | SS-8 | 50/1 (50/1") | **No Recovery 35.0-35.1'** Begin Rock Coring at 35.0 ft bgs See the next sheet for the rock core log | | Set HW casing to 35' and switch to rock coring; see rock core log End of drilling for the day, 5/22/07 |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
| 338884.FL | A-21A | 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

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

WATER LEVELS : 4.72 ft bgs on 3/12/07 START : 5/22/2007 END : 5/23/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 7.8 | 35.0 | | | | | | Begin rock coring at 08:17, 5/23/07 |
| | R1-HQ 5 ft 72% | 50 | 1 | 35.6' - Bedding plane, 0-30 deg, rough, planar, tight | | **Limestone** 35.0-38.6' - pale yellowish brown, (10YR 6/2), moderate to strong HCl reaction, very weak (R1), thin bedding, moderately fossiliferous (casts/molds), sample is 20-30% voids/casts <1/8", trace irregular shaped cavities 1/4"x1/8", trace coarse grain organic fragments, carbonate silt lenses present at 37.9-38.1' | |
| | | | 1 | 36.8' - Bedding plane, 5-10 deg, rough, undulating, tight to open (1/8") | | | |
| | | | 4 | 37.7' - Fracture, 50 deg, rough, undulating | | | |
| | | | 2 | 37.85, 37.95,' - Bedding plane (2), horizontal, wavy bedding plane contacts with carbonate fines | | | |
| | | | NR | 38.5' - Mechanical break | | **No Recovery 38.6-40.0'** | R1: 5 minutes |
| 40 | 40.0 | | | | | | |
| 2.8 | | | 2 | 40.3, 40.4' - Mechanical break (2), horizontal, rough, undulating, tight | | **Limestone** 40.0-43.0' - pale yellowish brown, (10YR 6/2), fine to medium grained, moderate to strong HCl reaction, extremely weak to very weak (R0 to R1), 3-5% fine grain moderately dark gray (N4) particles in matrix, 5-7% coarse grain black particles, moderately fossiliferous (casts/molds), fossils (up to 3/8"), 15-25% voids/casts (<1/16") | |
| | | | 4 | 41.0, 41.1' - Mechanical break (2), horizontal, rough, undulating, tight | | | |
| | R2-HQ 5 ft 60% | 23 | 4 | 41.6, 41.8' - Bedding plane (2), horizontal, rough, undulating, tight | | | |
| | | | | 42.15' - Fracture, 40 deg, smooth, planar, tight | | | |
| | | | NR | 42.2, 42.5, 42.9' - Mechanical break (3), <5 deg, rough, undulating, tight | | **No Recovery 43.0-45.0'** | R2: 3 minutes |
| 45 | 45.0 | | | | | | |
| -2.2 | | | >10 | 45.0-46.4' - Mechanical break, multiple irregular breaks | | **Limestone** 45.0-48.9' - dark yellowish brown, (10YR 4/2), extremely weak to very weak (R0 to R1), 3-7% black organic lamination (<1/16") and coarse grain particles, 25-35% spheroidal voids (<1/8"), moderately fossiliferous (casts and molds), most fossils <1/8", trace dissolution cavities across the entire run | |
| | | | >10 | | | | |
| | R3-HQ 5 ft 78% | 15 | 6 | 47.2, 47.4, 47.6, 47.8, 48.4, 48.8, 48.9' - Mechanical break (7), horizontal, rough, undulating, tight | | | |
| | | | 3 | | | | |
| | | | NR | | | **No Recovery 48.9-50.0'** | R3: 2 minutes |
| 50 | 50.0 | | | | | | |
| -7.2 | | | >10 | 50.0-50.3' - Fracture zone, subangular rock fragments 1/2"-1-1/8" in size | | **Limestone** 50.0-54.2' - dark yellowish brown, (10YR 4/2), very fine to fine grained, moderate HCl reaction, very weak to weak (R1 to R2), 15-20% spheroidal and elongated voids <1/8", 5-10% elongated dissolution cavities unfilled, both elongated voids and cavities appear to be sub horizontally aligned, 3-5% organic material as coarse black particles and laminations at 51.3' and 52.3' | |
| | | | 5 | 50.0, 50.1, 50.3, 50.45' - Bedding plane (4), 5-10 deg, rough, undulating, open (1/16"), occuring on organic laminations | | | |
| | R4-HQ 5 ft 84% | 28 | 2 | 50.6, 50.7' - Bedding plane (2), 5-10 deg, rough, undulating, open (1/16") | | | |
| | | | | 51.7' - Bedding plane, horizontal, rough, undulating, open (1/8") | | | |
| | | | 3 | 52.1, 52.65, 53.0, 53.15' - Bedding plane (4), 15-20 deg, rough, undulating, tight | | | |
| | | | 0 | 53.25' - Bedding plane, 30 deg, rough, undulating, organics on upper surface | | | |
| | | | NR | | | **No Recovery 54.2-55.0'** | R4: 5 minutes |
| 55 | 55.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
| 338884.FL | A-21A | SHEET 4 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

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

WATER LEVELS : 4.72 ft bgs on 3/12/07 START : 5/22/2007 END : 5/23/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -12.2 | R5-HQ 5 ft 78% | 47 | >10 | 55.2-55.45' - Fracture zone, 1/4" to 1-1/2" rock fragments | | **Limestone** 55.0-58.9' - pale yellowish brown with trace olive gray mottling, (10YR 6/2 with 5Y 4/1), very fine to fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), 10-15% voids (<1/16"), elongated, poorly fossiliferous (casts), fossils are <1/16", 3-7% medium grained angular shaped black particles, trace short (<1/16") discontinuous black laminations grading from weak rock (R2) at top to medium strong rock (R3) at the bottom | |
| | | | 3 | 55.65' - Bedding plane, 2-5 deg, rough, planar, open (<1/16") | | | |
| | | | 4 | 55.95' - Bedding plane, 5 deg, rough, stepped, open (<1/16") | | | |
| | | | 1 | 56.1, 56.3' - Mechanical break | | | |
| | | | NR | 56.5' - Fracture, 60 deg, rough, undulating, open (<1/8") | | | SC-1 collected at 57.5-58.9' |
| | | | | 57.3' - Fracture, 50 deg, rough, undulating, open (<1/8") | | | |
| | | | | 57.4' - Bedding plane or mechanical break | | | |
| | | | | 57.5' - Bedding plane, horizontal, rough, stepped, 3/8" relief on surface | | | R5: 7 minutes |
| 60 | 60.0 | | | 58.9' - Bedding plane or mechanical break, horizontal, rough, planar, open (< 1/16") | | **No Recovery 58.9-60.0'** | |
| -17.2 | R6-HQ 5 ft 92% | 35 | 1 | 60.3' - Bedding plane, horizontal, rough, undulating, open (1/2") | | **Limestone** 60.0-61.2' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), moderate to strong HCl reaction, medium strong (R3), 3-5% voids <1/16", 5-10% horizontally aligned <3/8" flat black flakes 61.2-61.4' - Same as 60.0-61.2' except weak (R2), 25-35% voids <1/16", 5-10% coarse grain black particles 61.4-62.0' - Same as 60.0-61.2' 62.0-64.6' - Same as 61.2-61.4' | |
| | | | 2 | 61.2, 61.4' - Bedding plane or mechanical break (2), 5-10 deg, rough, undulating, open (3/4") | | | |
| | | | 3 | 62.0' - Bedding plane, horizontal, rough, undulating, open (1/8") | | | |
| | | | 4 | 62.3' - Bedding plane, 5-10 deg, rough, undulating, tight | | | |
| | | | 0 | 62.5' - Mechanical break | | | |
| | | | NR | 62.8, 63.05, 63.3, 63.5, 63.8' - Bedding plane or mechanical break (5), horizontal, rough, undulating, open (<1/16") | | | R6: 6 minutes |
| 65 | 65.0 | | | | | **No Recovery 64.6-65.0'** | |
| -22.2 | R7-HQ 5 ft 100% | 68 | >10 | 65.6-65.78' - Fracture zone, rock fragments | | **Limestone** 65.0-71.0' - mottled pale yellowish brown and dark yellowish brown, (10YR 6/2 and 10YR 4/2), fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), 10-15% voids <1/16", voids restricted to pale yellowish brown color, 3-7% medium grain black flakes present as short discontinuous laminations across rock sample, very thinly bedded at 69.0-69.3', mottled areas appear to be bioturbated zones oriented subhorizontally | |
| | | | 0 | | | | SC-2 collected at 65.78-66.77' |
| | | | 1 | 67.2' - Bedding plane, horizontal, rough, undulating | | | |
| | | | 0 | | | | |
| | | | 4 | 69.0' - Bedding plane, horizontal, rough, planar, 1/16" silt and/or clay sized infilling | | | R7: 10 minutes |
| 70 | 70.0 | | | 69.3' - Bedding plane, horizontal, rough, planar, tight medium grained black flakes on surface | | | |
| -27.2 | R8-HQ 5 ft 88% | 60 | 2 | 69.6' - Fracture, 20-30 deg, smooth, stepped, 1-3/4" fossil on fracture surface | | 71.0-74.4' - pale yellowish brown, (10YR 6/2), fine grained, moderate to strong HCl reaction, 20-30% voids/casts <1/16", moderately fossiliferous with casts (up to 1/2"), 5-10% medium to coarse grain black particles, 3-5% medium to coarse grained dark gray angular to subangular shaped particles, 1/2" thick organic layer at 73.6', below 73.6' rock looks more weathered than above | |
| | | | 2 | 69.8' - Fracture, 80 deg, rough, planar, tight | | | |
| | | | 1 | 70.68' - Bedding plane, 10-15 deg, rough, undulating, at top of extremely weak rock | | | |
| | | | 1 | 70.8' - Bedding plane, 5-10 deg, rough, undulating, top of fractured rock | | | |
| | | | 1 | 71.0' - Bedding plane, <5 deg, rough, undulating, base of fractured zone | | | |
| | | | NR | 71.3' - Fracture, 80 deg, rough, undulating, tight, fracture up to 7" long | | | R8: 7 minutes |
| 75 | 75.0 | | | 72.7' - Bedding plane, 5-10 deg, rough, undulating, tight | | | |

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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

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

WATER LEVELS : 4.72 ft bgs on 3/12/07 START : 5/22/2007 END : 5/23/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: 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 | 73.6' - Bedding plane, 0-5 deg, rough, undulating, 1/2" thick organic layer | | **No Recovery 74.4-75.0'** | |
| | | | 1 | 73.8' - Mechanical break, 30 deg, rough, undulating, tight<br>74.1' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | **Limestone**<br>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 | |
| | | | >10 | 76.6' - Fracture, 30 deg, rough, undulating, tight | | | |
| | | | >10 | 76.6-77.1' - Fracture, vertical, rough, undulating, black staining on 15% of surface, multiple intersecting mechanical breaks | | | |
| | | | 0 | 77.6-78.6' - Fracture zone, high angle fractures through an interval of apparently weathered rock | | 78.6-79.8' - Same as 75.0-78.6' except very weak (R1) | R9: 6 minutes |
| 80 | 80.0 | | NR | 78.6, 78.8' - Bedding plane (2), horizontal, rough, undulating, top and base of organic-rich carbonate fines layer | | **No Recovery 79.8-80.0'** | |
| -37.2 | R10-HQ 5 ft 88% | 10 | >10 | 80.0-80.3' - Fracture zone, rock fragments | | **Limestone**<br>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 particles, fossils (up to 5/8"), various fossil types present including tubular shaped organisms, top 0.4' of run appears weathered | |
| | | | 3 | 80.6' - Bedding plane or mechanical break, horizontal<br>81.0' - Fracture, 65-75 deg, rough, undulating | | | |
| | | | 2 | 81.3' - Fracture, 30 deg, rough, undulating, tight<br>81.7' - Fracture, 40 deg, rough, undulating, tight | | | |
| | | | 2 | 82.1' - Fracture, 30 deg, rough, undulating, top of zone of fragmented rock | | | |
| | | | 1 | 82.7' - Fracture, 70-80 deg, rough, undulating, tight | | | R10: 10 minutes |
| 85 | 85.0 | | NR | 83.1' - Fracture, 70 deg, rough, undulating, tight | | **No Recovery 84.4-85.0'** | |
| -42.2 | R11-HQ 5 ft 46% | 15 | 0 | 83.2' - Fracture, horizontal, rough, undulating<br>83.8-84.3' - Fracture zone | | **Limestone**<br>85.0-85.9' - pale yellowish brown, (10YR 6/2), strong HCl 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 subangular in shape, brownish black staining on some fragments, stained dark yellowish brown over bottom 0.4' | SC-3 collected at 85.0-85.82' |
| | | | NR | 84.3' - Fracture, 30-40 deg, rough, undulating, base of fractured zone<br>85.9' - Fracture, 30 deg, rough, undulating, infilling on surface | | | Circulation loss at 87.0'<br>Core loss assumed to occur from 85.9-88.6' |
| | | | >10 | 88.5-89.6' - Fracture zone, fragments from 3/8" to 1", staining on few surfaces, possibly weathered rock, possible dissolution cavity | | | R11: 6 minutes |
| | | | >10 | | | | |
| 90 | 90.0 | | | 89.7' - Fracture, 60 deg, rough, undulating, open (<1/16") | | | |
| -47.2 | R12-HQ 5 ft 94% | 52 | 10 | 90.3-91.0' - Fracture zone, 1/2"-2" rock fragments | | **No Recovery 85.9-88.6'** | |
| | | | 2 | 91.1' - Fracture, 40-50 deg, rough, undulating, open (2")<br>91.5' - Fracture, 70 deg, rough, undulating, open (1/16") | | **Limestone**<br>88.6-90.0' - Same as 85.0-85.9'<br>90.0-91.5' - moderate yellowish brown with 40% mottled with very pale orange, (10YR 5/4 with 10YR 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 | |
| | | | 1 | 92.7' - Fracture, 5-10 deg, rough, undulating, open (<1/16") | | | |
| | | | 4 | 93.0, 93.1' - Fracture (2), 30 deg, rough, undulating, tight | | | |
| | | | 1 | 93.3' - Fracture, 50 deg, rough, undulating, tight | | | R12: 7 minutes |
| 95 | 95.0 | | NR | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
| 338884.FL | A-21A | SHEET 6 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

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

WATER LEVELS : 4.72 ft bgs on 3/12/07 START : 5/22/2007 END : 5/23/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -52.2 | R13-HQ 5 ft 52% | 15 | 0<br>>10<br>>10<br>NR | 93.95, 94.3' - Bedding plane or mechanical break (2), 5-10 deg, rough, undulating, tight<br>95.0-95.2' - Fracture zone, zone of mechanical breaks<br>96.0-97.6' - Fracture zone, 50-70 deg, fractures are intersected by potential mechanical breaks | | 91.5-94.7' - Same as 90.0-91.5' except pale yellowish brown, (10YR6/2), with brownish black rippled lamination at 94.5'<br>**No Recovery 94.7-95.0'**<br>**Limestone**<br>95.0-97.6' - moderate yellowish brown to pale yellowish brown, (10YR 5/4 to 10YR 6/2), fine grained, weak to medium strong (R2 to R3), 15-20% elongated voids <1/8" sub horizontally oriented, moderately fossiliferous with casts up to 3/8"<br>**No Recovery 97.6-100.0'** | SC-4 collected at 95.13-95.96'<br>R13: 4 minutes |
| 100 | 100.0 | | | | | | |
| -57.2 | R14-HQ 5 ft 64% | 18 | >10<br>>10<br>0<br>0<br>NR | 100.0-100.2' - Fracture zone<br>100.5-100.75' - Fracture zone<br>100.9' - Fracture, 20 deg, rough, undulating, open (1/8")<br>101.4' - Fracture, 20 deg, rough, undulating, open (1/2")<br>101.6' - Fracture, 80 deg, rough, undulating, tight<br>101.7' - Fracture, 0-10 deg, rough, undulating, tight<br>101.8' - Fracture, 15-20 deg, rough, undulating, top of fractured zone<br>102.0' - Fracture, 60 deg, rough, undulating, base of fractured zone | | **Limestone**<br>100.0-103.2' - pale yellowish brown, (10YR 6/2), fine grained, moderately fossiliferous with casts up to 5/8" weathered over top 0.7', color may be due to potential staining or weathering, 10-15% medium to coarse grain black particles, trace short (1/16") discontinuous black laminations throughout core run<br>**No Recovery 103.2-105.0'** | R14: 3 minutes |
| 105 | 105.0 | | | | | | |
| -62.2 | R15-HQ 5 ft 90% | 38 | 2<br>0<br>>10<br>9<br>2<br>NR | 105.1' - Bedding plane or mechanical break, horizontal, rough, undulating, open (1/8")<br>105.35' - Bedding plane or mechanical break, 30 deg, rough, undulating, tight<br>107.35' - Fracture, horizontal, rough, undulating, open<br>107.35-107.55' - Fracture zone<br>107.6-107.8' - Fracture, 60 deg, rough, undulating, open (1/4")<br>107.95-108.7' - Fracture, 80 deg, rough, undulating, open<br>108.2' - Fracture, horizontal, intersects one fragment of fracture at 107.95-108.7' | | **Limestone**<br>105.0-109.5' - moderate yellowish brown with 15-20% dark yellowish brown mottling, (10YR 5/4 with 10YR 4/2), fine grained, moderate HCl reaction, weak (R2), 15-25% voids <1/16", poorly fossiliferous (molds), trace irregular shaped unfilled cavities up to 5/8"<br>**No Recovery 109.5-110.0'** | R15: 5 minutes |
| 110 | 110.0 | | | | | | |
| -67.2 | R16-HQ 5 ft 50% | 0 | 9<br>>10<br>>10<br>NR | 108.4' - Fracture, horizontal, rough, undulating, open, intersects one fragment of fracture at 107.95-108.7'<br>108.8-109.0' - Fractures, 60 deg, rough, undulating, open<br>109.0-109.5' - Fracture, vertical, rough, undulating, open<br>109.5' - Fracture, 15 deg, rough, undulating, open<br>110.15' - Fracture, horizontal, rough, undulating, open<br>110.15-110.5' - Fracture, vertical, rough, undulating, open, rock fragments on smaller side of fracture | | **Limestone**<br>110.0-112.5' - pale yellowish brown, (10YR 6/2), fine grained, moderate HCl reaction, weak (R2), 5-10% voids up to 1/8", trace cavities up to 3/4"x3/4" infilled with fine grained weak (R2) carbonate material<br>**No Recovery 112.5-115.0'** | R16: 7 minutes |
| 115 | 115.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
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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

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

WATER LEVELS : 4.72 ft bgs on 3/12/07 START : 5/22/2007 END : 5/23/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -72.2 | R17-HQ 5 ft 60% | 18 | >10<br>2<br>4<br>NR | 111.0-111.5' - Fractures (2), 85 deg and vertical, rough, undulating, open<br>111.4-111.65' - Fracture, 60 deg, rough, undulating, open<br>111.65-112.0' - Fractures, 75 deg, rough, undulating, open<br>112.0-112.5' - Fracture zone<br>115.0-115.15' - Fracture zone<br>115.2, 115.35' - Fractures (2), <10 deg, rough, undulating, open<br>115.65, 115.75' - Fractures (2), horizontal, rough, stepped, open<br>115.75-116.0' - Fracture zone<br>116.1-116.25' - Fracture, 45 deg, rough, planar, tight | | **Limestone**<br>115.0-118.0' - grayish orange to pale yellowish brown, (10YR 7/4 to 10YR 6/2), fine to medium grained, moderate to strong HCl reaction, weak (R2), except very weak (R1) at 115.0-115.3', moderately fossiliferous, 25% coverage of very small (<1/16") voids, 5-10% small (1/16"-3/16") voids, trace cavities up to 1-3/16"x3/8", 50% of cavities infilled with carbonate material similar to 110.0-112.5', visible shell fragments at 115.0-115.5', large (about 50% of core by volume) cavity (not infilled) at 115.45-115.65', strength of HCl reaction decreases with depth | R17: 4 minutes |
| 120 | 120.0 | | | | | **No Recovery 118.0-120.0'** | SC-5 collected at 120.88-121.71' |
| -77.2 | R18-HQ 5 ft 90% | 57 | >10<br>2<br>1<br>0<br>5<br>NR | 116.35' - Fracture, horizontal, rough, undulating, open<br>117.1' - Fracture, <10 deg, rough, undulating, open<br>117.5, 117.6, 117.65' - Fractures (3), horizontal, rough, planar, open<br>120.2' - Fracture, horizontal, rough, undulating, open<br>120.25-120.6' - Fracture zone<br>120.85' - Fracture, horizontal, rough, undulating, open<br>121.75, 121.9' - Fractures (2), horizontal, rough, undulating, open<br>122.2-122.3' - Fracture, 45 deg, rough, undulating, open | | **Limestone**<br>120.0-124.5' - grayish orange to pale yellowish brown, (10YR 7/4 to 10YR 6/2), fine grained, mild HCl reaction, weak (R2), except very weak (R1) at 124.1-124.5', very small (<1/16") voids, trace small (1/16"-1/8") voids, trace casts/cavities up to 3/4"x3/8", 10% casts/cavities at 120.0-120.75' with partial (carbonate) infilling | R18: 4 minutes |
| 125 | 125.0 | | | | | **No Recovery 124.5-125.0'** | |
| -82.2 | R19-HQ 5 ft 40% | 0 | >10<br>>10<br>NR | 124.1, 124.2' - Fractures (2), horizontal, rough, undulating, open<br>124.2-124.35' - Fracture, vertical, smooth, planar, open<br>124.3, 124.7' - Fractures (2), 10 deg, rough, undulating, open<br>125.0-125.6' - Fracture zone (8)<br>125.6' - Fracture, horizontal, rough, undulating, open<br>125.6-125.9' - Fracture, 75 deg, rough, undulating, open<br>125.9-126.05' - Fracture, 75 deg, rough, undulating, open<br>126.05-126.3' - Fracture zone<br>126.45-126.6' - Fracture zone | | **Limestone**<br>125.0-126.45' - pale yellowish brown, (10YR 6/2), fine grained, mild HCl reaction, weak (R2), weathered, 10-15% (<1/16") voids, trace small (1/16"-1/4")voids, 5-10% casts/cavities up to 1-3/16"x3/4", poorly fossiliferous<br>126.45-127.0' - Same as 125.0-126.45' except weak to medium strong (R2 to R3), trace voids up to 1/16", no fossils casts/cavities | R19: 5 minutes |
| 130 | 130.0 | | | | | **No Recovery 127.0-130.0'** | |
| -87.2 | R20-HQ 5 ft 78% | 45 | >10<br>1<br>2<br>1<br>NR | 126.55-127.0' - Fracture, vertical, rough, undulating, tight<br>126.75' - Fracture, horizontal, rough, undulating, open<br>126.75-127.0' - Fracture, 60 deg, rough, undulating, tight<br>130.0-130.15' - Fracture, vertical, rough, planar, open<br>130.15' - Fracture, horizontal, rough, planar, open<br>130.15-130.85' - Fracture, vertical, rough, undulating, 1/4" relief<br>130.75' - Fracture, horizontal, rough, undulating, open<br>130.8-131.0' - Fracture zone | | **Limestone**<br>130.0-133.1' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, weak to medium strong (R2 to R3), trace voids (<1/16), no visible casts/cavities, dark gray to black irregular laminae at 130.5-131.0'<br><br>133.1-133.3' - Same as 130.0-133.1' except very fine to fine grained, moderate HCl reaction, medium strong (R3) | SC-6 collected at 131.2-132.1'<br><br>R20: 5 minutes |
| 135 | 135.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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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

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

WATER LEVELS : 4.72 ft bgs on 3/12/07 START : 5/22/2007 END : 5/23/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -92.2 | R21-HQ 5 ft 76% | 37 | >10 | 131.0-131.2' - Fracture, vertical, rough, undulating, open | | 133.3-133.9' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, very weak to weak (R1 to R2), trace voids up to 1/16", 5-10% casts/cavities up to 3/8"x3/8", poorly fossiliferous | |
| | | | 1 | 132.3-132.7' - Fracture, 60 deg, rough, undulating, open<br>132.7-132.9' - Fracture, 60 deg, rough, undulating, open | | **No Recovery 133.9-135.0'** | |
| | | | 6 | 133.1' - Fracture, horizontal, rough, undulating, open<br>135.0-135.15' - Fracture zone | | **Limestone**<br>135.0-138.8' - yellowish gray, (5Y 8/1), 30% medium light gray mottling, very fine grained, moderate HCl reaction, medium strong (R3), trace voids to 1/16", 10% casts/cavities up to 2"x3/8", partial infill of cavities | |
| | | | 5 | 135.5-135.65' - Fracture, horizontal, rough, undulating, open | | | |
| | | | NR | 136.5', 137.2', 137.3' - Fractures (3), horizontal, rough, undulating, 1/4" relief<br>137.4' - Fracture, horizontal, rough, undulating, open | | **No Recovery 138.8-140.0'** | R21: 7 minutes |
| 140 | 140.0 | | | | | | |
| -97.2 | R22-HQ 5 ft 50% | 7 | 8 | 137.6' - Fracture, horizontal, rough, undulating, open, black organic staining over 75% of fracture surface | | **Limestone**<br>140.0-141.8' - yellowish gray with very pale orange mottling, (5Y 7/2 with 10YR 8/3), very fine to fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), 10% voids (up to 1/16") at 140.35-140.65', 141.05-141.3' and 141.5-141.6', no visible casts/cavities, trace small (<1/16") pyrite inclusion present throughout core but more noticeable along fractures | |
| | | | >10 | 137.9-138.0' - Fracture zone<br>138.0-138.3' - Fracture zone, horizontal, rough, undulating, tight to healed, 1/2" spacing between fractures | | | |
| | | | >10 | 140.0-140.2' - Mechanical break (2) | | | |
| | | | NR | 140.4-140.5' - Fracture, 60 deg, rough, undulating, open<br>140.5' - Fracture, horizontal, rough, undulating, open<br>140.5-140.9' - Fracture, vertical, smooth, undulating, tight, "V" shaped<br>140.65' - Fracture, horizontal, rough, undulating, open | | 141.8-142.5' - pale yellowish brown, (10YR 6/2), fine to medium grained, mild to moderate HCl reaction, extremely weak (R0), trace voids up to 1/16", no cavities | R22: 6 minutes |
| 145 | 145.0 | | | | | | |
| -102.2 | R23-HQ 5 ft 78% | 53 | >10 | 140.75, 140.95' - Fracture, horizontal, smooth, planar, tight | | **No Recovery 142.5-145.0'** | |
| | | | >10 | 141.3' - Fracture, horizontal, rough, undulating, 1/8" relief<br>141.65', 141.8' - Fracture, 75 deg, smooth, undulating, open | | **Limestone**<br>145.0-146.0' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), medium grained, mild HCl reaction, weak (R2), 10% voids (up to 1/16"), trace casts/cavities (up to 3/4"x3/8"), trace black inclusions (up to 1/16") | |
| | | | 3 | 141.8-142.5' - Fracture zone<br>145.75-145.9' - Fracture zone | | | |
| | | | 4 | 146.0' - Fracture, 5 deg, rough, undulating, open<br>146.75-147.0' - Fracture zone | | | |
| | | | NR | 147.45' - Fracture, horizontal, rough, planar, 1/8" relief<br>147.8', 148.1' - Fracture, 50 deg, rough, planar, 1/4" relief, 30% black staining (possibly pyrite) on surface<br>148.35' - Fracture, horizontal, rough, undulating, tight | | 146.0-146.7' - Same as 145.0-146.0' except fine to medium grained, trace voids up to 1/16", trace infilled cavities<br>146.7-147.45' - Same as 145.0-146.0'<br>147.45-148.9' - pale yellowish brown with very pale orange and light gray mottling, (10YR 6/2 with 10YR 8/2 and N7), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), 5% voids up to 1/16" (decreasing with depth), no visible cavities<br>**No Recovery 148.9-150.0'** | R23: 6 minutes |
| 150 | 150.0 | | | | | | |
| -107.2 | | | | | | Bottom of Boring at 150.0 ft bgs on 5/23/2007 | Total depth of hole 150.0' |

| PROJECT NUMBER: | 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

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 bgs on 3/23/07 START : 3/22/2007 END : 3/27/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.6 | | | | | | | 10:08 Begin drilling with 2-7/8" tri-cone bit<br><br>Soil sampling every 5' from 3.5' below ground surface |
| | 3.5 | | | | | | |
| | | 0.9 | SS-1 | 3-3-3 (6) | **Poorly Graded Sand With Silt (SP-SM)**<br>3.5-4.4' - moderate yellowish brown with dusky brown, (10YR 5/4 with 5YR 2/2), wet, loose, very fine to fine grained, 10% organics, 10-15% nonplastic fines, sand is silica | | |
| 5<br>37.6 | 5.0 | | | | | | |
| | 8.5 | | | | | | |
| | | 1.1 | SS-2 | 12-16-13 (29) | **Silt (ML)**<br>8.5-9.6' - yellowish gray, (5Y 7/2), wet, very stiff, nonplastic, rapid dilatancy, moderate HCl reaction, 10% very fine sand-sized material, coarse gravel-size limestone fragments (white [N9] to yellowish gray [5Y 8/1] at top of sample, strong HCl reaction), all carbonate | | |
| 10<br>32.6 | 10.0 | | | | | | |
| | 13.5 | | | | | | |
| | 14.5 | 0.9 | SS-3 | 28-78/11.5 (82") | **Silt With Sand (ML)**<br>13.5-14.4' - Same as 8.5-9.6' except hard, 25% very fine to fine sand-sized material, one coarse gravel-sized limestone fragment | | |
| 15<br>27.6 | | | | | | | |
| | 18.5 | | | | | | |
| | 18.9 | 0.2 | SS-4 | 50/4.5 (50/4.5") | **Limestone Fragments**<br>18.5-18.7' - yellowish gray, (5Y 7/2), mild to moderate HCl reaction, fragments to 1/2", 25% silt- and sand-sized carbonate materials similar to 13.5-14.4' | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | 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

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 bgs on 3/23/07 START : 3/22/2007 END : 3/27/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.6 | | | | | | | |
| | 23.5 | | | | | | |
| | 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, hard, nonplastic, high dilatancy, mild to moderate HCl reaction, 20% very fine to fine grain material, traces of coarse sand-sized grains, all carbonate | | |
| 25 17.6 | | | | | | | |
| | 28.5 | | | | | | |
| | | 1.2 | SS-6 | 20-43-36 (79) | **Silty Sand (SM)** 28.5-29.7' - dusky yellow, (5Y 6/4), moist to wet, very dense, fine to coarse grained, rapid dilatancy, mild to moderate HCl reaction, 47% nonplastic fines, trace fine gravel, all carbonate | | |
| 30 12.6 | 30.0 | | | | | | |
| | 33.5 | 0.0 | SS-7 | 50/0.75 (50/0.75") | **No Recovery 33.5'** | | |
| 35 7.6 | | | | | | | Driller's Remark: Chatter at 36-37' |
| | 38.5 | | | | | | |
| | | 1.5 | SS-8 | 41-31-50/5.75 (81/11.75") | | | |
| 40 | 40.0 | | | | | | |

| PROJECT NUMBER: | 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

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 bgs on 3/23/07 START : 3/22/2007 END : 3/27/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.6 | 43.5 | | | | **Silty Sand (SM)** 38.5-40.0' - moderate olive brown, (5Y 4/4), wet, very dense, fine to coarse grained, mild to moderate HCl reaction, 20-25% low plastic fines, 10% fine gravel-sized material | | |
| | 44.5 | 1.0 | SS-9 | 24-50/6 (74/12") | **Silt With Sand And Limestone (ML)** 43.5-44.5' - dusky yellow, (5Y 6/4), wet, hard, low plasticity, rapid dilatancy, mild to moderate HCl reaction, 10-25% fine to coarse sand-sized grains (varies throughout sample), limestone lens at 43.8-43.9', organic lens 1/8" thick at 43.65' | | |
| 45 -2.4 | 48.5 | | | | | | |
| | 49.5 | 1.0 | SS-10 | 22-9-2 (11) | **Silty Sand With Limestone (SM)** 48.5-50.0' - moderate yellowish brown, (10YR 6/4), wet, medium dense, fine to coarse grained, mild to moderate HCl reaction, 37% low plastic fines, limestone lenses at 48.6', 48.8', 49.3' | | |
| 50 -7.4 | 53.5 | | | | | | |
| | 55.0 | 1.5 | SS-11 | 19-34-48 (82) | **Sandy Silt (ML)** 53.5-55.0' - moderate olive brown, (5Y 4/4), wet, hard, low plasticity, slow to rapid dilatancy, mild HCl reaction, 35-40% fine to coarse sand-sized grains, all carbonate, organic lenses (olive gray [5Y 3/4]) at 54.5-55.0' | | |
| 55 -12.4 | 58.5 58.6 | 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 | | | | | | | |

| PROJECT NUMBER: | 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

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 bgs on 3/23/07 START : 3/22/2007 END : 3/27/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -17.4 | | | | | | | |
| | 63.5 | | | | | | |
| | 64.5 | 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' | | |
| 65 -22.4 | | | | | | | |
| | 68.5 | | | | | | |
| | 68.6 | 0.0 | SS-14 | 50/1.5 (50/1.5") | **No Recovery 68.5'** | | 4" HW casing set to 70' below ground surface |
| 70 -27.4 | | | | | | | 16:56 Resume drilling, clearing hole |
| | 73.5 | | | | | | 3/22/07 End drilling for the day at 73.5' |
| | 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 | | 3/23/07, 07:58 Water level 6.6' below ground surface |
| 75 -32.4 | | | | | **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 at 73.6', all carbonate | | 08:17 Resume drilling by bringing up 73.5' sample |
| | 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 | | |
| 80 | | | | | | | |

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|---|---|
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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

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 bgs on 3/23/07 START : 3/22/2007 END : 3/27/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -37.4 | | | | | | | Driller's Remark: Slight chatter during drilling |
| | 83.5–83.7 | 0.1 | SS-17 | 50/2 (50/2") | **Limestone Fragments** 83.5-83.6' - Same as 78.5-78.6' | | |
| 85 -42.4 | | | | | | | |
| | 88.5–90.0 | 1.3 | SS-18 | 18-28-27 (55) | **Silty Sand With Limestone (SM)** 88.5-89.8' - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to 10YR 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 | | |
| 90 -47.4 | | | | | | | |
| | 93.5–95.0 | 1.2 | SS-19 | 33-12-15 (27) | **Limestone With Silty Sand** 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 | | |
| 95 -52.4 | | | | | | | Driller's Remark: Lost circulation at 96' |
| | 98.5–100.0 | 1.0 | SS-20 | 10-8-2 (10) | | | |
| 100 | | | | | | | |

| PROJECT NUMBER: | 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

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 bgs on 3/23/07 START : 3/22/2007 END : 3/27/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -57.4 | | | | | **Limestone With Silty Sand** 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 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 | | Casing advanced to 100' |
| | 103.5 | | | | | | Driller's Remark: Slight loss of circulation at 102' |
| | | 1.5 | SS-21 | 11-14-6 (20) | **Silty Sand With Limestone (SM)** 103.5-105.0' - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to 10YR 4/2), wet, medium dense, fine to coarse grained, mild HCl reaction, 20% nonplastic fines, 30% fine to coarse gravel-sized limestone fragments, all carbonate | | |
| 105 -62.4 | 105.0 | | | | | | Advancing casing to 105' |
| | 108.5 | 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 |
| | | | | | Begin Rock Coring at 109.0 ft bgs See the next sheet for the rock core log | | |
| 110 -67.4 | | | | | | | |
| 115 -72.4 | | | | | | | |
| 120 | | | | | | | |

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|---|---|
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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 109.0 | | 1 | | | **Limestone** | 3/23/07, 16:48 Start coring |
| 110 -67.4 | R1-NQ 2.5 ft 96% | 28 | 2 | 109.3' - Fracture, vertical, rough, undulating<br>109.7' - Fracture, 55 deg, smooth, undulating<br>110.0' - Fracture, vertical, smooth to rough, undulating | | 109.0-111.4' - light olive gray, (5Y 5/2), very fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), poorly fossiliferous, voids up to 1/16"over 15-20% of surface, larger cavities/fossil molds up to 1/4" x 1/2" over <5% of surface, <5% fine black inclusions | Note: R1 is short run (2.5') to set stroke<br>R1: 2 minutes |
| | | | 2 | 110.7' - Mechanical break | | | |
| | 111.5 | | NR | 111.15, 111.35' - Fracture (2), 70 deg, smooth to rough, undulating | | **No Recovery 111.4-111.5'** | Slight loss of circulation during run, driller advancing casing to 111.5' |
| | | | 2 | 112.1' - Mechanical break | | **Limestone** | 3/23/07 End drilling for the day at 111.5' |
| | | | 3 | 112.2' - Bedding plane, <10 deg, smooth, undulating<br>112.85, 113.25' - Bedding plane (2), <20 deg, rough, undulating | | 111.5-114.9' - Same as 109.0-111.4' except medium strong (R3), with increasing fossil content, voids up to 1/16" over 20-25% of surface, fossil molds up to 1/4" x 1/8" on 5-10% of surface | 3/24/07, 07:54 water level is 8.9' below ground surface<br>08:17 Begin drilling<br>SC-1 collected as 112.8-113.5' |
| | R2-NQ 5 ft 70% | 52 | 0 | 113.4' - Bedding plane, <10 deg, rough, undulating | | | |
| | | | 2 | 113.5, 113.9' - Mechanical break | | | |
| 115 -72.4 | | | NR | 114.9' - Fracture, 50 deg, rough, undulating<br>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 moderate HCl reaction, silts have delayed mild HCl reaction | Slight circulation loss during R2-NQ run<br>R2: 18 minutes |
| | 116.5 | | | | | **No Recovery 115.0-116.5'** | |
| | | | 4 | 117.05, 117.25, 117.4' - Bedding plane (3), 20 deg, rough, undulating | | **Limestone** | |
| | | | 3 | 117.7, 117.8, 117.9' - Bedding plane (3), <10 deg, smooth, planar | | 116.5-120.6' - light olive gray to yellowish gray, (5Y 5/2 to 5Y 7/2), very fine grained, very weak to medium strong (R1 to R3), fossiliferous with casts and molds up 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, thinly bedded | |
| | R3-NQ 5 ft 82% | 44 | 2 | 118.0, 118.75, 119.25, 120.0, 120.15' - Bedding plane (5), <10 deg, smooth, planar, infill of fine grained material at 119.25' | | | |
| 120 -77.4 | | | 2 | | | | |
| | | | NR | | | **No Recovery 120.6-121.5'** | R3: 22 minutes |
| | 121.5 | | | | | | |
| | | | 5 | 121.95' - Bedding plane, 20 deg, rough, undulating | | **Limestone** | |
| | | | 3 | 122.0, 122.1, 122.3, 122.5, 122.6, 122.75, 122.85, 122.9' - Bedding plane (8), <10 deg, smooth, undulating | | 121.5-122.85' - light olive gray, (5Y 5/2), fine grained, weak to medium strong (R2 to R3), voids (1/16") over 15-20% of surface, moderately fossiliferous with casts up to 1/4" x 1/4", larger cavities up to 1" x 1/2" over <5% of surface, thinly bedded | |
| | R4-NQ 5 ft 84% | 58 | 3 | 123.65, 123.8, 123.95' - Bedding plane (3), <10 deg, smooth to rough, undulating | | | |
| 125 -82.4 | | | 0 | | | 122.85-122.9' - medium light gray, (N6), very fine grained, medium strong (R3), no voids/fossils/cavities<br>122.9-125.7' - Same as 121.5-122.85' | SC-2 collected at 124.0-125.4' |
| | | | NR | | | **No Recovery 125.7-126.5'** | R4: 15 minutes |
| | 126.5 | | | | | | |
| | | | 3 | 126.85' - Fracture, 85 deg, rough to smooth, undulating | | | SC-3 collected at 127.10-128.15' |
| | | | 1 | 126.95, 127.05' - Bedding plane (2), horizontal, smooth, undulating<br>128.15' - Bedding plane, <10 deg, rough to smooth, undulating | | | |
| | R5-NQ | | | | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 5 ft 80% | 48 | 4 | 128.55, 128.75' - Bedding plane (2), horizontal, smooth, undulating | | **Limestone** 126.5-128.7' - light olive gray, (5Y 5/2), fine grained, weak (R2), small (1/16") voids over 15% of surface, fossiliferous, fossil casts up to 1/2" x 1/4", cavities 1" x 1/2" over <5% of surface, light gray (N6) mottling at 128.15-128.7' with decrease in small voids (<1/16") to <5% 128.7-130.5' - dusky yellow, (5Y 6/4), extremely weak to very weak (R0 to R1), small (<1/16") voids over 35% of surface, highly fossiliferous **No Recovery 130.5-131.5'** **Limestone** 131.5-135.5' - light olive gray, (5Y 5/2), fine grained, weak to medium strong (R2 to R3), small (<1/16") voids over 15-30% of surface increasing with depth, larger cavities up to 1" x 1" over 10% of surface, discontinuous black organic laminae (<5%), interbed of very fine grained light olive gray (5Y 5/2) dense limestone with <5% voids (<1/16") over surface **No Recovery 135.5-136.5'** **Limestone** 136.5-139.7' - yellowish gray to light gray, (5Y 8/1 to N7), weak to medium strong (R2 to R3), small voids (<1/8") over 10-20%, generally increasing with depth, larger cavities up to 1/2" x 1" over up to 10% of surface, partial infilling of cavities with soft medium light gray (N6) material **No Recovery 139.7-141.5'** **Limestone** 141.5-141.8' - medium gray, (N5), weak to medium strong (R2 to R3), 20% small voids (<1/16") over surface, cavities up to 1/4" x 1/4" <10% of surface 141.8-143.5' - yellowish gray with light gray and brownish gray interbed layering, (5Y 7/2 with N7 and 5Y 4/2), very fine grained, strong to very strong (R4 to R5), small (<1/16") voids <5" coverage, poorly fossiliferous 143.5-144.5' - Same as 141.8-143.5' except weak to medium strong (R2 to R3), interbedded with light olive gray (5Y 5/2), highly fossiliferous layers exhibiting small voids (<1/16") over 30% of surface | |
| 130 -87.4 | | | >10 | 129.3, 129.7' - Mechanical break (2) 129.4' - Bedding plane, 20 deg, smooth, undulating | | | Circulation loss during run, advancing casing |
| | | | NR | 129.95-130.5' - Fracture zone | | | R5: 21 minutes |
| | 131.5 | | | | | | |
| | | | >10 | 131.5-131.7' - Fracture zone, 50-60 deg, intersecting fractures | | | |
| | | | >10 | 132.4' - Bedding plane, <5 deg, smooth to rough, planar 132.7-132.8' - Fracture zone | | | |
| | R6-NQ 5 ft 80% | 53 | 2 | 132.9' - Bedding plane, <5 deg, smooth to rough, planar 133.1' - Bedding plane, <10 deg, rough, undulating | | | |
| 135 -92.4 | | | 3 | 134.35, 134.5' - Fracture (2), 20 deg, rough, undulating 134.6' - Fracture, 70 deg, rough, undulating | | | |
| | | | NR | 135.0' - Fracture, 15 deg, smooth, planar 135.1' - Bedding plane, horizontal | | | Lost circulation at 135' R6: 5 minutes |
| | 136.5 | | | | | | |
| | | | >10 | 136.8-137.05' - Fracture zone | | | |
| | | | >10 | 137.25' - Bedding plane, <15 deg, rough, undulating 137.4' - Bedding plane, associated with cavity | | | |
| | R7-NQ 5 ft 64% | 36 | 2 | 137.95' - Fracture, 15-20 deg, rough, undulating 138.4-138.55' - Fracture zone | | | |
| 140 -97.4 | | | 0 | 138.95' - Mechanical break 139.15, 139.45' - Bedding plane or mechanical break (2), 10-15 deg, rough to smooth, undulating | | | |
| | | | NR | | | | R7: 8 minutes |
| | 141.5 | | | | | | 3/24/07 End drilling for the day at 141.5' 3/25/07, 07:59 Water level 2.9' below ground surface 08:41 Resume drilling |
| | | | >10 | 141.65-141.8' - Fracture zone 141.9' - Fracture, 60 deg, smooth, partial mineralization on surface, open | | | |
| | | | >10 | 142.0' - Bedding plane, <5 deg, smooth, undulating, stains on surface | | | |
| | R8-NQ 5 ft 74% | 35 | 2 | 142.1, 142.2' - Fractures (2), 85 deg, smooth to rough, mineralization on surface 143.15, 143.55' - Bedding plane (2), <10 deg, rough to smooth, undulating | | | |
| 145 -102.4 | | | 6 | 144.3' - Bedding plane, <5 deg, smooth, undulating to planar, slight staining (<20%) on fracture surface | | | |
| | | | NR | 144.5' - Bedding plane, <20 deg, smooth to rough, undulating, partially associated with organic lens | | | R8: 14 minutes |
| | 146.5 | | | | | | |
| | | | >10 | 144.75' - Bedding plane, smooth, undulating 145.05-145.15' - Fracture zone 146.5-146.7' - Fracture zone | | | Driller's Remark: Circulation loss 100% near beginning of run R9 SC-4 collected at 147.0-147.8' |
| | | | 3 | 147.7, 147.85' - Bedding plane (2), <20 deg, smooth, undulating 147.95, 146.9' - Mechanical break | | | |
| | R9-NQ | | | | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 5 ft 75% | 62 | 1 | 148.15' - Bedding plane, <15 deg, smooth, undulating, associated with slightly softer zone | | **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' | |
| 150 -107.4 | | | 2 | 148.85' - Bedding plane, <5 deg, smooth, planar | | | |
| | | | NR | 149.95, 150.15' - Mechanical break (2) | | **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), 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 over <10% of surface increasing to 35% over interval from 147.9-148.9' | Casing advanced to 151' |
| | | | >10 | 151.9-152.4' - Fracture zone, smooth to rough, undulating, zone of organic layering | | | |
| | | | 4 | 152.9, 153.25, 153.4' - Bedding plane (3), 15-20 deg, smooth to rough, undulating | | | |
| | R10-NQ 5 ft 86% | 53 | >10 | 153.45' - Fracture, 65 deg, rough, undulating, medium gray infill (N5) infill on fracture face | | | |
| | | | | 153.55' - Fracture, 25 deg, smooth to rough, undulating, black staining on 50% of surface | | **No Recovery 150.25-151.5'** | |
| 155 -112.4 | | | 1 | 153.9-154.15' - Fracture zone | | **Limestone** 151.5-155.8' - yellowish gray, (5Y 7/2), fine grained, weak to medium strong (R2 to R3), poorly fossiliferous, <5% small 1/16" voids over surface, fine black organic lamination from 153.9-154.3' | |
| | | | 0 | 154.3' - Bedding plane, <20 deg, organic laminations throughout | | | R10: 9 minutes |
| | | | NR | 155.25' - Bedding plane, <20 deg<br>155.6' - Mechanical break | | **No Recovery 155.8-156.5'** | |
| | 156.5 | | | | | **Limestone** 156.5-159.95' - yellowish gray, (5Y 7/2), fine grained, weak to medium strong (R2 to R3), poorly fossiliferous, <5% small (1/16") voids, interval from 159.0-159.5' is laminated with alternating colors of dusky yellow (5Y 6/4) and light olive gray (5Y 5/2), laminations are inclined 30%, olive gray material is fine grained and is medium strong to strong (R3 to R4) | |
| | | | 1 | 156.6, 157.6' - Bedding plane (2), 10 deg, smooth to rough, undulating<br>157.25, 159.75' - Mechanical break | | | |
| | | | 3 | 157.8, 157.9, 158.75' - Bedding plane (3), <5 deg, planar | | | |
| | R11-NQ 5 ft 69% | 53 | 2 | 159.0-159.5' - Bedding plane, 30 deg, smooth, planar, organic staining on 35% of surface at 159.5' | | | |
| 160 -117.4 | | | 1 | | | | |
| | | | NR | | | **No Recovery 159.95-161.5'** | R11: 15 minutes |
| | 161.5 | | | | | **No Recovery 161.5-166.5'** | |
| | R12-NQ 5 ft 0% | 0 | NR | | | | |
| 165 -122.4 | | | | | | | |
| | | | | | | | R12: 2 minutes |
| | 166.5 | | | | | | |
| | | | 7 | | | | |
| | | | 2 | 167.3' - Bedding plane, horizontal, smooth, planar<br>167.5-167.7' - Bedding plane, horizontal, smooth, planar | | | |
| | R13-NQ | | >10 | | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | 5 ft 54% | 38 | | 168.4' - Bedding plane, 10 deg, smooth, undulating | | **Limestone** | |
| 170 -127.4 | | | NR | 168.55' - Fracture zone, 1-3" pieces<br>168.6' - Bedding plane, 15 deg, rough, undulating, open | | 166.5-169.2' - light olive gray, (5Y 5/2), moderate HCl reaction, medium strong to strong (R3 to R4), zones and blebs of 30-50% small (<3/16") voids alternating with fine grained material with few voids, void-rich zones occur along undulating bedding planes, larger cavities/fossil molds (up to 1/2" x 3/4") vary from <5-10% over surface | R13: 8 minutes<br>Casing advanced to 170' 3/25/07 End of drilling for the day at 171' 3/26/07, 08:05 Cleaning out hole to resume drilling |
| | 171.5 | | | | | | |
| | | | >10 | 171.5, 171.6, 171.9, 172.2, 172.4, 173.0, 173.15' - Bedding plane (7), horizontal, smooth, planar | | **No Recovery 169.2-171.5'** | |
| | | | >10 | 173.1' - Fracture, 80 deg, smooth, undulating | | **Limestone** | |
| | R14-NQ 5 ft 94% | 50 | >10 | 173.4-173.8' - Fracture zone, 3/4"-2" fragments<br>173.95' - Fracture, horizontal, rough, undulating, black staining on 50% of surface | | 171.5-176.2' - light olive gray, (5Y 5/2), dense, very fine grained, moderate HCl reaction, strong (R4), thinly laminated in zones 2-4" thick alternating with zones of 25-30% small (<1/8") voids and few (<5%) larger cavities up to 1/2" diameter | |
| 175 -132.4 | | | >10 | 174.2' - Fracture or mechanical break, 10 deg, rough, undulating | | | |
| | | | 0 | 174.5' - Fracture, horizontal, rough, planar<br>174.8-175.2' - Fracture zone | | | SC-5 collected at 175.4-176.2'<br>R14: 13 minutes |
| | 176.5 | | NR | | | **No Recovery 176.2-176.5'** | |
| | | | 1 | | | **Limestone** | SC-6 collected at 176.5-177.45' |
| | | | >10 | 177.75' - Fracture, horizontal, rough, undulating | | 176.5-178.8' - light olive brown to yellowish gray, (5Y 5/6 to 5Y 7/2), strong HCl reaction, strong (R4), fossiliferous with casts/molds up to 1/2", small (1/16") voids over 10-20% of surface occuring in zones, very fine lens of rock with no voids | |
| | R15-HQ 5 ft 46% | 19 | | 177.75-178.8' - Fracture zone, 3/4"-3" fragments | | **No Recovery 178.8-181.5'** | |
| 180 -137.4 | | | NR | | | | R15: 107 minutes<br>Stop drilling to mix mud |
| | 181.5 | | | | | | |
| | | | >10 | 181.5-181.75' - Fracture zone, 1"-2" fragments | | **Limestone** | |
| | | | >10 | 182.05' - Bedding plane<br>182.3-182.6' - Fracture zone, 1"-3" fragments | | 181.5-182.6' - moderate olive brown with light olive gray zones, (5Y 3/4 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 5 ft 22% | 0 | | | | **No Recovery 182.6-186.5'** | |
| 185 -142.4 | | | NR | | | | R16: 15 minutes |
| | 186.5 | | | | | | |
| | | | >10 | 186.5-186.9' - Fracture zone, 3/4"-2" fragments | | | |
| | | | >10 | 187.55' - Fracture, 25 deg, rough, undulating<br>187.85' - Bedding plane, rough, stepped | | | |
| | R17-NQ | | >10 | 188.35-188.65' - Fracture zone | | | |

| 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 5 ft 48% | 22 | | 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% over 188.2-188.4', moderate HCl reaction, medium strong to strong (R3 to R4) rock | |
| 190 -147.4 | | | NR | | | | R17: 12 minutes |
| | 191.5 | | | | | | |
| | | | 5 | 192.0-193.5' - Bedding plane, numerous 2" long bedding plane | | **No Recovery 188.9-191.5'** **Limestone** 191.5-193.6' - olive brown, (5Y 4/4), fine grained, moderate HCl 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" | |
| | | | 4 | 192.25' - Bedding plane, <15 deg, rough, undulating, organic staining | | | |
| | R18-NQ 5 ft 42% | 25 | 0 | 192.75, 193.1' - Fracture (2), 75 deg, rough, undulating, black staining | | | |
| 195 -152.4 | | | NR | | | **No Recovery 193.6-196.5'** | R18: 10 minutes 3/26/07, 17:31 End drilling for the day at 196.5' 3/27/07, 07:51 Water level is 3.3' below ground surface 08:05 Resume drilling |
| | 196.5 | | | | | | |
| | | | >10 | 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 | | **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 | |
| | | | >10 | 196.5-198.9' - Fracture zone, rough, undulating, numerous 0-25 deg. fractures over 1-2" intervals | | | |
| | R19-NQ 5 ft 50% | 28 | 0 | 196.85' - Fracture, 50 deg, rough, undulating, black organic staining | | | |
| 200 -157.4 | | | NR | | | **No Recovery 199.0-201.5'** | R19: 25 minutes |
| | 201.5 | | | | | | 3/27/07, 09:30 Boring total depth 201.5' Water level at 3.5' below ground surface |
| | | | | | | Bottom of Boring at 201.5 ft bgs on 3/27/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-22A SHEET 1 OF 7 |

# SOIL BORING 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

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 bgs on 6/13/07 START : 6/13/2007 END : 6/14/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.9 | | | | | | | A-22A is re-drill of A-22 with intent of starting rock coring at approximately 35.0'<br>Blind drill in soils to 35.0' |
| | | | | | | | Driller's Remark: Sand at 2.0' |
| | | | | | | | Water level 4.0' below ground surface |
| 5<br>37.9 | | | | | | | |
| | | | | | | | Driller's Remark: Tan silt at 8.0' |
| 10<br>32.9 | | | | | | | |
| | | | | | | | Driller's Remark: Weak sandy limestone at 14.3' |
| 15<br>27.9 | | | | | | | |
| | | | | | | | Driller's Remark: Harder limestone at 17' |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-22A SHEET 2 OF 7 |

# SOIL BORING 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

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 bgs on 6/13/07 START : 6/13/2007 END : 6/14/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.9 | | | | | | | |
| | | | | | | | Driller's Remark: Sandy silt with weak limestone at 21.5', gravel-sized clasts |
| 25 / 17.9 | | | | | | | |
| | | | | | | | Driller's Remark: Weak sandy limestone at 26.0' |
| | | | | | | | Driller's Remark: Carbonate silt at 28-29' |
| 30 / 12.9 | | | | | | | |
| | | | | | | | Driller's Remark: Hard limestone at 33.5' |
| | 35.0 | | | | | | |
| 35 / 7.9 | 35.3 | 0.3 | SS-1 | 50/4 (50/4") | **Limestone Fragments** 35.0-35.3' Begin Rock Coring at 35.0 ft bgs See the next sheet for the rock core log | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
| 338884.FL | A-22A | 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 on 6/13/07 START : 6/13/2007 END : 6/14/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| 7.9 | 35.0 R0-NQ 1 ft 100% 36.0 | 0 | >10 | 35.0-36.0' - Fracture zone, limestone fragments | | **Limestone Fragments** 35.0-36.0' - Same as 36.0-37.6' | Begin rock core at 35.0'; 6" casing installed from surface to 10.0', HW casing to 35.0' |
| | R1-NQ 5 ft 32% | 9 | 3 | 36.0-36.1' - Fracture zone, limestone fragments | | **Limestone** 36.0-37.6' - light olive gray, (5Y 5/2), moderate HCl reaction, medium strong (R3), 10-15% small (1/16" diameter) void space across surface, fossiliferous (many more molds than casts), few larger cavities (up to 3/8" diameter) **No Recovery 37.6-41.0'** | R0: 1 minute Note: core discarded |
| | | | >10 | 36.1' - Fracture, horizontal, rough, undulating, slight clayey infill in fossil mold on surface | | | |
| | | | NR | 36.8' - Fracture or mechanical break, 70 deg, rough, undulating to semi-planar, slightly radiused 36.9' - Fracture or mechanical break, horizontal, rough, undulating 37.2' - Mechanical break, vertical, non-planar, spall 37.5-37.6' - Fracture zone, limestone fragments | | | |
| 40 2.9 | 41.0 | | | | | | R1: 4 minutes |
| | R2-NQ 5 ft 70% | 20 | 0 | 41.0-43.0' - Compacted silty sand (carbonate derived) | | **Silty Sand (SM)** 41.0-43.0' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, compacted, carbonate derived, preferentially oriented thin (1/16") dark black organic inclusions and laminations (roughly horizontal), friable | |
| | | | 0 | | | | 42.5-43.0' More competent limestone beds with softer compacted silt material in between |
| | | | 5 | 43.0, 43.1, 43.2, 43.3' - Fractures or mechanical break (4), horizontal, rough, undulating | | **Limestone** 43.0-44.5' - grayish orange, (10YR 7/4), moderate HCl reaction, weak to medium strong (R2 to R3), fossiliferous (more molds than casts), voids over 10% of surface (60% smaller than 1/16"; 40% up to 3/8" fossil molds), inclusions up to 1/4" light gray (N7) (fossil infilling) **No Recovery 44.5-46.0'** | |
| | | | 1 | 44.0' - Fracture, >60 deg, rough, undulating, non-planar | | | |
| 45 -2.1 | | | NR | 44.3' - Fracture, horizontal, rough, with sand on surface (possible thin interbed) | | | R2: 3 minutes |
| | 46.0 | | | | | | |
| | R3-NQ 5 ft 62% | 34 | 3 | 46.3, 46.5, 46.8, 47.4' - Fractures (4), rough, undulating, mostly horizontal | | **Limestone** 46.0-49.1' - grayish orange, (10YR 5/4), moderate HCl reaction, very weak to weak (R1 to R2), easily broken by hand, void space across surface 15-20%, (80% smaller than 1/16", 20% larger cavities up to 1" diameter, fossiliferous (many more molds than casts), thin black organic laminae at 48.5-49.1' **No Recovery 49.1-51.0'** | |
| | | | 1 | | | | SC-1 collected at 47.4-48.5' |
| | | | >10 | 48.5-49.1' - Fractures (2), 75 deg, rough, undulating | | | |
| 50 -7.1 | | | NR | | | | R3: 3 minutes |
| | 51.0 | | | | | | |
| | R4-NQ 5 ft 100% | 62 | 2 | 51.7, 51.9' - Mechanical break, horizontal, rough, undulating to semi-planar 52.1, 52.3, 52.9, 53.2, 53.4, 53.9' - Fractures (6), 30-40 deg, rough, undulating to semi-planar | | **Limestone** 51.0-56.0' - moderate yellowish brown, (10YR 5/4), mild to moderate HCl reaction, weak (R2), silty, finely laminated with dark black thin (<1/16") organic laminations, undulating non-planar bedding planes | |
| | | | 3 | | | | |
| | | | 3 | | | | |
| | | | 0 | | | | |
| 55 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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 on 6/13/07 START : 6/13/2007 END : 6/14/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -12.1 | | | 3 | 55.1' - Fracture, 60 deg, rough, semi planar slightly radiused | | | R4: 5 minutes |
| 56.0 | | | | 55.5' - Fracture, rough, undulating | | | |
| | | | 3 | 55.9' - Bedding plane, horizontal, smooth, parting along organic laminae | | **Limestone** 56.0-56.5' - moderate yellowish brown, (10YR 5/4), 10-15% voids cover surface, few voids/cavities >3/16" | |
| | | | 1 | 56.5, 56.8' - Fractures (2), rough, undulating<br>56.9' - Bedding plane, horizontal, smooth, 1/4" thick black organic (lignite) laminae | | 56.5-56.9' - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to 10YR 4/2), very weak (R1), silt material with black laminar inclusions (organics, possibly lignite) | |
| | R5-NQ 5 ft 70% | 25 | >10 | 57.8-59.5' - Fracture zone, limestone fragments | | | |
| | | | >10 | | | 56.9-59.5' - moderate yellowish brown, (10YR 5/4), mild to moderate HCl reaction, very weak (R1), small voids (<1/16") occurring in irregular zones (possible bioturbation), thin zones containing fine black laminae (organics), slightly friable | |
| 60 -17.1 | | | NR | | | | R5: 4 minutes |
| 61.0 | | | | | | **No Recovery 59.5-61.0'** | |
| | | | 1 | 61.3, 62.15, 62.25' - Fractures or mechanical break (3), 30-60 deg, rough, undulating | | **Limestone** 61.0-65.7' - moderate yellowish brown to dusky yellow, (10YR 5/4 to 5Y 6/4), mild to moderate HCl reaction, medium strong (R3), variable (5-15%) small (<1/16") voids across surface, thin silt zones (1"-1-1/2" thick) at 62.3' and 64.6' | |
| | | | 3 | | | | |
| | R6-NQ 5 ft 94% | 46 | 1 | 62.75' - Fracture, horizontal, rough, undulating<br>63.0, 64.1' - Fractures (2), >80 deg, rough, undulating to semi-planar, open | | | |
| | | | 1 | 64.4-64.5' - Carbonate sand interbed | | | |
| 65 -22.1 | | | 4 | 65.0, 65.2, 65.35, 65.7' - Fractures (4), horizontal, rough, undulating to planar | | | R6: 5 minutes |
| 66.0 | | | NR | | | **No Recovery 65.7-66.0'** | |
| | | | 1 | 66.35' - Fracture, horizontal, rough | | **Limestone** 66.0-67.0' - dusky yellow, (5Y 6/4), fine grained, weak (R2), fossiliferous, silty, 5-10% small voids (<1/16") over surface | |
| | | | 1 | 67.0' - Fracture or mechanical break, rough, stepped | | 67.0-68.7' - dusky yellow to moderate yellowish brown, (5Y 6/4 to 10YR 5/4), intermingled zones of fine grained silty limestone (no voids) and limestone with 20-25% small voids (1/16" - 1/8") | |
| | R7-NQ 5 ft 96% | 74 | 3 | 68.0' - Fracture, >80 deg, rough, undulating to semi-planar | | | Possible bioturbation |
| | | | 4 | 69.1' - Fracture, 45 deg, rough, undulating to planar | | | |
| 70 -27.1 | | | 2 | 69.1-70.5' - Fracture, vertical, undulating, tight (possibly healed) | | 68.7-70.5' - weak (R2), very finely laminated (1/16"-1/8"), silty, with sparse inclusions of void rich (20-25%) limestone preferentially oriented parallel to bedding planes | R7: 3 minutes |
| 71.0 | | | NR | 69.7, 69.9, 70.1, 70.5' - Fractures (4), horizontal, rough, undulating, (possible bedding planes) | | | Start drilling 6/14/07 at 08:00, depth at 71.0' Water level 3.9' below ground surface |
| | | | 1 | | | 70.5-70.8' - grayish yellow, (5Y 8/4), medium strong (R3), fossiliferous, 15% small voids (<1/16") | |
| | | | 0 | 71.8, 73.5, 74.1, 74.3' - Mechanical break (4), rough, undulating, irregular | | **No Recovery 70.8-71.0'** | |
| | R8-NQ 5 ft 96% | 62 | 1 | | | | |
| | | | 3 | 74.5' - Fracture, >80 deg, non-planar (spall) | | | |
| 75 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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 on 6/13/07 START : 6/13/2007 END : 6/14/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -32.1 | | | 2 | 75.0' - Clay seam, 1/2" silty clay interbed, dark brown/black organics | | **Limestone** 71.0-75.8' - yellowish gray, (5Y 7/2), mild to moderate HCl reaction, weak to medium strong (R2 to R3), void space over surface varies from 10-25% (60-70% small voids <1/16" with remainder ranging from 3/16" to >3/4"), fossiliferous (many more molds than casts), void rich zone 71.5-71.8', minor clay infilling in larger (1") cavity, fine grained silty zone (no voids) 73.5-73.7', 1/2" thick organic rich black clay seam at 75.0' | R8: 3 minutes |
| 76.0 | | | NR | 75.7' - Mechanical break, rough, undulating, irregular | | | |
| | R9-NQ 5 ft 80% | 26 | 1 | 76.2' - Fracture, >60 deg, rough, undulating, irregular, tight (healed) | | | |
| | | | >10 | 77.4' - Fracture, 60 deg, slightly rough, undulating to planar | | | |
| | | | >10 | 77.6-78.5' - Fracture zone, limestone fragments | | | |
| | | | >10 | 79.1-79.3' - Fracture zone, limestone fragments, dark brownish black coating on one fragment, greasy luster on surface, tacky (organics). | | **No Recovery 75.8-76.0'** | |
| 80 -37.1 | | | NR | 79.8' - Clay seam, 1/2" clay infilling, dark brownish black, greasy luster, tacky (organics) | | **Limestone** 76.0-80.0' - Same as 71.0-75.8' except fractured/fragment zones associated with higher percentage of small voids/cavities (fossil molds), organic seams (black) at 79.5' and 80.0' | R9: 2 minutes |
| 81.0 | | | | | | | |
| | | | >10 | 81.0-81.2' - Fracture zone, limestone fragments | | | SC-2 collected at 81.6-82.6' |
| | | | 0 | 81.6' - Mechanical break, horizontal, rough, undulating | | **No Recovery 80.0-81.0'** | |
| | R10-NQ 5 ft 84% | 54 | 0 | | | **Limestone** 81.0-85.2' - moderate yellowish brown, (10YR 5/4), moderate HCl reaction, medium strong (R3), fossiliferous (many more molds than casts), 10-15% small voids covering surface (90% are <1/16"; 10% are larger cavities [3/16"-3/8"]) | |
| | | | 2 | 84.0' - Fracture, rough, undulating, irregular | | | |
| 85 -42.1 | | | 0 | 84.5, 84.7' - Fracture, >70 deg, rough, semi-planar | | | R10: 7 minutes |
| | | | NR | | | **No Recovery 85.2-86.0'** | |
| 86.0 | | | | | | | |
| | | | 5 | 86.1, 86.2, 86.3, 86.5, 86.7' - Fractures (5), 60-70 deg, rough, undulating to semi-planar, irregular, conjugate sets | | **Limestone** 86.0-88.7' - Same as 81.0-85.2' except strong (R4), increased percentage of voids and small (<3/8") cavities, fine grained dark olive gray limestone lense at 88.5-88.7' | |
| | | | >10 | 87.5-88.7' - Fracture zone, rough, limestone fragments, irregular surfaces | | | |
| | R11-NQ 5 ft 54% | 12 | >10 | | | | |
| | | | NR | | | **No Recovery 88.7-91.0'** | |
| 90 -47.1 | | | | | | | R11: 6 minutes |
| 91.0 | | | | | | | Driller's Remark: 50% loss of circulation at 90.0-91.0' |
| | | | 5 | 91.3' - Fracture, 60 deg, rough, undulating to semi-planar | | **Limestone** 91.0-91.8' - moderate olive brown, (5Y 4/4), fine grained, mild to moderate HCl reaction, strong to very strong (R4 to R5), dense, no voids | |
| | | | 3 | 91.5' - Fracture, horizontal, rough, undulating 91.6, 91.8, 91.9' - Fractures (3), 45 deg, rough, undulating, irregular | | | |
| | R12-NQ 5 ft 68% | 18 | 2 | 92.3, 92.5, 92.6, 93.0' - Fractures (4), 50-60 deg, rough, undulating and planar to semi-planar, irregular | | | SC-3 collected at 93.4 - 94.4' |
| | | | 0 | 93.4' - Fracture zone, irregular, with limestone fragments | | | |
| 95 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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 bgs on 6/13/07 START : 6/13/2007 END : 6/14/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -52.1 | | | NR | | | **Limestone** 91.8-94.4' - pale yellowish brown, (10YR 6/2), medium strong (R3), 10-15% small voids covering surface (<1/16"), few larger cavities infilled with fine grained yellowish gray (5Y 7/2) material, marbled zone of yellowish brown void-rich limestone with yellowish gray fine grained voidless limestone 94.0-94.4' (possible breccia) | R12: 4 minutes |
| | 96.0 | | | | | | |
| | R13-NQ 5 ft 28% | 0 | >10 | 96.0-97.4' - Fracture zone, limestone fragments | | | |
| | | | >10 | | | | |
| | | | NR | | | **No Recovery 94.4-96.0'** | |
| 100 -57.1 | | | | | | **Limestone** 96.0-97.4' - pale yellowish brown, (10YR 6/2), mild to moderate HCl reaction, medium strong (R3), 15-20% small voids covering surface (90% are voids <1/16", 10% are larger voids [3/16" - 3/4"]), fossiliferous (many more molds than casts) | R13: 3 minutes |
| | 101.0 | | | | | | |
| | R14-NQ 5 ft 64% | 40 | >10 | 101.0-102.5' - Fracture zone, limestone fragments with irregular non-planar surfaces | | **No Recovery 97.4-101.0'** | |
| | | | >10 | | | **Limestone** 101.0-104.2' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), moderate to mild HCl reaction, medium strong (R3), fossiliferous (many more molds than casts), 10-15% small voids (<1/16") over surface, variable larger voids/cavities (fossil molds) 3/16" to >3/4" diameter, larger cavities comprise up to 25% volume from 101.6-102.5' decreasing with depth | |
| | | | 2 | 102.5' - Fracture or mechanical break, 45 deg, rough, undulating, irregular | | | |
| | | | 0 | 103.4' - Fracture, 45 deg, rough, stepped, irregular | | | |
| 105 -62.1 | | | NR | | | | R14: 3 minutes |
| | 106.0 | | | | | | |
| | R15-NQ 5 ft 100% | 48 | 1 | 106.6, 107.1, 107.3' - Fractures or mechanical break (3), 60-70 deg, rough, undulating to semi-planar, slightly radiused | | **No Recovery 104.2-106.0'** | |
| | | | 3 | | | **Limestone** 106.0-111.0' - Same as 101.0-104.2' except few voids/cavities greater than 3/16" | |
| | | | 1 | 107.7' - Fracture or mechanical break, low angle, undulating | | | |
| | | | 4 | 108.7, 109.1, 109.5, 109.6, 109.9, 110.0' - Fractures or mechanical break (6), rough, undulating, irregular | | | |
| 110 -67.1 | | | 1 | | | | R15: 5 minutes |
| | 111.0 | | | | | | |
| | R16-NQ 5 ft 54% | 0 | >10 | 111.0-113.7' - Fracture zone, rough, undulating, limestone fragments, irregular | | 111.0-113.7' - Same as 106.0-111.0' except variable percentage of voids (<10-20%), thin zone of yellowish gray (5Y 7/2) fine-grained limestone at 111.8-112.0' | |
| | | | >10 | | | | |
| | | | >10 | | | **No Recovery 113.7-116.0'** | |
| 115 | | | NR | | | | |

| 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

WATER LEVELS : 4.0 ft bgs on 6/13/07 START : 6/13/2007 END : 6/14/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -72.1 | | | | | | | R16: 3 minutes |
| | 116.0 | | | | | **Limestone** | |
| | R17-NQ 5 ft 58% | 34 | 3 | 116.3, 116.7, 116.8' - Fractures (3), horizontal, rough, undulating, irregular | | 116.0-116.7' - Same as 111.0-113.7' except increasing percentage voids/cavities 3/16"-3/4" in size (up to 10% of surface), notable infilling and recrystallization in fossil molds | |
| | | | 2 | 117.0' - Bedding plane or fracture, horizontal, smooth, planar | | 116.7-117.25' - moderate yellowish brown, with pronounced bedding plane laminations, fine sand particles in fracture surface | |
| | | | 1 | 117.25' - Sharp horizontal contact with light gray, fine grained limestone<br>117.8' - Contact with fossil and void rich moderate yellowish brown limestone | | 117.25-117.8' - light gray, (N7), fine grained, strong (R4), dense, no voids | |
| 120<br>-77.1 | | | NR | | | 117.8-118.9' - Same as 111.0-113.7' except large 1" fossil cast at end of core<br>**No Recovery 118.9-121.0'** | R17: 4 minutes |
| | 121.0 | | | | | | Total depth 121.0' |
| | | | | | | Bottom of Boring at 121.0 ft bgs on 6/14/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-23 SHEET 1 OF 13 |

# SOIL BORING 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

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

WATER LEVELS : 0.5 ft bgs on 4/10/07 START : 4/9/2007 END : 4/17/2007 LOGGER : R. McComb, C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 40.8 | 0.0 – 1.5 | 0.8 | SS-1 | 1-2-2 (4) | **Poorly Graded Sand With Organics (SP)** 0.0-0.1' - topsoil<br>**Poorly Graded Sand (SP)** 0.1-0.75' - grayish black grading to medium gray, (N2 to N5), moist, very loose, fine grained, trace nonplastic fines, organics | | |
| 5 | 5.0 | | | | | | |
| 35.8 | 5.0 – 6.5 | 0.5 | SS-2 | 2-3-3 (6) | **Clayey Sand (SC)** 5.0-5.4' - greenish gray, (5G 6/1), moist, loose, fine grained, 40% fines, medium to high plasticity, silica sand<br>**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 | | |
| 10 | 10.0 | | | | | | |
| 30.8 | 10.0 – 11.5 | 1.0 | SS-3 | 10-9-5 (14) | **Silt And Limestone (ML)** 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, moderate HCl reaction, nonplastic, carbonate; 20-25% limestone fragments, fine to coarse gravel-sized | | End drilling at 11.5' on 4/9/07<br>Resume drilling 4/10/07 water level is 0.5' below ground surface (start)<br>Driller's Remark: hard drilling from 14-15.0', Limestone rock fragments in cuttings |
| 15 | 15.0 | | | | | | |
| 25.8 | 15.0 – 16.5 | 1.1 | SS-4 | 10-11-14 (25) | **Silt (ML)** 15.0-16.05' - very pale orange, (10YR 8/2), wet, very stiff, rapid dilatancy, moderate HCl reaction, nonplastic, carbonate; trace coarse sand to fine gravel-sized | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-23 SHEET 2 OF 13 |

# SOIL BORING 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

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

WATER LEVELS : 0.5 ft bgs on 4/10/07 START : 4/9/2007 END : 4/17/2007 LOGGER : R. McComb, C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 20.8 | 20.0 – 21.5 | 0.9 | SS-5 | 13-17-16 (33) | **Silt With Sand (ML)** 20.0-20.9' - very pale orange, (10YR 8/2), moist to wet, hard, rapid dilatancy, mild to moderate HCl reaction, 20% fine to medium grained sand, nonplastic, all carbonate | | |
| 25 / 15.8 | 25.0 – 26.5 | 0.9 | SS-6 | 19-24-11 (35) | **Sandy Silt (ML)** 25.0-25.9' - Same as 20.0-20.9' except up to 38% sand-sized grains with carbonate material | | |
| 30 / 10.8 | 30.0 – 31.5 | 1.4 | SS-7 | 8-22-35 (57) | **Silt With Sand (ML)** 30.0-31.4' - moderate yellow, (5Y 7/6), wet, hard, 15-20% sand, nonplastic to low plasticity, rapid dilatancy, moderate HCl reaction, <1/16" thick calcite stringers, all carbonate | | |
| 35 / 5.8 | 35.0 – 35.2 | 0.1 | SS-8 | 50/2 (100") | **Limestone Fragments** 35.0-35.1' - light olive gray, (5Y 5/2), mild HCl reaction, up to 3/8" Begin Rock Coring at 35.0 ft bgs See the next sheet for the rock core log | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-23 SHEET 3 OF 13 |

# 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

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

WATER LEVELS : 0.5 ft bgs on 4/10/07 START : 4/9/2007 END : 4/17/2007 LOGGER : R. McComb, C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 5.8 | 35.0 | | | | | | |
| | R1-HQ 5 ft 68% | 51 | >10 | 35.4-36.0' - Fracture zone, rough, stepped, vertical fracture, limestone fragments on top, various orientation | | **Limestone** 35.0-38.4' - pale yellowish brown, (10YR 6/2), fine grained, mild to moderate HCl 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 | | | | |
| | | | 1 | | | | |
| | | | 0 | 38.4' - Fracture, 50 deg, rough, stepped, open | | **No Recovery 38.4-40.0'** | |
| | | | NR | | | | R1: 9 minutes |
| 40 | 40.0 | | | | | | |
| 0.8 | | | | | | **Silt (ML)** 40.0-43.4' - dusky yellow, (5Y 6/4), wet, soft, rapid dilatancy, mild HCl reaction, sandy, carbonate material | |
| | R2-HQ 5 ft 68% | 0 | NA | | | | |
| | | | NR | | | **No Recovery 43.4-45.0'** | R2: 3 minutes |
| 45 | 45.0 | | | | | | |
| -4.2 | | | 2 | 45.2' - Fractures, rough, stepped, open | | **Limestone** 45.0-46.0' - dusky yellow, (5Y 6/4), fine grained, mild HCl reaction, extremely weak (R0), voids <1/16" over 15-20% of surface, cavities up to 3/16"x3/16", trace mold/ casts | |
| | | | 0 | 45.9' - Fractures, rough, planar, open | | | |
| | R3-HQ 5 ft 64% | 13 | 0 | | | **Silt With Sand (ML)** 46.0-48.2' - dusky yellow, (5Y 6/4), wet, soft to stiff, fine grained, 15-20% sand, rapid dilatancy | |
| | | | 0 | | | **No Recovery 48.2-50.0'** | |
| | | | NR | | | | R3: 6 minutes |
| 50 | 50.0 | | | | | | |
| -9.2 | | | >10 | 50.0-50.45' - Fracture zone | | **Limestone** 50.0-50.45' - Same as 46.0-48.2' except with some limestone fragments | |
| | | | >10 | 50.45' - Fracture zone, 30 deg, rough, undulating, open | | | |
| | R4-HQ 5 ft 26% | 9 | | 51.0' - Fracture zone, 60 deg, rough, undulating, open | | 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 black organic material from 50.9-51.3', voids <1/16" over 5-10% of surface | |
| | | | NR | 51.3-55.0' - Fracture zone, 80-90 degrees, black organic material covering up to 40-50% of some surface | | **No Recovery 51.3-55.0'** | R4: 12 minutes |
| 55 | 55.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-23 SHEET 4 OF 13 |

# 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

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

WATER LEVELS : 0.5 ft bgs on 4/10/07 START : 4/9/2007 END : 4/17/2007 LOGGER : R. McComb, C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -14.2 | R5-HQ 5 ft 100% | 30 | 1 | 55.6' - Fractures, 0- <5 deg, rough, stepped, open | | **Limestone** 55.0-59.5' - dusky yellow to light olive brown, (5Y 6/4 to 5Y 5/6), fine grained, mild HCl reaction, extremely weak to very weak (R0 to R1), extremely weak rock is friable, voids <1/16" over 3-5% of surface, interval of black carbonaceous laminae up to 3/4" thick | |
| | | | 3 | 56.2' - Fractures, horizontal, rough, stepped, open | | | |
| | | | 2 | 56.65-56.95' - Fractures, <5 deg, rough, stepped, open<br>57.1' - Fractures, 20-0 deg, rough, stepped | | | |
| | | | 2 | 57.85-58.1' - Fractures, <5 deg, rough, stepped, open<br>58.5-58.8' - Fracture zone, 50 deg, rough, stepped, open | | | R5: 8 minutes |
| 60 | 60.0 | | 0 | 59.4' - Fracture, 50 deg, rough, stepped, open | | 59.5-60.0' - yellowish gray, (5Y 7/2), very fine to fine grained, mild to moderate HCl reaction, weak (R2), voids (<3/16") over 10-15% of surface, weak vertical fractures from 59.5-60.0', mottled | |
| -19.2 | R6-HQ 5 ft 100% | 38 | 1 | 60.6' - Fracture, rough, stepped, planar, open | | 60.0-65.0' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, extremely weak to very weak (R0 to R1), voids (<3/16") over 10-15% of surface becoming <1% at 63.0', fossils (casts/molds) rare to absent with depth, trace black organic material at 61.0' | |
| | | | >10 | 61.2-61.8' - Fracture zone, stepped, undulating, open | | | |
| | | | 2 | 62.35' - Fractures, 50 deg, rough, undulating, tight | | | |
| | | | 2 | 62.8' - Fractures, <5 deg, rough, undulating, open<br>63.4' - 30 deg, rough, undulating, open | | | |
| | | | 1 | 63.9 - 64.0' - Fracture zone, horizontal, rough, stepped, undulating, open | | | R6: 7 minutes |
| 65 | 65.0 | | | | | | |
| -24.2 | R7-NQ 5 ft 100% | 20 | 4 | 65.3' - Fractures, rough, stepped, open<br>65.5' - Fractures, horizontal, smooth, planar, open | | 65.0-66.9' - dusky yellow, (5Y 6/4), fine grained, mild to moderate HCl reaction, very weak to extremely weak (R1 to R0), voids <10% of surface becoming more common with depth, very friable from 56.3-66.9' | R7: 3 minutes |
| | | | >10 | 65.65-66.02' - Fracture zone, horizontal, rough, undulating, open | | | |
| | | | 2 | 66.25-66.9' - Fracture zone, 0- 90 deg, rough, undulating, various orientations<br>67.35' - Fractures, 50 deg, rough, stepped, open | | 66.9-70.0' - yellowish gray, (5Y 7/2), mild to moderate HCl reaction, weak (R2), very fine grained, fine grained matrix, voids (<1/16") over 15-20% of surface, <5 cavities (3/8" diameter), bioturbation zone below 68.4' | |
| | | | 10 | 67.60-68.5" - Fracture zone, 50-90 deg, rough, undulating, open | | | |
| | | | 0 | 68.9' - Fractures, 0-80 deg, rough, undulating | | | SC-1 collected at 68.9-70.0' |
| 70 | 70.0 | | | | | | |
| -29.2 | R8-HQ 5 ft 96% | 26 | >10 | 70.0-71.05' - Fracture zone, 60 deg, rough, undulating to stepped, open | | 70.0-70.4' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, very weak (R1), voids <1/16" over 10-15% of surface, trace fossil molds/casts | |
| | | | 1 | | | **Silt (ML)** 70.4-70.65' - yellowish gray, (5Y 7/2), wet, soft, rapid dilatancy, mild HCl reaction | |
| | | | 4 | 72.0' - Fractures, rough, undulating to stepped, open<br>72.5' - Fractures, horizontal and 70 deg, rough, stepped, open | | **Limestone** 70.65-72.5' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, very weak (R1), voids <1/16" over 10-15% of surface, trace fossil molds/casts<br>72.5-73.5' - Same as 70.0-70.4' except voids 5-10% of surface | SC-2 collected at 71.05-72.0' |
| | | | >10 | 72.7' - Fractures, horizontal, rough, stepped, open | | | |
| | | | >10 | 72.8' - Fractures, 60 deg, rough, stepped, open | | | R8: 7 minutes |
| 75 | 75.0 | | | | | | |

| PROJECT NUMBER: | 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

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

WATER LEVELS : 0.5 ft bgs on 4/10/07 START : 4/9/2007 END : 4/17/2007 LOGGER : R. McComb, C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -34.2 | | | NR | 73.2-75.5' - Fracture zone, 60 deg, rough, stepped, open | | **Limestone** | |
| | | | 10 | 73.5-75.0' - Fracture zone, various orientations | | 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 | |
| | | | 0 | 75.0-75.3' - Fracture zone, horizontal, rough, undulating, open | | **No Recovery 74.8-75.0'** | |
| | R9-HQ 5 ft 100% | 64 | 2 | 75.3' - Fractures, horizontal, rough, undulating, open | | **Limestone** | |
| | | | 10 | 75.9' - Fractures, <5 deg, rough, undulating, open | | 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") | |
| | | | 2 | 77.45' - Fractures, <5 deg, rough, stepped, open | | | R9: 4 minutes |
| 80 | 80.0 | | | 77.7' - Fractures, 60 deg, rough, undulating, tight | | | |
| -39.2 | | | 1 | 78.0-79.0' - Fractures, 60 deg, rough, stepped, open | | 76.4-79.0' - light olive gray to yellowish gray, (5Y 5/2 to 5Y 7/2), fine to very fine grained, mild HCl 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" | |
| | | | 5 | 79.3-79.65' - Fractures, <5 deg, rough, stepped, open | | | |
| | | | 2 | 80.1' - Fracture, <5 deg, rough, undulating, open | | | |
| | R10-HQ 5 ft 100% | 36 | 1 | 81.1-81.3' - Fractures, <5 deg, rough, undulating, open | | 79.0-79.5' - light olive gray to yellowish gray, (5Y 5/2 to 5Y 7/2), fine grained, mild HCl reaction, extremely weak (R0), fragmented | SC-3 collected at 82.7-83.6' |
| | | | 10 | 81.5-81.7' - Fractures, horizontal, rough, undulating, open | | | |
| | | | 2 | 81.9-82.05' - Fractures, <5 deg, rough, undulating, open | | 79.5-80.0' - Same as 76.4-79.0' | |
| | | | 1 | 82.65' - Fractures, horizontal, rough, stepped, open | | 80.0-82.4' - light olive gray to yellowish gray, (5Y 5/2 to 5Y 7/2), 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 | R10: Run time not recorded |
| | | | 10 | 83.65' - Fracture, <5 deg, rough, undulating, open | | | Stop drilling for the day, 4/10/07 |
| 85 | 85.0 | | | 83.8-84.7' - Fracture, 60 deg and 70 deg, rough, stepped, open | | | Water level 0.5' below ground surface |
| -44.2 | | | 0 | 84.95' - Fractures, 60 deg, rough, stepped, open | | 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 | Resume drilling on 4/11/07 |
| | | | 0 | | | | Water level 0.5' below ground surface |
| | R11-HQ 5 ft 74% | 64 | 1 | 87.25' - Fracture, rough, undulating, open, horizontal | | | |
| | | | 1 | 88.15' - Fracture zone, 40 deg, rough, stepped, open | | 84.3-85.0' - Same as 82.4-84.3' except with >5 cavities (3/8"x3/8"), trace fossil molds/casts | DR: Soft at 88.2-90.0', assumed core loss from this interval |
| | | | NR | | | 85.0-88.2' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, very weak to weak (R1 to R2), voids <1/16" over 15-20% of surface, >3 cavities (1/16"x3/16") interconnected, trace casts/molds | R11: 6 minutes |
| 90 | 90.0 | | 0 | | | | |
| -49.2 | | | >10 | 90.0-94.0' - Fracture zone, gravel | | **No Recovery 88.2-89.5'** | |
| | | | 2 | 90.4' - Fracture zone, 60 deg, rough, stepped, open | | **Limestone** | |
| | | | 10 | 90.8' - Fracture zone, 0-<5 deg, rough, undulating, open | | 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-HQ 5 ft 78% | 15 | 10 | 91.1' - Fractures, 60 deg, rough, stepped, open | | | |
| | | | 10 | 91.5' - Fractures, 70 deg, rough, stepped, open, (7-1/5" long) from 91.3-91.9' | | | |
| | | | NR | 92.1' - Fractures, 0-90 deg, rough, stepped, open from 92.1-92.7' | | | |
| | | | | 92.7-92.9' - Fractures, 60 deg, rough, stepped, open | | | R12: 10 minutes |
| 95 | 95.0 | | | 93.4-93.8' - Fractures, 0-90 deg, rough, stepped, open | | | |

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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

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

WATER LEVELS : 0.5 ft bgs on 4/10/07 START : 4/9/2007 END : 4/17/2007 LOGGER : R. McComb, C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (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 | 2 | 95.4' - Fractures, horizontal, rough, stepped, open | | **Limestone** 90.0-91.0' - light olive gray, (5Y 5/2), very fine grained, moderate to strong HCl 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 HCl reaction, very weak to weak (R1 to R2), voids <1/16 over 25-30% of surface, several cavities (3/8"x3/8"), fragmented at bottom | SC-4 collected at 95.8-96.9' |
| | | | 1 | 95.8' - Fractures, horizontal, rough, undulating, open | | | |
| | | | 0 | 96.9' - Fracture, 50 deg, rough, stepped | | | |
| | | | 3 | 98.5' - Fractures, 60 deg, rough, stepped, open | | | |
| | | | 10 | 98.7' - Fractures, rough, undulating, vertical 98.9' - Fractures, <5 deg, rough, undulating, open | | **No Recovery 93.9-95.0'** | R13: 9 minutes |
| 100 | 100.0 | | | | | | |
| -59.2 | R14-HQ 5 ft 60% | 24 | >10 | 99.15-99.4' - Fracture zone, 60-70 deg, rough, stepped | | **Limestone** 95.0-96.9' - yellowish gray, (5Y 7/2), 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 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 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 dusky yellow, (5Y 7/2 to 5Y 6/4), fine grained, mild HCl reaction, very weak (R1), voids <3/16" over 25-30% of surface, cavities (several) 3/16"x3/16", black carbonaceous laminae at 100.9' | |
| | | | >10 | 99.9-100.0' - Fracture, 60-70 deg, rough, stepped, open | | | |
| | | | >10 | 100.0-101.0' - Fracture zone, 60-70 deg, rough, planar to undulating, open, some black carbonaceous staining | | | |
| | | | >10 | 101.0-102.0' - 70-80 deg, 7-1/5"- 8-2/5" long 102.0-103.0' - fractures resulting in gravel-sized limestone fragments | | | |
| | | | NR | | | | R14: 5 minutes |
| 105 | 105.0 | | | | | | |
| -64.2 | R15-HQ 5 ft 98% | 88 | 3 | 105' - Fractures, rough, stepped, open 105.2' - Fractures, rough, planar, open 105.3' - Fractures, 50 deg, rough, stepped, open | | **No Recovery 103.0-105.0'** **Limestone** 105.0-109.9' - dusky yellow, (5Y 6/4), fine grained, mild to moderate HCl 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" | SC-5 collected at 105.9-107.4' |
| | | | 0 | | | | |
| | | | 2 | 107.35-107.5' - Fractures, 30 deg, rough, stepped, open | | | |
| | | | 0 | | | | |
| | | | 0 | | | | R15: 5 minutes |
| 110 | 110.0 | | | | | **No Recovery 109.9-110.0'** | |
| -69.2 | R16-HQ 5 ft 100% | 35 | NR | | | **Limestone** 110.0-115.0' - dusky yellow, (5Y 6/4), fine to very fine grained, mild HCl reaction, very weak to extremely 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 | |
| | | | 3 | 110.2' - Fractures, horizontal, rough, undulating, open | | | |
| | | | >10 | 110.6-110.9' - Fracture zone, 70-0 deg, rough, stepped, open 111.0-113' - Fracture zone, horizontal, rough, undulating, open | | | |
| | | | >10 | | | | |
| | | | 1 | 113.15' - Fracture, horizontal, rough, undulating | | | |
| | | | 1 | | | | R16: 7 minutes |
| 115 | 115.0 | | | | | | |

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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

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

WATER LEVELS : 0.5 ft bgs on 4/10/07 START : 4/9/2007 END : 4/17/2007 LOGGER : R. McComb, C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -74.2 | R17-HQ 5 ft 66% | 8 | >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, extremely weak (R0), abundant cavities (>5) up to 3/4"-2"x 3/8"-3/4", voids over 60% of surface, fossil molds/casts | |
| | | | >10 | 116.0-118' - Fracture zone, 90-<5 deg, rough, stepped, open | | 116.0-117.4' - dusky yellow, (5Y 6/4), fine grained, mild HCl reaction, very weak (R1), fossiliferous (molds/casts) and organized shell material | |
| | | | >10 | | | | |
| | | | >10 | | | | |
| | | | NR | | | 117.4-118.3' - light olive brown, (5Y 5/6), fine grained, mild HCl reaction, extremely weak (R0), friable, coarse sand to gravel-sized fragments | R17: 4 minutes |
| 120 | 120.0 | | | | | | |
| -79.2 | R18-HQ 5 ft 82% | 40 | 5 | 120.2' - Fractures, horizontal, rough, undulating, open | | **No Recovery 118.3-120.0'** **Limestone** 120.0-121.6' - dusky yellow, (5Y 6/4), fine grained, weak (R2), voids up to 1/16" covering 15-20%, > cavities up to 3/4-1-3/16"x3/8", fossil casts/molds | |
| | | | 4 | 120.3' - Fractures, 40 deg, rough, stepped, open<br>120.5-120.65' - Fractures, horizontal, rough, stepped, open | | | |
| | | | 10 | 120.75' - Fractures, 40-60 deg, rough, stepped, open<br>121.05-121.4' - Fractures, <5 deg, rough, stepped, open | | 121.6-121.9' - dusky yellow, (5Y 6/4), fine grained, weak (R2), <10% voids over surface, no cavities at 121.0' | SC-6 collected at 123.0-124.1' |
| | | | 0 | 121.55-121.85' - Fractures, horizontal, rough, planar, open | | 121.9-124.1' - dusky yellow, (5Y 6/4), fine grained, weak (R2), extremely weak (R0), at 122.6-123.0' | R18: 6 minutes |
| | | | 0 | 122.55' - Fractures, rough, stepped, open | | | |
| | | | NR | 122.8-103.0' - Fractures, horizontal, rough, open | | **No Recovery 124.1-125.0'** | |
| 125 | 125.0 | | | | | | |
| -84.2 | R19-HQ 5 ft 80% | 30 | 10 | 124.1' - Fracture, horizontal, rough, stepped, open | | **Limestone** 125.0-129.0' - dusky yellow, (5Y 6/4), fine grained, very weak to extremely weak (R1 to R0), punctuated with thin beds up to 2-1/2" thick, fissile, very weak, (R1), laminations (126.5-126.5'; 126.8-127.5') mild to moderate HCl reaction, voids up to 1/16" over 30-40% of surface, cavities >5 (1/16"x3/16") fossiliferous (molds/casts) and shell material, laminated from 128.8-128.9'. | |
| | | | 3 | 125.4-125.85' - Fracture zone, 0-<5 deg, rough, stepped to undulating, open<br>126.1-126.7' - Fracture zone, 50 deg, rough, stepped, open | | | |
| | | | 0 | 126.5-126.75' - Fractures, horizontal, rough, stepped, open | | | |
| | | | 2 | 128.35' - Fractures, 30 deg, rough, tight, undulating to stepped, clay and silt | | | |
| | | | 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 |
| 130 | 130.0 | | | | | | |
| -89.2 | R20-HQ 5 ft 78% | 28 | >10 | 130.3-131.85' - Fracture zone, smooth, planar, open | | **Limestone** 130.0-131.5' - Same as 125.0-129.0' | |
| | | | 10 | | | 131.5-131.9' - dusky yellow, (5Y 6/4), fine to very fine grained, punctuated with thin beds of fine grained laminations with voids | |
| | | | 1 | 131.85' - Fractures, <5 deg, rough, stepped, open | | | |
| | | | 2 | 132.85' - Fracture, rough, stepped, open<br>133.05' - Fractures, 0-90 deg, rough, stepped, open | | 131.9-133.9' - Same as 125.0-129.0' except from 133.25-133.5 (<10% voids) | |
| | | | NR | 133.53' - Fractures, rough, planar, open | | **No Recovery 133.9-135.0'** | R20: 7 minutes |
| 135 | 135.0 | | | | | | |

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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

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

WATER LEVELS : 0.5 ft bgs on 4/10/07 START : 4/9/2007 END : 4/17/2007 LOGGER : R. McComb, C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -94.2 | R21-HQ 5 ft 88% | 38 | 2 | 135.1' - Fractures, 50 deg, smooth, undulating, open | | **Limestone** 135.0-136.4' - dusky yellow, (5Y 6/4), fine grained, very weak to extremely weak (R1 to R0), trace fine grained laminations | |
| | | | >10 | 135.95' - Fractures, <5 deg, rough, undulating, open<br>136' - Fracture zone, gravels | | | |
| | | | 2 | 136.4' - Fracture zone, 40 deg, rough, stepped, open<br>136.9' - Fracture zone, 60-70 deg, rough, undulating, open | | 136.4-139.4' - greenish gray, (5GY 6/1), very light gray mottled, very fine grained, strong HCl reaction, medium strong (R3), voids <3/16" over 3-5% of surface becoming more common with depth, cavity 1-3/16"-1-9/16", ovate shape (>5) becomes numerous with depth, black carbonaceous material especially along fracture plane common below 138.5', HCl reaction becoming mild with depth | SC-7 collected at 137.25-138.05' |
| | | | 4 | 137.1' - Fractures, 50 deg, rough, undulating, open | | | |
| | | | >10 | 137.3' - Fractures, 30 deg, rough, undulating to stepped, open | | | R21: 9 minutes |
| 140 | 140.0 | | NR | 138.1' - Fractures, <5 deg, rough, undulating, open | | | |
| -99.2 | R22-HQ 5 ft 100% | 76 | 10 | 138.45' - Fractures, 30 deg, rough, stepped, open, dark brown to black stain over 60-70% of surface | | **No Recovery 139.4-140.0'**<br>**Limestone** 140.0-143.1' - yellowish gray mottled with light olive gray, (5Y 7/2 with N8), very fine grained, moderate to strong HCl reaction, weak to very weak (R2 to R1), interbedded/laminae of fine grained limestone, laminations from 140.0-140.8' and 141.0-141.4', voids (<1/16") concentrated in fine grained material over 25% of surface, cavities less than <3/8", material is medium strong to strong rock (R3 to R4) | |
| | | | 1 | 138.7' - Fractures, 80 deg, rough, stepped, open | | | |
| | | | 1 | 138.95' - Fractures, rough, undulating, open<br>139.1-140.3' - Fracture zone | | | |
| | | | 1 | 140.7' - Fractures, <5 deg, rough, undulating, open<br>141.7' - Fracture, horizontal, rough, undulating, open | | | |
| | | | 5 | 142.4' - Fracture, <5 deg, rough, stepped, open<br>143.6' - Fracture, <5 deg, smooth, undulating, tight | | | R22: 9 minutes |
| 145 | 145.0 | | | | | | |
| -104.2 | R23-HQ 5 ft 100% | 62 | 2 | 144.1-144.85' - Fractures, <5 deg, rough, undulating, open | | 143.1-145.0' - moderate olive brown, (5Y 4/4), mild HCl reaction, extremely weak (R0), friable, coarse grained from 143.1-143.6 becoming fine grained with depth, voids, cavities over 70-80% from 143.6, diminishing to 10-15% with depth | |
| | | | 4 | 144.9' - Fractures, vertical, rough, stepped, open<br>145.75-145.85' - Fractures, <5 deg, rough, undulating, open | | | |
| | | | 2 | 146.0-146.5' - Fractures, <5 deg, rough, undulating, open | | | |
| | | | 0 | 146.9' - Fractures, rough, planar, open<br>147.3' - Fractures, <5 deg, rough, undulating, open | | 145.0-145.75' - light olive gray, (5Y 5/2), very fine to fine grained, mild HCl reaction, very weak (R1), voids over 10-15% of surface, <5 cavities 3/16"x3/16" | |
| | | | 1 | 147.5-148.0' - Fractures, 75 deg, rough, undulating, tight<br>149.3' - Fracture, 20 deg, rough, planar, open | | | R23: 5 minutes |
| 150 | 150.0 | | | | | | |
| -109.2 | R24-HQ 5 ft 72% | 42 | 3 | 149.9' - Fracture, vertical, rough, stepped, open | | 145.75-147.3' - moderate olive brown, (5Y 4/4), mild HCl reaction, extremely weak (R0), voids are 70-80% of surface | |
| | | | 0 | 150.3-150.7' - Fractures, smooth, planar to undulating, light tan to dark staining over 20-50% surface | | 147.3-150.0' - light olive gray, (5Y 5/2), very fine to fine grained, mild HCl reaction, very weak (R1), fossils (casts/molds), becoming fragmented at base, friable, weak (R2) | SC-8 collected at 150.7-151.8' |
| | | | 3 | 152.2' - Fractures, horizontal, rough, undulating, open | | 150.0-150.3' - light olive gray, (5Y 5/2), fine grained, mild HCl reaction, very weak (R1), voids over 10-15% of surface | |
| | | | 1 | 152.3' - Fractures, <5 deg, rough, undulating, open | | | |
| | | | NR | 152.4' - Fractures, 60 deg, rough, undulating, tight<br>153.3' - Fracture, 0-90 deg, rough, stepped, open | | | R24: 5 minutes |
| 155 | 155.0 | | | | | | |

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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

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

WATER LEVELS : 0.5 ft bgs on 4/10/07 START : 4/9/2007 END : 4/17/2007 LOGGER : R. McComb, C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -114.2 | R25-HQ 5 ft 60% | 32 | 2 | 155.15' - Fractures, rough, undulating, open | | 150.3-150.7' - moderate olive brown, (5Y 4/4), fine grained, mild HCl reaction, extremely weak (R0), very thick laminations (wavy), voids up to 1/16" over 20-25% of surface, linear-shaped cavities up to 1-3/16"x3/16" | |
| | | | 2 | 155.7' - Fractures, 10 deg, smooth, planar, open<br>155.8' - Fractures, rough, undulating<br>156.03' - Fractures, rough, stepped, open | | **Limestone**<br>150.7-152.2' - yellowish gray, (5Y 7/2), mottled, fine to medium grained, mild HCl reaction, very weak to weak (R1 to R2), voids over 35% of surface | |
| | | | >10 | 156.7' - Fractures, <5 deg, rough, undulating, tight<br>157.0-160.0' - Fracture zone, 90-0 deg, rough, open, gravel sized fragments | | | |
| | | | NR | | | | R25: 5 minutes |
| 160 | 160.0 | | | | | 152.2-153.6' - light olive brown, (5Y 7/2), very weak (R1), voids over 25-30% of surface, cavities (3/16"x3/16"), some black organic material throughout | |
| -119.2 | R26-HQ 5 ft 80% | 50 | 0 | | | **No Recovery 153.6-155.0'**<br>**Limestone**<br>155.0-155.4' - Same as 152.2-153.6' | |
| | | | 0 | | | 155.4-156.0' - yellowish gray, (5Y 7/2), very fine grained, strong HCl reaction, weak to medium strong (R2 to R3), voids/cavities absent, laminated, weak/unbroken fracture separated by overlying limestone | |
| | | | >10 | 162.0' - Fracture zone, rough, predominantly horizontal undulating to stepped, open | | | |
| | | | 10 | 163.3' - Fracture, rough, stepped, open, horizontal, fracture connecting 163.3-163.4' | | | |
| | | | NR | 163.4-163.65' - Fractures, <5 deg, undulating, smooth to rough<br>163.7-163.85' - Fractures | | 156.0-158.0' - light olive brown, (5Y 7/2), very weak (R1), voids over 25-30% of surface, cavities (3/16"x3/16"), some black organic material throughout | R26: 7 minutes |
| 165 | 165.0 | | | | | **No Recovery 158.0-160.0'**<br>**Limestone** | |
| -124.2 | R27-HQ 5 ft 100% | 26 | 10 | 163.85' - Fractures, horizontal, rough, undulating, open<br>165.1-165.75' - Fracture zone, 0-90 deg, rough, undulating, open | | 160.0-160.2' - light olive brown, (5Y 7/2), very weak (R1), voids over 25-30% or surface, cavities (3/16"x3/16"), some black organic material throughout | SC-9 collected at 165.7-167.0' |
| | | | 0 | | | | |
| | | | >10 | 167.0-168.3' - Fracture zone, 90-0 deg, rough, undulating to stepped, open | | 160.2-162.15' - yellowish gray, (5Y 7/2), mild HCl reaction, weak to medium strong (R2 to R3), voids <1/16" over <1% of surface, < 5 cavities (3/16"x3/16") | |
| | | | >10 | 168.3' - Fracture zone, horizontal, smooth, undulating | | | |
| | | | 4 | 168.7' - Fracture zone, vertical, stepped, open<br>168.85' - Fracture zone, horizontal, rough, undulating, open | | | R27: 9 minutes |
| 170 | 170.0 | | | | | 162.15-164.0' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine to very fine grained, extremely weak to medium strong (R0 to R3), laminated, void percentage from <1% up to 30-40%, cavities (3/8"x3/16"), primarily in upper 1.0' of section | |
| -129.2 | R28-HQ 5 ft 92% | 30 | 3 | 169.1-169.65' - Fractures, horizontal, rough, undulating, open | | | |
| | | | 10 | 170.1' - Fractures, <5 deg, rough, undulating, open<br>170.35' - Fractures, 10 deg, smooth, planar | | | |
| | | | 10 | 170.9' - Fractures, rough, undulating, open<br>171.3' - Fractures, rough, stepped, open<br>171.45' - Fractures, smooth, planar, open | | **No Recovery 164.0-165.0'**<br>**Limestone**<br>165.0-168.0' - yellowish gray, (5Y 7/2), fine to very fine grained, mild HCl reaction, weak to very weak (R2 to R1), voids <1/16" over 10-15% of surface, >5 cavities 3/8"x 1/16", fossils (mold/cast) | |
| | | | 5 | 172.0-172.2' - Fractures, <5-90 deg, rough, undulating to stepped, open<br>172.25-173.0' - Fractures, horizontal, intersecting angles | | | |
| | | | 1 | 173.2-173.8' - Fractures, rough, undulating, vertical fracture along face of core, open | | | R28: 7 minutes |
| 175 | 175.0 | | NR | | | | |

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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

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

WATER LEVELS : 0.5 ft bgs on 4/10/07 START : 4/9/2007 END : 4/17/2007 LOGGER : R. McComb, C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -134.2 | R29-HQ 5 ft 91% | 60 | 1 | 173.8' - Fractures, horizontal, rough, undulating, open<br>173.9' - Fractures, smooth, planar, open | | 168.0-170.0' - yellowish gray, (5Y 7/2), very fine grained, weak (R2)<br>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'<br>**Limestone**<br>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 laminae becoming thicker with depth.<br>**No Recovery 174.6-175.0'**<br>**Limestone**<br>175.0-175.3' - dusky yellow, (5Y 6/4), mild HCl reaction, extremely weak (R0), friable<br>175.3-176.9' - yellowish gray, (5Y 7/2), very fine grained, strong HCl reaction, medium strong (R3), voids confined to cavity infilling<br>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 in upper 0.5' (1-3/16"-1-9/16'x3/8-3/4") less frequent with depth<br>**No Recovery 179.55-180.0'**<br>**Limestone**<br>180.0-181.7' - 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 (1-3/16" to 1-9/16"x3/8" to 3/4") abundant in upper 0.5' less frequent with depth<br>181.7-183.4' - yellowish gray mottled with pale greenish yellow, (5Y 7/2 with 10Y 8/2), strong HCl reaction, weak to medium strong (R2 to R3), voids up to 1/16", ovate cavities up to 3/4"-1-3/16", fossil (cast), voids<br>183.4-185.0' - yellowish brown to dusky yellow, (5Y 7/2 to 5Y 6/4), strong HCl reaction, weak to medium strong (R2 to R3), interbeds of limestone similar to 181.7-183.4'<br>185.0-186.0' - light olive gray, (5Y 5/2), fine grained, mild HCl reaction, extremely weak (R0), voids, cavities (up to 3/8"-3/4"x3/8") over 50-60% of surface, fossils (mold/casts) | |
| | | | >10 | 174.3' - Fracture, <10 deg, smooth, planar, tight, slightly inclined | | | |
| | | | 0 | 175.2' - Fracture, smooth, undulating, open, sand-sized grains<br>176.0-177.0' - Fracture zone, 0-90 deg, undulating, smooth to rough, open | | | |
| | | | 3 | 178.6-178.75' - Fractures, 10 deg, smooth, planar, tight | | | R29: 9 minutes |
| | | | 3 | 178.85' - Fractures, <5 deg, rough, undulating to stepped, open | | | |
| 180 | 180.0 | | NR | | | | |
| -139.2 | R30-HQ 5 ft 100% | 54 | 2 | 179.25-179.35' - Fractures, horizontal, smooth, planar, open<br>179.45' - Fractures, rough, stepped, open | | | |
| | | | 0 | 180.8' - Fractures, rough, undulating, open<br>180.9' - Fractures, <5 deg, rough, stepped, open | | | |
| | | | 1 | | | | |
| | | | >10 | 182.95' - Fracture, <5 deg, rough, undulating, open<br>183.0-184.0' - Fracture zone, 0-<5 deg, smooth to rough, undulating stepped, open | | | R30: 9 minutes |
| | | | >10 | | | | |
| 185 | 185.0 | | | | | | |
| -144.2 | R31-HQ 5 ft 100% | 26 | >10 | 185.0-186.0' - Fracture zone, gravels, vertical orientation | | | |
| | | | >10 | 186.0' - Fracture zone, 0-90 deg, rough, stepped, open<br>186.1' - Fracture zone, vertical, rough, generally stepped to undulating | | | |
| | | | >10 | 186.4' - Fracture zone, horizontal, rough, planar, open | | | |
| | | | 10 | 187.5' - Fracture zone, 60 deg, rough, undulating, open<br>188.0-188.7' - Fracture zone, 60 deg and 70 deg, rough, undulating to stepped, open | | | R31: 8 minutes |
| | | | 3 | | | | Stopped drilling for the day 4/11/07<br>Resume drilling 4/12/07<br>Water level 0.5' below ground surface |
| 190 | 190.0 | | | | | | |
| -149.2 | R32-HQ 5 ft 100% | 15 | 2 | 190.1' - Fractures, rough to smooth, undulating, open | | | |
| | | | 10 | 190.75' - Fractures, 10 deg, smooth, planar, open<br>190.85' - Fractures, <5 deg, rough, stepped, open | | | |
| | | | >10 | 191.0-191.2' - Fracture zone, 60 deg, rough, stepped, open<br>191.4' - Fractures, 10 deg, smooth, planar, tight | | | |
| | | | >10 | 191.7' - Fractures, 10 deg, smooth, undulating, open | | | |
| | | | >10 | 192.0' - Fracture zone, 90-<5 deg, rough, stepped, open | | | R32: 6 minutes |
| 195 | 195.0 | | | | | | |

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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

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

WATER LEVELS : 0.5 ft bgs on 4/10/07 START : 4/9/2007 END : 4/17/2007 LOGGER : R. McComb, C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -154.2 | R33-HQ 5 ft 86% | 0 | >10 | 192.25-192.4' - Fracture zone, 60 deg, rough, stepped, open, horizontal | | 186.0-188.0' - yellowish gray, (5Y 7/2), very fine grained, strong HCl reaction, medium strong (R3), voids <1/16" over <1% of surface | |
| | | | >10 | 192.6' - Fracture zone, 60 deg, rough, stepped, open<br>192.6-195.0' - Fracture zone, various orientation from subhorizontal to very vertical, stepped to undulating, rough to smooth, open | | 188.0-190.0' - light olive gray, (5Y 5/2), fine grained, mild HCl reaction, extremely weak (R0), voids, cavities (up to 3/8"-3/4"x 3/8") over 50-60% of surface, fossils (mold/casts) | |
| | | | >10 | 195.0-199.5' - Fracture zone, smooth, undulating | | **Limestone**<br>190.0-190.85' - light olive brown, (5Y 4/4), fine grained, mild HCl reaction, extremely weak to very weak (R0 to R1), laminated, voids and cavities up to 2"x3/8" (coating) >5 at | |
| | | | >10 | | | | R33: 12 minutes |
| | | | >10 | | | | |
| 200 | 200.0 | | NR | | | | |
| -159.2 | R34-HQ 5 ft 64% | 0 | >10 | 200.0-201.0' - Fracture zone | | 190.3-190.4' becoming smaller with depth | Stopped drilling HQ on 4/12/07 |
| | | | >10 | 201.0-202.0' - Fracture zone | | 190.85-191.4' - light olive brown, (5Y 4/4), fine grained, no to mild HCl reaction, extremely weak (R0), voids 1/16" or less over 3-5% of surface | Resume drilling on 4/17/07<br>C. Dougherty begins logging |
| | | | >10 | 202.0-203.0' - Fracture zone | | 191.4-195.0' - grayish yellow, (5Y 7/2), very fine to fine grained, very weak to extremely weak (R1 to R0), laminated from 191.4-191.9, becoming massive-bedded with depth (gravelly) with fossil mold/casts | |
| | | | 0 | 203.0-203.2' - Fracture zone | | | |
| | | | NR | | | 195.0-199.3' - yellowish gray, (5Y 7/2), very fine grained, moderate to strong HCl reaction, very weak (R1), easily breaks along fracture plane, voids over 1-3% to absent, cavities rare <5 (3/16"x3/16"), trace laminations, trace calcareous stain | R34: 9 minutes |
| 205 | 205.0 | | | | | **No Recovery 199.3-200.0'** | |
| -164.2 | R35-HQ 5 ft 72% | 8 | 5 | 205.1' - Fractures, rough, undulating, horizontal, open | | **Limestone**<br>200.0-201.0' - pale olive, (10Y 6/2), fine grained, moderate HCl reaction, medium strong (R3), 1/4" thick zones with voids up to 1/16" | |
| | | | 7 | 205.5' - Fractures, horizontal, rough, undulating, open<br>205.8' - Fractures, horizontal, smooth, stepped | | | |
| | | | >10 | 205.9' - Fractures, horizontal, smooth, stepped, black staining | | 201.0-203.2' - light olive gray, (5Y 6/1), fine to medium grained, moderate HCl reaction, weak (R2), 20% voids up to 1/16", collapse breccia zone from 202.0-203.2' | |
| | | | >10 | 206.0' - Fractures, horizontal, smooth, stepped, slight black staining | | | |
| | | | NR | 206.2' - Fractures, 45 deg, rough, undulating, black staining<br>206.4-206.5' - Fractures, horizontal, smooth, undulating, <1/16" coating of silt size particles on surface | | | R35: 8 minutes |
| 210 | 210.0 | | | | | **No Recovery 203.2-205.0'** | |
| -169.2 | R36-HQ 5 ft 90% | 40 | >10 | 206.8' - Fractures, horizontal, rough, undulating | | **Limestone**<br>205.0-207.0' - yellowish gray, (5Y 7/2), mild to moderate HCl reaction, weak (R2), voids to 1/16"x1/16" over 25% of surface, few cavities 1"x1/4", poorly fossiliferous (molds/casts), voids over 3-5% of surface | |
| | | | | 207.0-208.6' - Fracture zone | | | |
| | | | 5 | 211.0' - Fractures, 20 deg, smooth, undulating | | | |
| | | | 3 | 211.2' - Fractures, horizontal, rough, undulating, brown staining, on 50% of surface | | 207.0-208.6' - light olive gray, (5Y 5/2), fine grained, mild HCl reaction, weak (R2), moderately fossiliferous molds/casts, voids over 35% of surface | |
| | | | | 211.5-211.9' - Mechanical break, 35 deg, rough, undulating | | | |
| | | | 3 | 212.5' - Fractures, horizontal, rough, undulating, fine to medium grain particles on surface | | **No Recovery 208.6-210.0'** | R36: 8 minutes |
| | | | 2 | | | | |
| 215 | 215.0 | | NR | 213.2' - Fractures, horizontal, smooth, stepped | | | |

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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

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

WATER LEVELS : 0.5 ft bgs on 4/10/07 START : 4/9/2007 END : 4/17/2007 LOGGER : R. McComb, C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -174.2 | | | >10 | 213.6' - Fractures, horizontal, smooth, planar, thin, (1/16" silt infill) | | **Limestone** | |
| | | | >10 | 213.8' - Fractures, horizontal, rough, undulating, silt to fine grained particles<br>214.1' - Mechanical break, horizontal, rough, undulating | | 210.0-211.2' - yellowish gray, (5Y 7/2), mild to moderate HCl reaction, weak (R2), some iron staining on fracture planes | |
| | R37-HQ 5 ft 70% | 17 | 1 | 215.0-216.0' - Fracture zone<br>216.9' - Fracture zone, iron staining on some surfaces | | 211.2-213.2' - light olive gray, (5Y 5/2), fine grained, mild HCl reaction, weak (R2), highly fossiliferous (molds/casts) | SC-10 collected at 217.0-217.8' |
| | | | 1 | 217.8' - Fracture, 45 deg, rough, undulating, brown iron staining | | **Limestone** | |
| | | | NR | 218.2' - Fracture, horizontal, rough, undulating | | 213.2-214.5' - yellowish gray, (5Y 7/2), mild to moderate HCl reaction, weak (R2), some iron staining on fracture planes | R37: 9 minutes |
| 220 | 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 planes | | **Limestone** | |
| | | | >10 | | | 215.0-215.7' - light olive gray, (5Y 5/2), fine to medium grained, moderate HCl reaction, weak (R2), 15% voids up to 1/16", moderately fossiliferous | |
| | R38-HQ 5 ft 86% | 35 | 1 | 223.3-223.0' - Mechanical break, rough, uneven | | 215.7-216.9' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, weak (R2), carbonate derived silt zone from 216.0-216.6' is laminated | |
| | | | 2 | 223.5' - Fractures, horizontal, smooth, undulating, iron staining | | 216.9-217.8' - yellowish gray, (5Y 7/2), weak (R2), uneven bedding plane, laminated, black staining along bedding planes, <5% voids | R38: 6 minutes |
| | | | >10 | | | | |
| | | | NR | | | | |
| 225 | 225.0 | | | | | | |
| -184.2 | | | >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 | | 217.8-218.5' - yellowish gray, (5Y 7/2), weak (R2), 10% voids, fractured, poorly fossiliferous | |
| | | | >10 | | | **No Recovery 218.5-220.0'** | |
| | | | >10 | | | **Limestone** | |
| | R39-HQ 5 ft 50% | 0 | | | | 220.0-221.3' - yellowish gray, (5Y 7/2), moderate HCl reaction, weak (R2), laminated bedding some are uneven, voids over 20% of surface, iron staining on bedding plane, poorly fossiliferous, fractures are along bedding plane | |
| | | | NR | | | 221.3-223.5' - light olive gray, (5Y 5/2), fine grained, mild to moderate HCl reaction, weak (R2), voids 1/16" over 20% of surface, cavities 3/8"x3/4" over 5% highly fossiliferous (molds/casts) | R39: 13 minutes |
| 230 | 230.0 | | | | | | |
| -189.2 | | | >10 | 230.0-232.0' - Fracture zone, rock fragments, with some 1-3" long sections of core | | 223.5-224.3' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, weak (R2), laminated, no voids, non fossiliferous | |
| | | | >10 | | | **No Recovery 224.3-225.0'** | |
| | R40-HQ 5 ft 68% | 0 | >10 | 232.0-233.4' - Fracture zone, carbonate derived fine to medium grain particles with some rock fragments | | **Limestone** | |
| | | | >10 | | | 225.0-225.7' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, weak (R2), fragments have voids 15% below 225.4' | Sample pulverized below 232.9' |
| | | | NR | | | | R40: Run time not recorded |
| 235 | 235.0 | | | | | | |

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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

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

WATER LEVELS : 0.5 ft bgs on 4/10/07 START : 4/9/2007 END : 4/17/2007 LOGGER : R. McComb, C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -194.2 | | | >10 | 235.0-236.1' - Fracture zone, rock fragments, irregular shape, generally 2" length or less | | 225.7-227.5' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, weak (R2), voids, casts/molds, iron staining on partings, voids <5% of surface, poorly fossiliferous | |
| | | | >10 | | | **No Recovery 227.5-230.0'** | |
| | R41-HQ 5 ft 22% | 0 | NR | | | **Limestone** 230.0-231.9' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, weak (R2), zone of voids over 40% of surface from 230.7-231.1' | R41: 5 minutes |
| 240 | 240.0 | | | | | **Limestone** 231.9-233.4' - dusky yellow, (5Y 6/4), fine grained, moderate HCl reaction, very weak (R1) | |
| -199.2 | | | >10 | 240.0-243.0' - Fracture zone, mostly rock fragments 240.0-243.0', with 2 pieces of core about 3" long | | **No Recovery 233.4-235.0'** | |
| | | | >10 | | | **Limestone** 235.0-236.1' - yellowish gray, (5Y 7/2), fine grained, mild to moderate HCl reaction, weak (R2), fragments have 10% voids, poorly fossiliferous | |
| | R42-HQ 5 ft 68% | 0 | >10 | | | **No Recovery 236.1-240.0'** | |
| | | | 2 | 242.7-245.9' - Fracture zone, top and bottom are 10 to 20 degrees from horizontal, respectively | | **Limestone** 240.0-241.3' - Same as 235.0-236.1' | |
| | | | NR | 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 | 245.0 | | | | | 242.0-242.5' - light olive gray, (5Y 5/2), fine grained, medium strong (R3), poorly fossiliferous, iron staining along bedding planes, bedding planes are uneven and undulating | |
| -204.2 | | | >10 | 245.0-248.0' - Fracture zone, rock fragments | | 242.5-243.4' - yellowish gray, (5Y 7/2), fine grained, mild to moderate HCl reaction, weak (R2), voids over 50% of surface, moderately fossiliferous (casts/molds) | |
| | | | >10 | | | **No Recovery 243.4-245.0'** | |
| | R43-HQ 5 ft 60% | 0 | >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 fossiliferous (casts) | R43: 4 minutes |
| | | | NR | | | **No Recovery 248.0-250.0'** | |
| 250 | 250.0 | | | | | Bottom of Boring at 250.0 ft bgs on 4/17/2007 | |
| -209.2 | | | | | | | |

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# SOIL BORING 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

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 : 4.0 ft bgs on 04/20/07 START : 4/18/2007 END : 4/20/2007 LOGGER : C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 40.6 | 0.0 – 1.5 | 1.1 | SS-1 | 2-2-3 (5) | **Poorly Graded Sand With Silt (SP-SM)** 0.0-1.1' - medium light gray, (N6), moist, loose, fine grained, no HCl reaction, 5% nonplastic fines, organics roots decreasing with depth, sand is silica | | |
| 5 | 5.0 | | | | | | |
| 35.6 | 5.0 – 6.5 | 1.1 | SS-2 | 2-2-2 (4) | **Silty Sand (SM)** 5.0-6.1' - yellowish gray, (5Y 7/2), wet, very loose, fine grained, no HCl reaction, 25% low to nonplastic fines, trace iron nodules, trace roots, sand is silica | | |
| 10 | 10.0 | | | | | | |
| 30.6 | 10.0 – 11.5 | 1.0 | SS-3 | 3-5-4 (9) | **Silty Sand And Limestone (SM)** 10.0-10.95' - light gray, (N7), wet, loose, very fine to fine grained, moderate to strong HCl reaction, mixed with yellowish gray (5Y 8/1) fine to medium sand sized carbonate grains, 24% fines, 30% fine to coarse gravel-sized carbonate grains, limestone fragments at bottom of sample, sand is silica | | |
| 15 | 15.0 | | | | | | |
| 25.6 | 15.0 – 16.5 | 1.5 | SS-4 | 40-49-17 (66) | **Silt (ML)** 15.0-16.5' - very pale orange, (10YR 8/2), wet, hard, rapid dilatancy, moderate HCl reaction, 5% gravel, trace fine grained sand, fine grained lamination, nonplastic, all carbonate | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

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 : 4.0 ft bgs on 04/20/07 START : 4/18/2007 END : 4/20/2007 LOGGER : C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 20.6 | 20.0 – 21.5 | 1.5 | SS-5 | 39-20-13 (33) | **Limestone Fragments And Silt (ML)** 20.0-20.5' - dusky yellow, (5Y 6/4), fine to coarse grained, moderate to strong HCl reaction, angular, limestone fragments | | Casing set at 20' below ground surface |
| | | | | | **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 | 26.5 | 1.1 | SS-6 | 10-10-4 (14) | **Sandy Silt (ML)** 25.0-26.1' - yellowish gray, (5Y 7/2), wet, stiff, rapid dilatancy, moderate HCl reaction, 31% fine to medium grained sand, nonplastic | | |
| 30 | 30.0 | | | | | | |
| 10.6 | 31.5 | 1.1 | SS-7 | 5-6-25 (31) | **Silt With Sand (ML)** 30.0-31.1' - Same as 25.0-26.1' except 20-25% fine to coarse grained sand | | Drilling ends 4/18/07<br>Drilling resumes 4/19/07 at 07:35 hrs |
| 35 | 35.0 | | | | | | |
| 5.6 | 35.6 | 0.6 | SS-8 | 22-72/7 (72/7") | **Silty Gravelly Sand (SM)** 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 | | Driller's Remark: Organic material in cuttings at about 37' below ground surface |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

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 : 4.0 ft bgs on 04/20/07 START : 4/18/2007 END : 4/20/2007 LOGGER : C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 0.6 | 40.0 – 41.5 | 1.5 | SS-9 | 20-35-34 (69) | **Sandy Silt (ML)** 40.0-41.5' - pale yellowish brown, (10YR 6/2), wet, hard, rapid dilatancy, moderate HCl reaction, 25-30% fine to medium grained sand, low plastic, trace organics, all carbonate | | |
| 45 -4.4 | 45.0 – 46.5 | 1.5 | SS-10 | 3-9-27 (36) | **Silty Sand (SM)** 45.0-46.5' - pale yellowish brown, (10YR 6/2), wet, dense, moderate HCl reaction, 40% low plastic fines, fine to coarse grained sand, trace fine gravel, all carbonate | | |
| 50 -9.4 | 50.0 – 51.5 | 1.4 | SS-11 | 47-32-49 (81) | **Sandy Silt (ML)** 50.0-51.4' - light olive gray, (5Y 5/2), trace black iron mottling, moist, hard, rapid dilatancy, moderate HCl reaction, 30% fine to medium grained sand, 50% coarse grained sand in last 3.6" of sample, all carbonate | | |
| 55 -14.4 | 55.0 – 55.4 | 0.4 | SS-12 | 50/5 (50/5") | **Sandy Silt (ML)** 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: |
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# SOIL BORING 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

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 : 4.0 ft bgs on 04/20/07 START : 4/18/2007 END : 4/20/2007 LOGGER : C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -19.4 | 60.0<br>60.7 | 0.4 | SS-13 | 34-50/2<br>(50/2") | **Silt (ML)**<br>60.0-60.4' - moderate yellowish brown, (10YR 5/4), 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 |
| 65<br>-24.4 | 65.0 | | | | | | |
| | 66.5 | 1.1 | SS-14 | 13-15-13<br>(28) | **Silty Sand (SM)**<br>65.0-65.7' - yellowish gray, (5Y 7/2), wet, medium dense, fine to medium grained, moderate HCl reaction, 40% low plastic fines, trace coarse grained sand at 65.4', all carbonate<br>**Silt With Sand (ML)**<br>65.7-66.1' - yellowish gray, (5Y 7/2), wet, hard, rapid dilatancy, moderate HCl reaction, 26% fine to medium grained sand, low plastic fines, all carbonate | | |
| 70<br>-29.4 | 70.0<br>70.2 | 0.1 | SS-15 | 50/2<br>(50/2") | **Limestone Fragments**<br>70.0-70.1' - light olive gray, (5Y 5/2), black iron staining<br>Begin Rock Coring at 70.0 ft bgs<br>See the next sheet for the rock core log | | |
| 75<br>-34.4 | | | | | | | |
| 80 | | | | | | | |

| 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

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

WATER LEVELS : 4.0 ft bgs on 04/20/07 START : 4/18/2007 END : 4/20/2007 LOGGER : C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -29.4 | 70.0 | | | | | | |
| | R1-HQ 5 ft 60% | 35 | 0 | | | **Limestone** 70.0-73.0' - light olive gray, (5Y 5/2), moderate HCl reaction, very weak (R1), voids over 70% of surface from 70.5' to 73.0', organics at 72.0' | Driller's Remark: Tools were bouncing when hammering, also chatter when drilling to 70' below ground surface. Driller switches to rock coring at 11:25 hrs |
| | | | 3 | 71.2-71.6' - Fracture zone, rock fragments | | | |
| | | | 1 | 71.9' - Fracture, 20 deg, rough, undulating, open, coating of carbonate derived silt<br>72.6' - Fracture zone | | | Begin rock coring at 13:18 hours |
| | | | NR | | | **No Recovery 73.0-75.0'** | Split Spoon sample SS-15 actually advanced 70.0-70.2'<br>R1: 6 minutes |
| 75 | 75.0 | | | | | | |
| -34.4 | | | | | | | |
| | R2-HQ 5 ft 32% | 18 | 0 | | | **Limestone** 75.0-76.6' - Same as 70.0-73.0' except cavities (2) up to 1/2" wide and 1/2" deep | SC-1 collected at 75.0-75.9' |
| | | | 2 | 75.9-76.6' - Fracture zone | | | |
| | | | NR | | | **No Recovery 76.6-80.0'** | R2: 6 minutes |
| 80 | 80.0 | | | | | | |
| -39.4 | | | | | | | |
| | R3-HQ 5 ft 100% | 65 | 0 | | | **Limestone** 80.0-85.0' - light olive gray, (5Y 5/2), very fine grained, moderate HCl 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' | |
| | | | 0 | 80.7, 80.8, 80.9, 81.4, 81.5, 81.6, 82.0, 82.3' - Mechanical break (8) | | | |
| | | | 0 | | | | |
| | | | >10 | 83.0-83.3' - Fracture zone | | | |
| | | | >10 | 84.0-84.3' - Fracture zone | | | R3: 5 minutes |
| 85 | 85.0 | | | | | | |
| -44.4 | | | | | | | |
| | R4-HQ 5 ft 100% | 83 | 0 | | | **Limestone** 85.0-91.0' - Same as 80.0-85.0' except weak to medium strong (R2 to R3) | |
| | | | 0 | | | | |
| | | | >10 | 87.6-88.2' - Fracture zone | | | |
| | | | 0 | | | | |
| | | | 0 | | | | R4: 9 minutes |
| 90 | 90.0 | | | | | | |

| 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

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

WATER LEVELS : 4.0 ft bgs on 04/20/07 START : 4/18/2007 END : 4/20/2007 LOGGER : C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -49.4 | | | 0 | | | | 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, medium strong to strong (R3 to R4), voids <1/16" over 20% of surface, solution cavity 1/2"x1.5"x3/4" deep at 92.5', 1/16" wide weathered area around edges of cavity | |
| | R5-HQ 5 ft 60% | 35 | 1 | 92.1' - Joint, smooth, undulating, possible cavity, open | | | Driller's Remark: Lost circulation at 92' |
| | | | NR | | | **No Recovery 93.0-95.0'** | R5: 9 minutes |
| 95 | 95.0 | | | | | | |
| -54.4 | | | >10 | | | **Limestone** 95.0-99.2' - Same as 80.0-85.0' except trace organics at 97.6' | |
| | | | 1 | | | | |
| | R6-HQ 5 ft 100% | 57 | 1 | 96.8' - Joint, 60 deg, smooth, undulating, coating of carbonate derived silt, tight 97.2-98.0' - Fracture, vertical, rough, undulating | | | |
| | | | 0 | | | | |
| | | | >10 | | | 99.2-99.6' - medium light gray, (N6), very fine grained, moderate HCl reaction, medium strong to strong (R3 to R4) 99.6-104.0' - Same as 95.0-99.2' | R6: 10 minutes |
| 100 | 100.0 | | | | | | |
| -59.4 | | | >10 | 100.4-100.8' - Fracture zone | | | |
| | | | >10 | 101.5-101.9' - Fracture zone | | | |
| | R7-HQ 5 ft 80% | 48 | 1 | 102.3' - Joint, 35 deg, rough, undulating, black iron staining, open | | | |
| | | | 1 | | | | |
| | | | NR | 103.8' - Joint, horizontal, rough, undulating, open | | **No Recovery 104.0-105.0'** | R7: 8 minutes |
| 105 | 105.0 | | | | | | |
| -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" voids over 40% of surface, moderately fossiliferous (cast and molds), color change to yellowish gray, (5Y 7/2), at 108.3' and very weak (R1) | |
| | | | 0 | | | | |
| | R8-HQ 5 ft 74% | 40 | >10 | 107.0' - Fracture or mechanical break, horizontal 107.0-107.4, 107.7-107.9' - Fracture zone (2), horizontal, coating of carbonate derived silt | | | |
| | | | 1 | | | | |
| | | | NR | 108.4' - Fracture or mechanical break, horizontal, loose | | **No Recovery 108.7-110.0'** | R8: 5 minutes |
| 110 | 110.0 | | | | | | |

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|---|---|---|
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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

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

WATER LEVELS : 4.0 ft bgs on 04/20/07 START : 4/18/2007 END : 4/20/2007 LOGGER : C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -69.4 | | | 0 | | | **Limestone**<br>110.0-114.0' - Same as 105.0-108.7' except poorly fossiliferous | |
| | | | 0 | | | | SC-3 collected at 111.4-112.4' |
| | R9-HQ<br>5 ft<br>100% | 78 | 0 | 112.6-112.9' - Mechanical break | | | |
| | | | 2 | 113.3' - Joint, 20 deg, smooth, undulating, dark staining, loose | | | |
| | | | 1 | 113.7' - Joint, 60 deg, smooth, undulating, dark staining, loose<br>114.0, 114.9' - Mechanical break (2) | | 114.0-115.0' - dusky yellow, (5Y 6/4), fine to very fine grained, strong HCl reaction, very weak (R1), 1/16" voids over 15% of surface, poorly fossiliferous | R9: 8 minutes |
| 115 | 115.0 | | | | | | |
| -74.4 | | | 1 | 114.3' - Fracture zone or mechanical break<br>115.0-115.4' - Joint, 80 deg, rough, undulating, black iron staining on 25% of the surface | | 115.0-117.0' - Same as 110.0-114.0' except <1/16" voids over 20% of surface | |
| | | | 0 | 115.5' - Mechanical break<br>116.3-116.5' - Mechanical break | | | |
| | R10-HQ<br>5 ft<br>90% | 40 | >10 | 117.0-118.1' - Fracture zone | | 117.0-118.2' - moderate olive brown, (5Y 4/4), moderate HCl reaction, very weak (R1), zone of carbonate derived silt at 117.0-117.4' and 117.8-118.0' | |
| | | | 0 | | | 118.2-119.5' - light olive gray, (5Y 5/2), moderate HCl reaction, weak (R2), voids (1/16") over 20% of surface, larger voids (up to 3/8") over 5% of surface, moderately fossiliferous (molds) | |
| | | | >10 | 119.0-119.5' - Fracture zone | | | R10: 8 minutes |
| 120 | 120.0 | | NR | | | | |
| -79.4 | | | 3 | 120.4-120.7' - Fracture zone | | **No Recovery 119.5-120.0'**<br>**Limestone**<br>120.0-120.5' - Same as 118.2-119.5' | Fragments from 120.4-120.4' appear to have been cored at two different angles indicating they were loose in borehole |
| | | | 3 | 121.3' - Fracture, 20 deg, smooth, planar, coating of carbonate derived fine sand particles on face, along bedding plane | | 120.5-123.6' - light olive gray, (5Y 5/2), moderate HCl reaction, weak to medium strong (R2 to R3), voids <1/16" over 30% of surface, few large voids (3/8"x1"), moderately fossiliferous, voids oriented parallel to bedding plane at about 20 degrees, large cavity (3/8"x1-3/16") present at 122.0', laminated bedding (1/16"-1/4") below 122.5' | |
| | R11-HQ<br>5 ft<br>72% | 20 | 1 | 121.5-121.8' - Fracture zone<br>121.7' - Fracture, 20 deg, smooth, planar, along bedding plane | | | |
| | | | 0 | | | | |
| | | | NR | | | | R11: 6 minutes |
| 125 | 125.0 | | | | | | |
| -84.4 | | | 1 | | | **No Recovery 123.6-125.0'**<br>**Limestone**<br>125.0-127.8' - Same as 118.2-119.5' except zone of larger (3/4"x3/8") cavities from 125.8-126.3' over 30% of surface, voids (<1/16") over 25% of surface | |
| | | | 1 | 125.8' - Fracture, horizontal, rough, undulating, coating of carbonate derived silt on faces, loose | | | |
| | R12-HQ<br>5 ft<br>56% | 38 | 0 | 126.3' - Joint or mechanical break, horizontal, rough, undulating | | | |
| | | | NR | | | **No Recovery 127.8-130.0'** | R12: 5 minutes |
| 130 | 130.0 | | | | | | |

| 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

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

WATER LEVELS : 4.0 ft bgs on 04/20/07 START : 4/18/2007 END : 4/20/2007 LOGGER : C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -89.4 | | | NA | 130.0-130.7' - Fracture zone, mostly carbonate derived fine sand and silt size fragments | | **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 |
| | | | >10 | 130.7-132.0' - Fracture zone, only rock fragments, 2"x3", breakage is mostly along 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 HCl 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) with 30% voids, light olive gray limestone increases with depth, bedding oriented from 0-10 degrees **No Recovery 132.0-135.0'** | Resume drilling 4/20/07, 07:45 hrs<br>Driller's Remark: Water level 4' below ground surface |
| | R13-HQ 5 ft 40% | 0 | NR | | | | R13: 7 minutes |
| 135 | 135.0 | | | | | | |
| -94.4 | | | >10 | | | **Limestone** 135.0-137.7' - moderate olive brown, (5Y 4/4), fine grained, mild HCl reaction, medium strong (R3), moderately fossiliferous, (1/16") voids over 20% of surface, cavities (>3/16") and fossil molds over 10% of surface, <3/16" fragments of gray limestone included in matrix at about 2-3% from 136.3-137.5', 1" fragments 137.5'-137.7'. | |
| | | | 1 | 136.6' - Joint, horizontal, rough, undulating, iron staining, open | | | |
| | R14-HQ 5 ft 88% | 57 | 1 | 137.5' - Fracture zone or mechanical break, horizontal | | | |
| | | | 0 | | | | |
| | | | 0 | | | | R14: 11 minutes |
| 140 | 140.0 | | NR | | | | |
| -99.4 | | | 0 | | | 137.7-139.4' - medium gray mottled yellowish gray, (N5, mottled 5Y 7/2), fine to very fine grained, mild HCl 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'** | |
| | | | 1 | 141.5' - Joint, horizontal, rough, undulating, iron staining, coating of carbonate derived fine sands on 15% of surface | | | |
| | R15-HQ 5 ft 92% | 70 | 0 | | | **Limestone** 140.0-142.0' - Same as 137.7-139.4' except yellowish gray (5Y 7/2) at 140.7-142.0' | |
| | | | 0 | | | | SC-4 collected at 143.5-144.6' |
| | | | 0 | | | 142.0-143.0' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, medium strong to strong (R3 to R4), 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" | R15: 9 minutes |
| 145 | 145.0 | | NR | | | | |
| -104.4 | | | 0 | | | 143.0-144.6' - light olive gray to yellowish gray, (5Y 5/2 to 5Y 7/2), moderate HCl reaction, weak (R2), laminated bedding, areas of voids (1/16") correspond to bedding **No Recovery 144.6-145.0'** | |
| | | | 0 | | | | |
| | R16-HQ 5 ft 76% | 68 | 0 | | | | |
| | | | 0 | | | | |
| | | | NR | | | | R16: 5 minutes |
| 150 | 150.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-24 SHEET 9 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

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

WATER LEVELS : 4.0 ft bgs on 04/20/07 START : 4/18/2007 END : 4/20/2007 LOGGER : C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -109.4 | R17-HQ 5 ft 100% | 92 | 0 | | | **Limestone** 145.0-145.4' - olive gray to yellowish gray, (5Y 3/2 to 5Y 7/2), fine grained, mild to moderate HCl reaction, medium strong to strong (R3 to R4), very fossiliferous, voids (<1/16") over 30% of surface, larger (up to 3/8"x3/8") cavities and fossil molds over 5% | |
| | | | 0 | | | | |
| | | | 0 | | | | SC-5 collected at 151.9-152.9' |
| | | | >10 | 153.3-153.8' - Fracture zone, fragments 1/16" to 1-9/16" | | 145.4-145.7' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, strong (R4), few voids (<1/16") | |
| | | | 0 | | | 145.7-148.8' - moderate olive brown, (5Y 4/4), fine grained, mild HCl reaction, medium strong (R3), voids (<1/16") up to 50% of surface (few from 146.0-146.4' and 146.8-147.5'), cavities (up to 1" in diameter) over 5% from 147.0-148.8' | R17: 9 minutes |
| 155 | 155.0 | | | | | | |
| -114.4 | R18-HQ 5 ft 90% | 75 | 1 | 155.7' - Fracture, rough, undulating, iron staining on <5%, open | | **No Recovery 148.8'-150.0'** | |
| | | | 1 | | | **Limestone** 150.0-155.0' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, medium strong to strong (R3 to R4), thinly laminated from 152.0-153.8', voids (<1/16") over 10% of surface from 150.0-152.5', 30% voids from 152.5-154.0', trace voids (up to 3 /16") and fossil molds | |
| | | | 1 | 157.6-158.2' - Fracture zone | | | |
| | | | >10 | | | | |
| | | | 0 | | | | R18: 5 minutes |
| 160 | 160.0 | | NR | | | 155.0-156.9' - Same as 145.7-148.8' | |
| -119.4 | | | | | | 156.9-157.3' - yellowish gray, (5Y 7/2), fine to very fine grained, moderate HCl reaction, medium strong (R3), thin (1/4") bedding, few voids, abrupt change from light olive gray with voids to yellowish gray with few voids, changes back at 157.3' (bedding, <5 degree from horizontal), tight | Total Depth at 160' at 09:45 hrs, 4/20/07 |
| | | | | | | 157.3-159.5' - Same as 145.7-148.8' 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 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-24A SHEET 1 OF 5 |

# SOIL BORING 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

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

WATER LEVELS : 4.0 ft bgs on 04/20/07 START : 6/15/2007 END : 6/15/2007 LOGGER : J. Townes

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 40.3 | | | | | | | |
| | | | | | | | Blind drill to 25'<br>Install SW casing to 10' |
| | | | | | | | Water level obtained from boring A-24 |
| 5<br>35.3 | | | | | | | |
| 10<br>30.3 | | | | | | | |
| 15<br>25.3 | | | | | | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-24A SHEET 2 OF 5 |

# SOIL BORING 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

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

WATER LEVELS : 4.0 ft bgs on 04/20/07 START : 6/15/2007 END : 6/15/2007 LOGGER : J. Townes

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 20.3 | | | | | | | |
| 25 | 25.0 | | | | | | |
| 15.3 | 26.5 | 1.3 | SS-1 | 3-5-8 (13) | **Silt With Sand (ML)** 25.0-26.3' - grayish orange, (10YR 7/4), moist, stiff, rapid dilatancy, mild to moderate HCl reaction, 15-20% fine to medium sand, 10% coarse sand to fine gravel-sized limestone fragments, all carbonate | | |
| 30 | 30.0 | | | | | | |
| 10.3 | 31.5 | 0.9 | SS-2 | 3-4-11 (15) | **Silt With Sand (ML)** 30.0-30.9' - Same as 25.0-26.3' | | |
| 35 | 35.0 | | | | | | |
| 5.3 | 35.1 | 0.0 | SS-3 | 50/1 (50/1") | **No Recovery 35.0-35.1'** Begin Rock Coring at 35.0 ft bgs See the next sheet for the rock core log | | Install HW casing to 35' |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
| 338884.FL | A-24A | SHEET 3 OF 5 |

# 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| 5.3 | 35.0 R1-NQ 1.5 ft 60% 36.5 | 33 | 1<br>NR | 35.72' - Fracture, 52 deg, rough, undulating, minor recrystallization, 3/16" open, rock, rubble at top of run 0.2" thick | | **Limestone**<br>35.0-35.9' - pale reddish brown, (10R 5/4), very fine to fine grained, moderate HCl reaction, very weak (R1), voids up to 1/16" over 85% of surface, 10% irregular cavities (up to 9/16"x3/4"), minor recrystallization, some with fossil casts/ fossil molds, moderately fossiliferous<br>**No Recovery 35.9-36.5'** | Begin NQ coring; first run 1.5' to set stroke<br>R1: Run time not recorded SC-1 collected at 36.1-37.05' |
| | R2-NQ 5 ft 72% 41.5 | 63 | 0<br>1<br>1<br>1<br>NR | 37.85' - Fracture, 65 deg, rough, undulating, open 3/16"<br>39.0' - Fracture, 75 deg, rough, undulating, open 1/16", minor carbonate recrystallization<br>39.75' - Fracture, 75 deg, rough, undulating, open 1/16" | | 36.5-40.1' - Same as 35.0-36.5' except fewer irregular cavities, 5% cavities, most with fossil cast/molds, cavities up to 3/16"x3/8", two larger cavities 1-3/16"x3/8", moderately fossiliferous<br>**No Recovery 40.1-41.5'** | R2: 2 minutes |
| 40<br>0.3 | R3-NQ 5 ft 30% 46.5 | 8 | 3<br>>10<br>NR | 41.7-42.0' - Fracture (2), horizontal, smooth, undulating, open 3/16"<br>42.45' - Fractures, horizontal, rough, undulating, open 3/8"<br>42.75-43.0' - Fracture zone | | **Limestone**<br>41.5-43.0' - moderate yellowish brown, (10YR 5/4), fine to medium grained, mild to moderate HCl reaction, extremely weak (R0), voids 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 organic inclusions, most 1/16"-1/8", one inclusion 1"x3/8"<br>**No Recovery 43.0-46.5'** | R3: 1 minute |
| 45<br>-4.7 | R4-NQ 5 ft 48% 51.5 | 15 | 2<br>3<br>2<br>NR | 46.6' - Fracture, 45 deg, rough, undulating, open<br>46.95' - Fracture, 35 deg, rough, undulating, open 3/4", minor carbonate recrystallization<br>47.7' - Fracture, horizontal, rough, undulating, open 1/16", tight<br>48.0' - Fracture, horizontal, rough, undulating, open 3/8"<br>48.35' - Fracture, horizontal, rough, undulating, open 1/16", slightly tight<br>48.55' - Fracture, 50 deg, rough, undulating, open | | **Limestone**<br>46.5-48.0' - moderate yellowish brown, (10YR 5/4), fine to medium grained, moderate HCl reaction, extremely weak (R0), some voids with fossil mold/casts, voids up to 1/16"x1/16" covering 100% of surface; 5% subangular, gray, rock clasts up to 3/16"x3/16", poorly to moderately fossiliferous<br>48.0-48.9' - Same as 41.5-43.0' except very few organic inclusions<br>**No Recovery 48.9-51.5'** | R4: 1 minute |
| 50<br>-9.7 | R5-NQ 5 ft 72% | 14 | 2<br>5<br>3<br>0 | 52.0' - Fracture, 30 deg, smooth, planar<br>52.35' - Fracture, horizontal, smooth, planar<br>52.6' - Fracture or mechanical break, horizontal, rough, undulating<br>52.7' - Mechanical break, horizontal, rough, undulating<br>52.95, 53.1' - Fractures (2), horizontal, rough, undulating | | **Limestone**<br>51.5-53.0' - moderate yellowish brown, (10YR 5/4), fine to medium grained, mild to moderate HCl reaction, extremely weak (R0)<br>53.0-54.0' - Same as 51.5-53.0' except 2% black staining | |
| 55 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
| 338884.FL | A-24A | SHEET 4 OF 5 |

# 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -14.7 | | | NR | 53.4' - Fractures, 50 deg, rough, undulating, minor carbonate recrystallization, open 1/16"<br>53.7' - Mechanical break<br>54.45' - horizontal, rough, undulating, tight<br>54.95' - Fracture, <90 deg, rough, undulating | | **Limestone**<br>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 moderately fossiliferous, irregular voids up to 9/16" over 2% of surface<br>**No Recovery 55.1-56.5'**<br>**Limestone**<br>56.5-58.6' - moderate yellowish brown, (10Y 5/4), fine to medium grained, mild to moderate HCl 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'.<br>**No Recovery 58.6-61.5'**<br>**Limestone**<br>61.5-62.0' - grayish pink, (5R 8/2), very fine to fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids <1/16" over 50% of surface. irregular cavities up to 2" over 10% of surface. poorly fossiliferous<br>62.0-64.3' - moderate reddish orange, (10R 6/6), very fine to fine grained, moderate to strong HCl reaction, very weak to weak (R1 to R2), voids <1/16" over 50% of surface, single black organic layer at 62.6', 1/16" thick; trace organics above and below.<br>64.3-64.9' - Same as 61.5-62.0' except more cavities, up to 9/16"x9/16" over 20% of surface.<br>64.9-66.35' - Same as 62.0-64.3' except more voids <1/8" over 70% of surface<br>**No Recovery 66.35-66.5'**<br>**Limestone**<br>66.5-67.0' - moderate reddish orange, (10R 6/6), fine grained, moderate HCl reaction, very weak (R1), voids over 10% of surface, trace organic black material, 66.5-67.0' non fossiliferous layer<br>67.0-68.0' - Same as 66.5-67.0' except poorly to moderately fossiliferous. mottled and layered areas with grayish pink limestone, weak (R2) over 5% of surface area.<br>68.0-68.4' - Same as 66.5-67.0'<br>68.4-69.3' - Same as 67.0-68.0'<br>69.3-70.85' - Same as 61.5-62.0'<br>70.85-71.5' - Same as 62.0-64.3' | R5: 3 minutes<br>R6: 2 minutes<br>R7: 4 minutes<br>SC-2 collected at 69.78-70.58'<br>R8: 4 minutes |
| 56.5 | R6-NQ 5 ft 42% | 27 | 3 | 56.7' - Fractures, horizontal, rough, undulating, tight, open 1/16" | | | |
| | | | 4 | 57.05' - Fractures, horizontal, rough, undulating, open 1/16" | | | |
| | | | 0 | 57.4' - Fractures, horizontal, rough, undulating, open 3/8", minor black organic laminae | | | |
| 60<br>-19.7 | | | NR | 57.6, 57.7, 57.8' - Fractures (3), horizontal, rough, undulating, abundant black organic laminae<br>58.0' - Fracture, horizontal, rough, undulating, open 3/4", small black laminae | | | |
| 61.5 | R7-NQ 5 ft 97% | 63 | 0 | | | | |
| | | | 3 | 62.8' - Fracture or bedding plane, 10 deg, rough, undulating, open 3/8" | | | |
| | | | 2 | 63.15' - Fractures, horizontal, rough, undulating, open 2"<br>63.5' - Fractures, 5 deg, rough, undulating, open 3/8" | | | |
| 65<br>-24.7 | | | 2 | 63.9' - Fractures, horizontal, rough, undulating, minor recrystallization | | | |
| | | | 2 | 64.15' - Bedding plane, horizontal, rough, undulating | | | |
| 66.5 | | | NR | 64.8' - Bedding plane, horizontal, rough, undulating, open 3/4" | | | |
| | R8-NQ 5 ft 100% | 80 | 1 | 65.1' - Fractures, rough, undulating, minor recrystallization | | | |
| | | | 2 | 65.7' - Fractures, 5 deg, rough, undulating<br>66.1' - Fracture, horizontal, rough, undulating, open 1-3/16" | | | |
| | | | 2 | 66.95' - Fracture, horizontal, rough, undulating, open 3/8", minor recrystallization<br>67.7' - Fractures, 60 deg, rough, undulating, minor recrystallization | | | |
| 70<br>-29.7 | | | 1 | 68.4' - Bedding plane, 5 deg, rough, undulating | | | |
| | | | 2 | 69.05' - Fracture, 30 deg, rough, undulating, minor recrystallization<br>69.3' - Fracture, horizontal, rough, undulating, open 2" | | | |
| 71.5 | R9-NQ 5 ft 86% | 51 | 2 | 69.7' - Fracture, horizontal, rough, undulating, minor recrystallization | | | |
| | | | >10 | 70.6, 71.3' - Mechanical break (2)<br>72.2' - Fractures, horizontal, rough, undulating, minor recrystallization | | | |
| | | | 1 | 72.5-72.9' - Fracture zone, rubble, minor recrystallization<br>73.35' - horizontal, rough, undulating, tight<br>73.5' - Fractures, 60 deg, rough, undulating, minor recrystallization | | | |
| 75 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | A-24A SHEET 5 OF 5 |

# 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -34.7 | | | 1 | | | **Limestone** | |
| | | | >10 | 75.3-75.7' - Fracture zone, rough, irregular, minor recrystallization | | 71.5-72.1' - grayish pink to moderate reddish orange, (5R 8/2 to 10R 6/6), moderate HCl reaction, weak (R2), poorly fossiliferous, voids over 5% of surface | R9: 2 minutes |
| | | | NR | | | | |
| | 76.5 | | | | | | |
| | | | >10 | 76.5-77.0' - Fracture zone | | 72.1-75.8' - moderate reddish orange, (10R 6/6), moderate HCl reaction, amount of voids varies in alternating 1' thick layers, voids range from 10-90%, irregular cavities throughout, up to 9/16"x9/16" over 40% of surface, poorly fossiliferous | |
| | | | >10 | 77.4' - Fracture zone, 20 deg, rough, undulating, minor recrystallization | | | |
| | | | | 78.2-78.4' - Fracture zone | | | |
| | R10-NQ 5 ft 75% | 46 | >10 | 78.9-79.1' - Fracture zone | | **No Recovery 75.8-76.5'** | |
| 80 -39.7 | | | 2 | | | **Limestone** | |
| | | | | 80.1' - Fractures, 60 deg, rough, undulating, two intersecting fractures | | 76.5-80.25' - moderate reddish orange, (10R 6/6), moderate HCl reaction, very weak (R1), voids over 80% of surface, irregular cavities up to 9/16" over 20% of surface | R10: 2 minutes |
| | | | NR | | | **No Recovery 80.25-81.5'** | |
| | 81.5 | | | | | | |
| | | | 1 | | | **Limestone** | |
| | | | | 82.2' - Mechanical break, horizontal, rough, undulating | | 81.5-86.45' - moderate reddish orange, (10R 6/6), fine to medium grained, moderate HCl reaction, very weak (R1), voids <1/16" over 80% of surface, irregular cavities up to 3/8" over 20% of surface, some voids and cavities contain fossil casts/molds, trace, black organics throughout, fossil and organics especially prevalent from 83.0-84.0'. | |
| | | | 2 | 82.8' - Fractures, 30 deg, rough, undulating, open 3/8", organic material | | | |
| | R11-NQ 5 ft 99% | 44 | 1 | 83.1' - Fractures, rough, undulating, surface open 1-9/16", minor recrystallization | | | |
| | | | | 83.9-84.0' - Fracture zone, horizontal, undulating, organics | | | |
| 85 -44.7 | | | >10 | 84.5-85.6' - Fracture zone, 3/8"-3-1/8" long rock fragments | | | |
| | | | >10 | | | | R11: 2 minutes |
| | 86.5 | | | | | | |
| | | | NR | 86.05' - Fracture zone, 60 deg, rough, undulating, open 1-3/16", minor recrystallization | | **No Recovery 86.45-86.5'** | |
| | | | | | | Bottom of Boring at 86.5 ft bgs on 6/15/2007 | Drilling ended at 13:00 hours; grouting completed at 17:00 hours<br>Total depth is 86.5' |

| 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 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 204.0 | | | | | | |
| 205 -163.0 | R1-HQ 2.5 ft 100% | 24 | >10 | 204.0-204.7' - Fracture zone, multiple intersecting fractures, gravel-sized fragments <3" diameter | | **Limestone** 204.0-206.5' - yellowish gray, (5Y 7/2), very fine to medium grained, mild to moderate HCl reaction, extremely weak (R0), with areas of 1" diameter weak (R2) rock, voids over 40% of surface, trace laminations, fossiliferous, medium strong to strong (R3 to R4) from 204.0-204.2', HCl reaction 1-3 seconds | Boring AD-1 blind drilled to approximately 204 feet below ground surface before beginning sampling/logging. Water level is based on Ground Water Monitoring at LNP site (FSAR Table 2.4.12.08)" |
| | | | 4 | 204.7, 204.9, 205.1, 205.3' - Fractures (4), <10, 80, <10, and <10 deg, rough, undulating, intersecting fractures | | | |
| | 206.5 | | >10 | 205.9-206.5' - Fracture zone, rough, undulating, fragments <2" diameter | | | |
| | R2-HQ 2.5 ft 80% | 0 | >10 | 206.5-207.15' - Fracture zone, rough, undulating, multiple intersecting fractures, gravel-sized fragments <2" diameter | | 206.5-208.5' - yellowish gray, (5Y 7/2), very fine to medium grained, extremely weak to very weak (R0 to R1), 206.5-207.15': light olive gray (5Y 5/2), high organic content; slow, moderate HCl reaction, trace strong organic odor, 207.15-208.5': laminated with trace organics in laminations, <10% voids over surface | 08/22/07 HW casing set to 204.25' below ground surface 08/23/07 Begin rock coring HQWL Use thick mud mix with 250-350 rpm rotation R1: 4 minutes 204-204.2': Probable sluff fallen to bottom of borehole during sonic advancement |
| | | | >10 | 207.3, 207.4, 207.55, 207.6, 207.9, 208.15' - Fractures or mechanical break (6), <10 deg, undulating, smooth to rough, bedding planes | | | |
| | | | >10 | 208.15-208.5' - Fracture zone, gravel-sized fragments <2" diameter | | | |
| | 209.0 | | NR | | | **No Recovery 208.5-209.0'** | |
| 210 -168.0 | R3-HQ 5 ft 32% | 0 | NA | 209.0-209.4' - Fracture zone, rough, undulating, gravel-sized fragments <2" diameter | | **Limestone** 209.0-209.4' - yellowish gray, (5Y 7/2), very fine to fine grained, medium strong to strong (R3 to R4), voids <1/16" over <20% of surface, poorly fossiliferous, trace laminations, trace organics | R2: 3 minutes |
| | | | NA | 209.4-210.6' - Sandy silt interval, friable | | | |
| | | | NR | | | **Sandy Silt (ML)** 209.4-210.6' - yellowish gray, (5Y 7/2), moist to dry, hard, strong HCl reaction, >60% low to moderate plasticity carbonate fines, <40% fine to medium grained carbonate sand, trace $H_2S$ odor | R3: 6 minutes |
| | 214.0 | | | | | **No Recovery 210.6-214.0'** | 08/26/07 Switch drill rigs and crew: Boart Longyear BL300T drill rig operated by Minnesota crew. Using HW casing previously set. Using face discharge type bit. C. Sump takes over logging. |
| 215 -173.0 | R4-HQ 5 ft 76% | 8 | >10 | 214.0-214.7' - Fracture zone, angular limestone fragments 2-3" | | **Limestone Fragments** 214.0-215.3' - yellowish gray, (5Y 7/2), slow moderate HCl reaction, weak (R2), 2-3" fragments from 214.0-214.7' decreasing to <1" from 214.7-215.3', voids 1/16-1/8" over 15-25% of surface | |
| | | | >10 | 214.7-215.3' - Fracture zone, fragments <1" diameter | | | |
| | | | >10 | 215.3-217.1' - Fracture zone, fragments range from 1/2" to >3" in zones | | | |
| | | | >10 | | | | |
| | | | 3 | 217.0, 217.5' - Mechanical break (2), rough, undulating | | | |
| | | | NR | 217.8' - Fracture, horizontal, rough, undulating, possible bedding plane | | | R4: 7 minutes |
| | 219.0 | | | | | **Limestone And Limestone Fragments** 215.3-219' - yellowish gray, (5Y 7/2), fine grained, slow moderate HCl reaction, extremely weak to very weak (R0 to R1), finely laminated (<1/16"), thin zone (217.0-217.1') of medium strong (R3) rock fragments, fine grained laminated material appears argillaceous | |
| 220 -178.0 | R5-HQ 5 ft 60% | 13 | 3 | 219.0' - Fracture or mechanical break, horizontal, rough, undulating | | | |
| | | | | 219.4' - Fracture, rough, stepped | | | |
| | | | 2 | 219.7' - Bedding plane, horizontal, rough, bedding plane fracture | | | |
| | | | | 220.2, 220.5' - Fractures (2), rough, undulating, ends of single full core piece | | | |
| | | | >5 | 220.5-222.0' - Fracture zone | | | |
| | | | NR | | | **No Recovery 217.8-219.0'** **Limestone** 219.0-219.7' - Same as 215.3-217.8' | R5: 13 minutes |
| | 224.0 | | | | | | |

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|---|---|---|
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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 225<br>-183.0 | R6-HQ<br>5 ft<br>56%<br>229.0 | 8 | 1<br>0<br>0<br>NR | 224.3' - Fracture, horizontal, rough, undulating, contact with very soft sandy silt carbonate material<br>224.3-225.1' - carbonate silt with gravel sized fragments (1/4-1/2")<br>225.1-225.7' - Fracture zone, very weak limestone fragments 1-4"; full core piece laminated, easily parted on bedding plane fractures<br>225.7-226.8' - Fracture zone, limestone material with fragments | | **Limestone And Silty Sand**<br>219.7-222.0' - mild to moderate HCl 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)<br>**No Recovery 222.0-224.0'** | R6: 10 minutes |
| 230<br>-188.0 | R7-HQ<br>5 ft<br>48%<br>234.0 | 0 | NA<br>NA<br>NA<br>NR | 229.0-229.55' - Fracture zone, limestone fragments, 3/4-2", weak (R2), fine oxidation staining on fracture surfaces<br>229.55-230.2' - Extremely weak rock fractured into sand/gravel sized carbonate material<br>229.8' - Mechanical break, horizontal, rough<br>230.2-230.4' - Fracture zone, more competent limestone fragments, angular, fine grained, 1/4-1" diameter<br>230.4-231.4' - Extremely weak material, same as 229.55-230.2' | | **Limestone**<br>224.0-226.8' - yellowish gray, (5Y 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<br>**No Recovery 226.8-229.0'** | R7: 13 minutes |
| 235<br>-193.0 | R8-HQ<br>5 ft<br>32%<br>239.0 | 0 | NA<br>NA<br>NR | 234.0-234.7' - Fracture zone, limestone fragments 1/2-2" in size, weak to medium strong (R2-R3)<br>234.7' - Horizontal contact with silty, sandy fine gravel-sized limestone fragments | | **Limestone Fragments**<br>229.0-229.2' - yellowish gray, (5Y 7/2), very fine to fine grained, mild to moderate HCl 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<br>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)<br>**Limestone**<br>229.5-229.9' - yellowish gray, (5Y 7/2), very fine to fine grained, weak (R2), voids (1/16") over 40-50% of surface, larger cavities up to 1/2" over 5-10% | R8: 13 minutes |
| 240<br>-198.0 | R9-HQ<br>5 ft<br>36%<br>244.0 | 8 | >10<br>2<br>NR | 239.0-239.7' - Fracture zone, limestone fragments 1" to 2-1/2" diameter<br>239.7' - Fracture, horizontal, rough, undulating, chipped fracture face<br>240.0, 240.4' - Mechanical break (2), horizontal, smooth, planar | | **Silty Sand Sized Material (SM)**<br>229.9-231.4' - with gravel-sized very weak (R1) limestone fragments similar to 224.0-226.5'<br>**No Recovery 231.4-234.0'**<br>**Limestone Fragments**<br>234.0-234.7' - yellowish gray, (5Y 7/2), fine grained, moderate to strong HCl 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") | R9: 8 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 245<br>-203.0 | R10-HQ<br>5 ft<br>50%<br>249.0 | 20 | >10<br>3<br>>10<br>NR | 244.0-244.6' - Mechanical break, 1-2" Limestone core pieces and fragments, mostly horizontal, rough, undulating fracture faces; extremely weak rock<br>244.6, 245.1' - Bedding plane (2), horizontal, rough, undulating, fractures on intact core pieces<br>245.2, 245.9' - Fractures or mechanical break (2), rough, undulating, very weak rock<br>245.9-246.2' - Fracture zone, 1/4-3/4" fragments (very weak)<br>246.2-246.5' - Fractures (2), rough, undulating, on either end of single core piece of very weak (R1) limestone | | **Silt (ML)**<br>234.7-235.6' - yellowish gray and dark olive gray in alternating mottled bands, (5Y 7/2 and 5Y 3/2), moderate to strong HCl reaction, extremely weak (R0), finely laminated, all carbonate material<br>**No Recovery 235.6-239.0'**<br>**Limestone**<br>239.0-240.8' - yellowish gray, (5Y 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 more competent bed at 239.9' (very weak -R1)<br>**No Recovery 240.8-244.0'** | 244.0': Slightly improved recovery/RQD after mixing new batch of mud<br>R10: 8 minutes |
| 250<br>-208.0 | R11-HQ<br>5 ft<br>58%<br>254.0 | 24 | 3<br>>10<br>4<br>NR | 249.4' - Fracture, 10 deg, rough, undulating<br>249.5' - Fracture or mechanical break, 60-70 deg, rough, undulating<br>249.6' - Fracture, horizontal, rough, undulating, contact with finer grained limestone<br>249.6-250.4' - Fracture zone, limestone fragments 1/2-3/4" thick up to 3" diameter<br>250.4, 250.9' - Fractures or mechanical break (2), horizontal, rough, undulating<br>251.1' - Disk-shaped discontinuity with finer grained limestone below, brown staining on surface<br>251.2, 251.35' - Bedding plane (2), horizontal, bedding plane fractures | | **Limestone**<br>244.0-246.5' - yellowish gray, (5Y 7/2), strong HCl reaction, very weak (R1), voids (1/16") over 10-20% of surface, variable in zones, trace fossil molds (<1/2"), light olive gray (5Y 5/2) thinly laminated zones up to 1/4" thick spaced 1-2" apart over 244.6-245.1'<br>**No Recovery 246.5-249.0'**<br>**Limestone**<br>249.0-249.4' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, very weak (R1), pitted surface, <1/16" dark brown laminations, many with 1/2" relief | 250.0': Not re-circulating mud<br>R11: 10 minutes |
| 255<br>-213.0<br>260<br>-218.0 | R12-HQ<br>5 ft<br>96%<br>259.0<br>R13-HQ<br>5 ft<br>44%<br>264.0 | 35<br>0 | >10<br>>10<br>>10<br>2<br>>10<br>NR<br>2<br>>10<br>NR | 251.4' - Fracture, 10 deg, rough, undulating, stepped, crosses bedding planes<br>254.0-254.7' - Fracture zone, 30% limestone fragments 1/2-3/4" in size, single 4" half core diameter with vertical rough undulating fracture or mechanical break, remaining fragments 1-2" diameter<br>255.1' - Fracture, horizontal, rough, undulating<br>255.4' - Fracture or mechanical break, horizontal, rough, undulating, stepped, 1/2"<br>255.6-255.8' - Fracture zone, 1/2" thick bedding plane parting<br>255.8, 256.2' - Bedding plane (2), horizontal, smooth, bedding plane partings<br>256.2-256.6' - Fracture zone, similar to 255.6-255.8'<br>256.9, 257.1' - Bedding plane (2), horizontal, rough, bedding plane partings<br>257.8' - Fracture or mechanical break, 70-80 deg<br>257.9-258.4' - Fracture zone, fragments 1-2" in length<br>259.0-259.4' - Coarse carbonate sand<br>259.4-259.6' - Fractures (2), horizontal, rough, undulating, single full-core diameter, limestone, fracture faces on both ends | | 249.4-251.9' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, weak to medium strong (R2 to R3), voids (1/16") over surface variably <5-10% in thin zones, larger cavities/fossil molds up to 1/2" variable from trace to 5%; thinly bedded (1/2-3/4") at 249.6-250.4', very fine grained thin beds (<2") with no voids/fossils 251.2-251.5', very fine black inclusions (<1/16") over 1-2%<br>**No Recovery 251.9-254.0'**<br>**Limestone**<br>254.0-258.8' - yellowish gray, (5Y 7/2), strong HCl reaction, very weak (R1), medium density, alternating zones of very fine grained and fine grained, voids (1/16") occur in horizontal zones up to 25% of surface, fossil molds and casts up to 1/2" in discrete zones 1/2-1" thick<br>**No Recovery 258.8-259.0'** | R12: 8 minutes<br>R13: 7 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 265<br>-223.0 | R14-HQ<br>5 ft<br>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**<br>259.0-261.2' - Same as 254.0-258.8' except extremely weak (R0), fractured during drilling process into silty sand/gravel-sized material<br>**No Recovery 261.2-269.0'** | 264.0': Driller's Remark:<br>No loss of torque<br>Tag bottom of hole at 268.5'<br>Bit clear<br>Mud pump on low (6 - 8 gallons per minute)<br>Sand-sized limestone material in previous run - possible washout |
| 269.0 | | | | | | | |
| 270<br>-228.0 | R15-HQ<br>5 ft<br>32% | 0 | >10<br>>10<br>NR | 269.0-269.6' - Fracture zone, limestone fragments; 1/2-2" diameter, <5% fines (sand-sized)<br>269.6-270.1' - Fracture zone, sandy gravel sized material<br>270.1' - Discontinuity with competent limestone, weak rock (R2)<br>270.3' - Fracture or mechanical break, horizontal, undulating, bedding plane fracture<br>270.6' - Mechanical break | | **Limestone Fragments**<br>269.0-269.8' - yellowish gray, (5Y 7/2), mild HCl reaction, fine to medium gravel-sized fragments range in size from 1/4-2", fragments exhibit voids (1/16-1/8") over 10-25% of surface, cavities (up to 3/4") variable from trace to 15%<br>**Clayey Silt (ML)**<br>269.8-270.0' - slow strong HCl reaction<br>**Limestone**<br>270.0-270.6' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, extremely weak (R0), medium density, thinly bedded (1-2") with fine laminations (<1/16") between beds, voids (1/16") up to 30% in discrete horizontal zones 1/2" thick<br>**No Recovery 270.6-274.0'** | R15: 11 minutes |
| 274.0 | | | | | | | |
| 275<br>-233.0 | R16-HQ<br>5 ft<br>62% | 0 | >10<br>>10<br>>10<br>NR | 274.0-274.2' - Fracture zone, 3/4-1" limestone fragments<br>274.2, 274.5, 274.7' - Bedding plane (3), horizontal, smooth, planar, bedding plane fractures<br>274.7-275.1' - Fracture zone, 3/4" to 1-1/2" fragments<br>275.2' - Fracture or mechanical break, vertical, rough, undulating<br>275.4' - Contact between fractured limestone above and very weak limestone below<br>275.6-276.2' - Fracture zone, 1/4" to 1-1/2" fragments<br>276.2-277.1' - Fracture zone, limestone fragments 3-4" with sandy fine gravel sized pieces at end | | **Limestone**<br>274.0-275.8' - yellowish gray, (5Y 7/2), very fine grained, strong HCl reaction, extremely weak to very weak (R0 to R1), voids (1/16") over 5% of surface concentrated in discrete horizontal zones (bedding plane fractures)<br>**Limestone Fragments**<br>275.8-276.1' - very fine grained, with 1" thick bed of greenish gray (5G 6/1) limestone, very strong (R5), numerous cavities up to 7/8" on one side of bed (cannot determine bed orientation) | R16: 10 minutes |
| 279.0 | | | | | | | |
| 280<br>-238.0 | R17-HQ<br>5 ft<br>34% | 0 | >10<br>>10<br>NR | 279.0-280.7' - Fracture zone, 80% fragments 3/4" to 1-1/2", few larger fragments up to 3", undulating fracture surfaces | | **Limestone**<br>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<br>**No Recovery 277.1-279.0'** | R17: 13 minutes |
| 284.0 | | | | | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 285<br>-243.0 | R18-HQ<br>5 ft<br>82%<br>289.0 | 22 | >10<br>>10<br>>10<br>3<br>NR | 284.0-285.65' - Fracture zone, 70% fragments 1-3" in size, 30% 1/2-1" in size, thinly bedded (1/4" thick) smaller fragments; fragments exhibit bedding plane partings<br>285.65' - Fracture, 5 deg, smooth, with black staining<br>286.1' - Fracture or mechanical break, horizontal, rough, undulating<br>286.1-286.4' - Fracture zone, 1/2-2" fragments<br>286.4' - Fractures, 45 deg, rough, undulating, intersecting fracture set (end of full core diameter limestone)<br>286.85' - Fracture or mechanical break, 45 deg, rough, undulating | | **Limestone Fragments**<br>279.0-280.7' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, very weak to weak (R1 to R2), trace voids (1/16") over surface, fossil molds and casts over 10-15% surface of most fragments, 90% of fossil molds <3/8" in longest dimension, few molds up to 3/4", fragments from 279.0-279.1' contain only trace fossils (casts and molds) and exhibit smooth bedding plane fractures<br>**No Recovery 280.7-284.0'**<br>**Limestone**<br>284.0-284.3' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, medium strong (R3), HCl reaction on fresh (powdered) surface | 284.0-286.5': Note core barrel plugged after coring 2.5 feet. Pulled barrel and core, then cored second 2.5 feet with clean barrel. Upper portion of second run indicates material fell out of 1st run (cored twice). Combined cores for 5 foot interval.<br>R18: combined run time: 15 minutes |
| 290<br>-248.0 | R19-HQ<br>5 ft<br>42%<br>294.0 | 7 | >10<br>>10<br>NR | 287.3' - Fracture, 45 deg, rough, undulating<br>287.7' - Fracture, 5 deg, rough, undulating, soft material<br>287.9' - Fracture, horizontal, rough, undulating, stepped (1/4" relief)<br>289.0-289.15' - Fracture zone, fragments 3/4" to 1-1/2"<br>289.15' - Silty sand material on fracture surface of full core diameter limestone piece<br>289.6' - Fracture, 10 deg, undulating, very rough<br>289.7-290.1' - Fracture zone, fragments 1-3" in size<br>290.15-290.4' - Fractures (2), horizontal, rough, undulating, fractures on both of ends of single core diameter limestone | | **Limestone Fragments**<br>284.3-284.7' - yellowish gray, (5Y 7/2), fine grained, weak (R2), very mild HCl reaction, moderate where pulverized, 5-10% voids (1/16") over surface, fossil molds and casts 1/4-3/4" over 25% of surface<br>284.7-285.7' - yellowish gray with light gray mottling, (5Y 7/2 and N7), fine grained, 50% fragments exhibit thin bedding plane partings (1/4-1/2" thick), light gray clayey seam at 284.7-285.0' | R19: 11 minutes<br>SC-1 collected at 294.0-294.91' |
| 295<br>-253.0 | R20-HQ<br>5 ft<br>58%<br>299.0 | 18 | 1<br>>10<br>>10<br>NR | 290.4-290.7' - Fracture zone, 3/4-1" fragments with soft sandy material<br>290.7-291.1' - Fractures, undulating, partial full core diameter limestone rock; vertical fracture surfaces intersected by 45 deg fracture set<br>294.95' - Fracture, 45 deg, rough, undulating<br>294.95-296.9' - Fracture zone, 2-3" fragments to 296.0' then rock becomes extremely weak and fractures into silt, sand , and fine gravel sized pieces (<3/4") | | **Limestone**<br>285.7-288.1' - light gray, (N7), very fine to medium grained, moderate HCl reaction, very weak to weak (R1 to R2), mostly weak (R2), with thin zones of weaker (R1) material, voids (1/16-3/16") over 10-15% of surface, larger cavities/fossil molds up to 1/2" diameter over 15-20% of surface<br>**No Recovery 288.1-289.0'**<br>**Limestone And Limestone Fragments**<br>289.0-291.1' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction on powdered surface, weak to medium strong (R2 to R3), voids (1/16-1/8") over 15-25% of surface, trace cavities/fossil molds (up to 1/2"), extremely weak (R0) fractured soft material 290.4-290.7': silty, sandy gravel-sized limestone material | R20: 8 minutes |
| 300<br>-258.0 | R21-HQ<br>5 ft<br>78%<br>304.0 | 29 | 2<br>1<br>>10<br>>10<br>NR | 299.25, 299.8' - Fractures or mechanical break (2), horizontal, rough, undulating, soft material<br>300.3' - Fracture, horizontal, with loose material; top of dark black (organic) silt clay seam (1" thick)<br>301.1' - Fractures (2), rough, undulating, vertical and horizontal intersecting fractures, possible mechanical break<br>301.1-301.4' - Fracture zone, gravel sized limestone fragments (1/4-3/4") with silty sandy fines<br>301.7' - Fractures, vertical, rough, undulating, intersecting fracture set in 3-1/2" core piece | | **No Recovery 291.1-294.0'** | R21: 11 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| 305<br>-263.0 | R22-HQ<br>5 ft<br>91%<br>309.0 | 9 | >10<br>>10<br>>10<br>2<br>1<br>NR | 301.9-302.9' - Fracture zone, silty sandy material with gravel sized (1/4-3/4") limestone fragments (25%)<br>304.0-304.7' - Fracture zone, extremely weak silt-sized material<br>305.1, 305.2, 305.35, 305.7' - Fractures or mechanical break (4), horizontal, slightly rough to smooth, weak rock, possible bedding planes<br>305.7-305.9' - Fragments (1/2-1")<br>305.9-306.5' - Fracture zone, extremely fractured zone slightly healed (intact core piece)<br>306.5-307.0' - Fracture zone, 1-3" fragments<br>307.3, 307.6, 307.9, 308.0' - Fractures (4), horizontal, rough, undulating, partially stepped (1/4" relief) | | **Limestone And Limestone Fragments**<br>294.0-295.2' - yellowish gray to grayish yellow, (5Y 7/2 to 5Y 8/4), strong HCl reaction, extremely weak to very weak (R0 to R1), intact core from 294.0-294.9': finely laminated with darker laminae (1/16" thick) spaced 1/2-1" apart<br>**Limestone Fragments**<br>295.2-296.2' - Same as 294.0-295.2' except voids (1/16-1/8") over 5-10% of surface, trace cavities up to 1/2" diameter<br>296.2-296.9' - Same as 294.0-295.2' except moderate HCl reaction, extremely weak (R0), fractured into silty sandy gravel-sized material 25% gravel / 75% coarse to fine-grained silt and sand-sized particles<br>**No Recovery 296.9-299.0'**<br>**Limestone**<br>299.0-300.3' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), moderate HCl reaction, extremely weak (R0), fragments with preferred horizontal orientation (yellowish gray) with fine grained light olive gray matrix material, fragments up to 1" in longest dimension, finely laminated | R22: 12 minutes |
| 310<br>-268.0 | R23-HQ<br>5 ft<br>76%<br>314.0 | 22 | >10<br>1<br>2<br>3<br>NR | 309.0-310.3' - Fracture zone, 3/4-3" fragments<br>310.9, 311.2, 311.4, 312.1, 312.4, 312.6' - Fractures or mechanical break (6), horizontal, rough, undulating | | **Clay (CL)**<br>300.3-300.5' - dark black, no HCl reaction, finely laminated, organic | R23: 11 minutes |
| 315<br>-273.0 | R24-HQ<br>5 ft<br>94%<br>319.0 | 20 | >10<br>>10<br>>10<br>>10<br>2<br>NR | 314.0-316.5' - Fracture zone, 1-3" limestone fragments<br>316.8' - Fracture, 45 deg, rough, undulating<br>317.0' - Fracture, 50 deg, rough, undulating, tight<br>317.5' - Fracture or mechanical break, horizontal, rough, undulating<br>317.5-317.8' - Fracture zone, silty material with gravel sized fragments (3/4") | | **Limestone**<br>300.5-301.9' - yellowish gray, (5Y 7/2), fine grained, extremely weak (R0), dark gray/black blebs covering 5-10% of surface, dark brown staining on few fracture surfaces<br>301.9-302.9' - Same as 300.5-301.9' except fractured into silt and gravel-sized limestone fragments<br>**No Recovery 302.9-304.0'**<br>**Limestone**<br>304.0-307.8' - yellowish gray, (5Y 7/2), fine grained, slow strong HCl reaction, extremely weak to weak (R0 to R2), with dark gray blebs up to 1/2" in size<br>307.8-308.55' - light olive gray, (5Y 5/2), strong HCl reaction, medium strong (R3), sharp contact with yellowish gray limestone above, finely laminated 307.8-307.9', voids 1/16" over 30-40% of surface, few larger cavities up to 3/8" (<2%)<br>**No Recovery 308.55-309.0'** | R24: 8 minutes |
| 320<br>-278.0 | R25-HQ<br>5 ft<br>82%<br>324.0 | 37 | 5<br>>10<br>>10<br>2<br>NR | 318.1' - Fracture, 15 deg, rough, undulating<br>318.3' - Fracture or mechanical break, horizontal, rough, undulating<br>319.3, 319.4, 319.6, 319.7, 319.85' - Fractures (5), horizontal, rough, undulating, bedding plane partings 2-4"<br>320.2-321.8' - Fracture zone<br>321.8' - Contact with competent limestone<br>322.1' - Fracture, horizontal, stepped, (1/4" relief)<br>322.7' - Fracture or mechanical break, horizontal, rough, undulating | | | R25: 9 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 325<br>-283.0 | R26-HQ<br>5 ft<br>14%<br>329.0 | 0 | >10<br>NR | 324.0-324.7' - Fracture zone, 1" to 1-1/2" fragments; 324.0-324.2' thin very weak fractured silty material | | **Limestone**<br>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<br>311.5-312.1' - Same as 309.0-311.5' except pale yellowish brown, (10YR 6/2)<br>312.1-312.8' - Same as 309.0-311.5'<br>**No Recovery 312.8-314.0'**<br>**Limestone**<br>314.0-318.7' - Same as 309.0-311.5' except more fragmented, color becoming pale yellowish brown (5YR 5/2) at 317.0'<br>**No Recovery 318.7-319.0'**<br>**Limestone**<br>319.0-321.8' - pale yellowish brown with zones of yellowish gray, (5Y 5/2 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 cavities up to 3/8"<br>321.8-323.1' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, very weak (R1), finely laminated (1/16") 321.8-322.2'<br>**No Recovery 323.1-324.0'**<br>**Limestone Fragments**<br>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<br>**Fractured Limestone**<br>324.2-324.7' - yellowish gray, fine grained, very strong HCl reaction, extremely weak (R0), with fine gravel-sized limestone fragments (1/4-1/2"), dark brown organic material (<2%)<br>**No Recovery 324.7-329.0'**<br>**Sandy Silt To Gravelly Silt (ML)**<br>329.0-329.4' - yellowish gray, (5Y 7/2), moist, moderate to strong HCl reaction, >50% silt with <50% limestone fragments as sand to gravel-sized fraction<br>**Limestone**<br>329.4-330.4' - yellowish gray, (5Y 7/2), very fine to medium grained, moderate to strong HCl reaction, extremely weak to very weak (R0 to R1), trace fossil fragments, strong organic odor | Driller's Remark: No loss of torque during drilling; wash out fine soft material possible<br>R26: 10 minutes<br>C. Sump and R. Bitely logging<br>R27: 7 minutes<br>R28: 9 minutes<br>SC-2 collected at 338.6-339.4'<br>6" of R29 at end of R28 run; adjust R28 to 5.5' and R29 to 4.5' to accommodate<br>R29: 7 minutes |
| 330<br>-288.0 | R27-HQ<br>5 ft<br>70%<br>334.0 | 19 | >10<br>>10<br>>10<br>0<br>NR | 329.0-329.4', 330.4-331.15', 331.7-331.95' - Silt intervals<br>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 | | | |
| 335<br>-293.0 | R28-HQ<br>5.5 ft<br>100%<br>339.5 | 55 | 3<br>4<br>1<br>1<br>2<br>0 | 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<br>336.5' - Mechanical break | | | |
| 340<br>-298.0 | R29-HQ<br>4.5 ft<br>100%<br>344.0 | 53 | >10<br>>5<br>2<br>2<br>1 | 339.9, 340.1' - Fractures (2), <10 deg, smooth, undulating, bedding plane fractures or mechanical breaks<br>340.1-340.75' - Fracture zone, rough, undulating, gravel sized fragments <3" diameter<br>341.35, 341.5, 341.65, 343.65' - Fractures or mechanical break (4), <10 deg, rough, undulating, bedding plane fractures or mechanical breaks, tight to open <1/2"<br>342.25-342.3' and 343.15-343.45' - Clay seams and silt seams | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 345 -303.0 | R30-HQ 5 ft 100% | 77 | 1, 4, 2, 0, 1 | 344.4, 345.25, 345.5, 345.75, 346.0, 346.5, 346.75, 348.3' - Fractures (8), 40 deg, bedding plane fractures or mechanical breaks, smooth to rough, undulating | | **Sandy To Gravelly Silt (ML)** 330.4-331.15' - Same as 329.0-329.4'<br>**Limestone** 331.15-331.7' - Same as 329.4-330.4'<br>**Sandy To Gravelly Silt (ML)** 331.7-331.95' - Same as 329.0-329.4'<br>**Limestone** 331.95-332.5' - Same as 329.4-330.4'<br>**No Recovery 332.5-334.0'** | Driller's Remark: 100% circulation<br>J. Burkard and C. Sump logging<br>SC-3 collected at 344.4-345.25'<br>08/29/07 16:30<br>Stop drilling AD-1 for shift. Remove core barrel for geophysical logging<br>R30: 7 minutes |
| 349.0 | | | | | | **Limestone** 334.0-339.5' - yellowish gray, (5Y 7/2), very fine to medium grained, strong HCl reaction, very weak to medium strong (R1 to R3), voids <1/16" over <30% of surface, highly variable, trace bedding plane of 30 deg, trace bedding plane 40 deg, trace inclusion clasts<br>339.5-340.05' - very light gray to yellowish gray, (N8 to 5Y 8/1), very fine to medium grained, strong HCl reaction, extremely weak to weak (R0 to R2), highly variable, increasing organic laminations with depth to mildly to moderately competent organic lens, olive gray to dark gray (5Y 4/1 to N3), very fine to fine grained, extremely weak (R0), no apparent HCl reaction on organic material, mild reaction on limestone in section, 10-20% limestone probably due to boxing, limestone same as 340.05-344.0'<br>340.05-344.0' - Same as 339.5-340.5' except strong HCl reaction, very weak to weak (R1 to R2), trace voids <1/16" intermittent over surface, trace laminated organics, variable hardness, variable grain sizes, trace fossil structure, trace mottled coloration, silt seam at 342.25-342.3' and clay seam at 343.15-343.45', carbonate derived, friable, nonplastic silts and moderately to highly plastic clays<br>344.0-349.0' - very light gray with yellowish gray mottling, (N8 and 5Y 8/1), very fine grained, moderate to strong HCl reaction, very weak to medium strong (R1 to R3), trace voids <1/16" over surface, trace fossil casts, few cavities <1"x1/4"<br>349.0-350.3' - yellowish gray, (5Y 8/1), fine grained, mild to moderate HCl reaction, weak to medium strong (R2 to R3), few cavities <1"x1/4" | 09/05/07 10:00<br>Start drilling at the beginning of the shift |
| 350 -308.0 | R31-HQ 5 ft 94% | 50 | 2, >10, >10, 1, 0 | 349.6, 349.8' - Mechanical break (2), 10-30 deg, rough, undulating<br>350.2-351.7' - Fracture zone, rough, undulating, multiple breaks with sharp angular fragments, no visible orientation<br>352.7' - Fracture, 70-80 deg, rough, undulating, tight | | | R31: 8 minutes |
| 354.0 | | | NR | | | | |
| 355 -313.0 | R32-HQ 5 ft 100% | 95 | 1, 2, 1, 1, 3 | 354.6, 355.2, 356.0, 356.5, 357.5, 358.2, 358.7, 358.8' - Mechanical break (8), horizontal to 10 deg, rough to smooth, undulating | | | R32: 7 minutes |
| 359.0 | | | | | | | |
| 360 -318.0 | R33-HQ 5 ft 90% | 60 | 2, >10, 2, 4, 1 | 359.7, 359.8, 361.2, 361.9, 362.0, 362.5, 363.1' - Mechanical break (7), horizontal to 15 deg, rough to smooth, undulating<br>360.3-360.7' - Horizontal bedding plane followed by a fracture zone composed of very weak (R1) rock fragments<br>362.7-363.1' - Fracture, 70-80 deg, rough, undulating, trace stain | | | R33: 7 minutes |
| 364.0 | | | NR | | | | |

| 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 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 365<br>-323.0 | R34-HQ<br>5 ft<br>98% | 35 | 1<br>5<br>>10<br>2<br>2 | 364.5, 365.0, 365.3, 365.6, 365.9, 366.3, 367.3, 367.6, 368.3' - Mechanical break (9), horizontal to 10 deg, rough to smooth, undulating<br>364.6-366.5' - Silt-size particle infill<br>366.5-367.0' - Fracture zone, angular fragments up to 1/2"x1" in size | | 350.3-351.0' - yellowish gray, (5Y 7/2), very fine grained, mild HCl reaction, very weak to weak (R1 to R2), <1/16" thick laminar bedding planes<br>351.0-351.7' - yellowish gray transition to pale blue, (5Y 7/2 to 5B 6/2), fine grained, mild to moderate HCl reaction, very weak to weak (R1 to R2), visible casts and molds<br>351.7-353.7' - yellow gray, (5Y 8/1), fine grained, mild HCl reaction, very weak to weak (R1 to R2), no casts or molds<br>**No Recovery 353.7-354.0'**<br>**Limestone**<br>354.0-358.4' - very pale orange to pale yellowish brown, (10YR 8/2 to 10YR 6/2), fine to medium grained, mild to moderate delayed HCl reaction, very weak to weak (R1 to R2), moderately fossiliferous (casts and molds), <1/16" voids cover 20-50% of surface, solution cavities 1/8x1"<br>358.4-359.0' - yellowish gray, (5Y 7/2), fine to very fine grained, moderate to strong delayed HCl reaction, weak to medium strong (R2 to R3), <1/16" voids covering <5% of surface<br>359.0-361.3' - very pale orange, (10YR 8/2), very fine to fine grained, moderate HCl reaction, very weak to weak (R1 to R2), trace voids 1/16" on surface, mildly fossiliferous (casts and molds), 360.4' undulating bedding plane 1/4" thick, dark yellowish brown (10YR 4/2)<br>361.3-362.4' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate to strong delayed HCl reaction, contains silt-sized particles between breaks<br>362.4-363.5' - grayish yellow, (5Y 8/4), fine to medium grained, strong HCl reaction, solution cavities 1/8"x1/2"<br>**No Recovery 363.5-364.0'**<br>**Limestone**<br>364.0-364.6' - very pale orange to grayish orange, (10YR 8/2 to 10YR 7/4), fine to medium grained, delayed HCl reaction, very weak to weak (R1 to R2), 1/16" voids cover 10-20% of surface, few cavities 1/4"x1/2"<br>364.6-366.5' - dusky yellow, (5Y 6/4), very fine to fine grained, delayed mild to strong HCl reaction, very weak to weak (R1 to R2), laminar bedding 1/8" planes throughout the section | Driller's Remark: loss of circulation at 366.8'<br>R34: 7 minutes<br>R35: 7 minutes<br>T. Borton and J. Burkard logging<br>R36: 5 minutes<br>SC-4 collected at 381.7-382.8'<br>R37: 5 minutes |
| 369.0 | | | NR | | | | |
| 370<br>-328.0 | R35-HQ<br>5 ft<br>96% | 55 | 1<br>>10<br>1<br>>10<br>>10 | 369.7, 370.3, 371.4' - Fractures (3), horizontal to 40 deg, rough to smooth, undulating, no stain, no infill<br>370.7-370.9' - Fracture zone, with clay size particle infill<br>372.4-373.4' - Fracture zone, top of zone along a smooth bedding plane, bottom section is rough and undulating | | | |
| 374.0 | | | NR | | | | |
| 375<br>-333.0 | R36-HQ<br>5 ft<br>100% | 67 | >10<br>3<br>2<br>1<br>1 | 374.2-374.5' - Fracture zone, no visible orientation, gravels 1/2", angular to subangular<br>375.3-376.1' - Fracture, 80 deg, rough, undulating, 9-9/16" length visible<br>375.5, 375.7, 376.1, 377.6, 378.3' - Fractures or mechanical break (5), horizontal, rough, undulating<br>376.8' - Fracture or mechanical break, horizontal, smooth | | | |
| 379.0 | | | | | | | |
| 380<br>-338.0 | R37-HQ<br>5 ft<br>82% | 60 | >10<br>>10<br>3<br>1<br>NR | 379.2-379.4' - Fracture zone, subangular fragments, 1" length or less<br>379.9' - Fracture or mechanical break, horizontal, smooth<br>380.1-380.6' - Fracture zone, subangular fragments, 1" length or less, no visible orientation between fractures<br>380.1' - Fracture, horizontal, rough, undulating<br>380.6' - Fracture, 35 deg, rough<br>381.0' - Fracture, <5 deg, rough, undulating<br>381.2, 381.7' - Fractures (2), horizontal, rough, undulating<br>382.7' - Fracture, 50 deg, rough, undulating | | | |
| 384.0 | | | | | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 385<br>-343.0 | R38-HQ<br>5 ft<br>74%<br>389.0 | 13 | >10<br>1<br>>10<br>>10<br>NR | 384.0-385.0' - Fracture zone, rough, undulating, no visible orientation, angular fragments up to 1" length<br>385.3' - Fracture or mechanical break, horizontal, rough, undulating, 20% of fractured plane stained black<br>385.8-387.7' - Fracture zone, no visible orientation, angular fragments up to 2" in length | | 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"<br>**No Recovery 368.9-369.0'**<br>**Limestone**<br>369.0-372.3' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine to very fine grained, strong HCl 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': 1/16" voids covering up to 0-10% of surface | R38: 6 minutes |
| 390<br>-348.0 | R39-HQ<br>5 ft<br>90%<br>394.0 | 48 | >10<br>1<br>4<br>3<br>3<br>NR | 389.4' - Fracture zone, no visible orientation, subangular fragments up to 1/2" length<br>389.9' - Fracture or mechanical break, horizontal, rough, undulating<br>390.5' - Fracture, horizontal, smooth, possible mechanical break<br>391.0, 391.1' - Fractures (2), horizontal, smooth, bedding plane parting<br>391.5, 391.8, 392.0, 392.3, 392.4' - Fractures (5), horizontal, smooth, undulating<br>393.1, 393.2' - Fractures (2), horizontal, smooth, undulating, bedding plane parting<br>393.3' - Fracture or mechanical break, horizontal, rough, undulating | | 372.3-373.8' - yellowish gray, (5Y 7/2), fine to medium grained, moderate to strong HCl reaction, very weak to weak (R1 to R2), moderately fossiliferous (casts and molds), solution cavities 1/2"x1" in size<br>**No Recovery 373.8-374.0'**<br>**Limestone**<br>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 reaction, very weak to weak (R1 to R2), voids to <1/16" over 10-20% of surface, moderately fossiliferous (casts and molds) | R39: 7 minutes<br>0.2' of core believed to be recovered from R39 |
| 395<br>-353.0 | R40-HQ<br>5 ft<br>100%<br>399.0 | 43 | 3<br>>10<br>2<br>2<br>3 | 394.3, 394.4, 394.7' - Fractures (3), horizontal, smooth, bedding plane parting<br>395.0, 395.2' - Fractures (2), horizontal, rough, undulating<br>395.4-395.7' - Fracture zone, no visible orientation, subangular fragments up to 1"<br>395.9' - Fracture, horizontal, rough<br>396.2' - Fracture, <5 deg, rough, undulating<br>396.6, 396.8, 397.8' - Fractures (3), horizontal, rough, undulating<br>398.4' - Fracture, horizontal to 10 deg, smooth, undulating | | 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<br>379.0-380.6' - yellowish gray, (5Y 8/1), fine to medium grained, delayed moderate to strong HCl reaction, very weak to weak (R1 to R2), planar laminations, trace fossils<br>380.6-383.1' - Same as 378.5-379.0' except yellowish gray, (5Y 7/2)<br>**No Recovery 383.1-384.0'**<br>**Limestone** | R40: 7 minutes |
| 400<br>-358.0 | R41-HQ<br>5 ft<br>74%<br>404.0 | 37 | 4<br>3<br>2<br>1<br>NR | 399.2, 399.4, 399.6' - Fractures (3), <10 deg, rough, undulating<br>399.9' - Fracture, horizontal, smooth, undulating<br>400.1, 400.2' - Fractures (2), horizontal, rough, undulating, bedding parting<br>400.6' - Fracture or mechanical break, horizontal, rough, undulating<br>401.0' - Fracture or mechanical break, horizontal, smooth, undulating<br>401.8, 402.1' - Fractures (2), horizontal, smooth, undulating | | 384.0-385.0' - yellowish gray, (5Y 7/2), fine to medium grained, moderate HCl reaction, weak (R2), voids to <1/16" over 20-30% of surface<br>385.0-386.0' - light bluish gray, (5B 7/1), fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), trace organics | 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| 405 -363.0 | R42-HQ 5 ft 100% | 60 | 2 | 404.3' - Fracture, <5 deg, rough, undulating | | 386.0-387.7' - yellowish gray, (5Y 7/2), fine to medium grained, delayed mild to moderate HCl reaction, weak (R2), layered organics, laminae visible, voids to 1/16" over 20-30% of surface, possible cross bedding | 0.3' of core placed in box with R41 |
| | | | 1 | 404.9, 405.7' - Fractures or mechanical break (2), horizontal, smooth | | | Mechanical break at bottom of 0.3' is horizontal and smooth |
| | | | | 406.4' - Fracture, <10 deg, rough, undulating | | | |
| | | | 2 | 406.7' - Fracture, 20 deg, rough, undulating | | **No Recovery 387.8-389.0'** | SC-5 collected at 404.75-405.55' |
| | | | | 407.0' - Fracture, horizontal, smooth, undulating | | **Limestone** 389.0-391.5' - very pale orange, (10YR 8/2), fine to medium grained, delayed mild to moderate HCl reaction, very weak (R1), voids to <1/16" over 0-10% of surface | |
| | | | 3 | 407.2' - Fracture, horizontal, smooth | | | |
| | | | | 407.7-407.9' - Fracture, horizontal, rough, undulating, fine to very fine grained | | | R42: 10 minutes |
| | | | 5 | 408.0' - Fracture, <5 deg, rough, undulating | | 391.5-393.5' - yellowish gray, (5Y 8/1), fine to medium grained, delayed mild to moderate HCl reaction, very weak (R1), trace surface voids (<1/16"), 393.1': chert lens 0.05" | |
| | 409.0 | | | 408.3' - Fracture, 10 deg, rough, undulating | | | |
| | R43-HQ 5 ft 72% | 40 | >10 | 408.7' - Fracture, horizontal, rough, undulating | | | |
| 410 -368.0 | | | | 408.9' - Fracture or mechanical break, <10 deg, rough, undulating, bedding plane parting | | **No Recovery 393.5-394.0'** | |
| | | | 1 | 409.0' - Fracture or mechanical break, <10 deg, smooth, undulating | | **Limestone** 394.0-395.2' - pale greenish yellow, (10Y 8/2), fine grained, strong HCl reaction, very weak (R1), <1/16" voids over 0-5% of surface | |
| | | | >10 | 409.3' - Fracture zone, horizontal orientation of fragments up to 1-3/16" | | | |
| | | | 1 | 409.6' - Fracture, horizontal, smooth, bedding plane parting | | 395.2-396.8' - Same as 394.0-395.2' except fine to medium grained, moderate to strong HCl reaction, voids to <1/16" over 10-20% of surface | |
| | | | | 410.4' - Fracture or mechanical break, horizontal, rough, undulating | | | |
| | | | NR | 411.1-411.5' - Fracture zone, no visible orientation, one fragment 2-3/8", most <1-3/16", subangular, silty clay size, fine to very fine fill | | | R43: 10 minutes |
| | 414.0 | | | | | 396.8-399.8' - yellowish gray, (5Y 8/1), strong HCl reaction, very weak to weak (R1 to R2), voids to <1/16" over 20-30% of surface | |
| | R44-HQ 5 ft 88% | 18 | >10 | 411.9' - Fracture, horizontal, smooth, undulating | | | |
| 415 -373.0 | | | | 412.5' - Fracture or mechanical break, 5 deg, rough, undulating | | 399.8-402.7' - Same as 395.2-396.8' except yellowish gray, (5Y 8/1), fine grained, delayed strong HCl reaction | |
| | | | 1 | 414.3-414.6' - Fracture zone, no visible orientation, fragments up to 2-3/8", subangular, silt/clay intermixed with limestone fragments | | | |
| | | | >10 | | | **No Recovery 402.7-404.0'** | |
| | | | | | | **Limestone** 404.0-407.4' - yellowish gray, (5Y 8/1), fine to medium grained, delayed strong HCl reaction, very weak (R1), voids up to <1/16" over 0-5% of surface | |
| | | | >10 | 414.9-415.0' - Fracture zone, no visible orientation, fragments up to 5/8", subangular | | | |
| | | | | 415.4' - Fracture, horizontal, rough, undulating, lithologic discontinuity | | | R44: 8 minutes |
| | | | NR | 416.0, 416.05, 416.1, 416.2, 416.35' - Fractures (5), horizontal, rough, undulating, bedding plane partings | | 407.4-409.4' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine to medium grained, mild to moderate HCl reaction, weak (R2), trace voids <1/6", fine scale laminar and planar bedding | |
| | 419.0 | | | | | | |
| | R45-HQ 5 ft 42% | 17 | >10 | 416.5' - Mechanical break | | | |
| 420 -378.0 | | | | 416.8-416.9' - Fracture zone, no visible orientation, fragments up to <5/8"', subangular to angular | | | Driller did not note a change in drilling patterns (no given reason for low recovery) |
| | | | >10 | 417.4' - Fracture, <5 deg, rough, undulating, trace fill | | 409.4-410.45' - yellowish gray with undulating laminae of olive gray, (5Y 8/1 and 5Y 4/1), fine to medium grained, mild HCl reaction, extremely weak to very weak (R0 to R1), voids to <1/16" over 0-5% of surface, delayed HCl reaction but strong reaction when pulverized, undulating laminations | |
| | | | | 417.8-418.1' - Fracture zone, no visible orientation, fragments up to 1-7/8", trace fine to very fine grained fill | | | |
| | | | NR | 419.0-419.9' - Fracture zone, no visible orientation, fragments up to 2-3/8", subround, fine to very fine fill | | | |
| | | | | 419.9' - Fracture, 10-20 deg, smooth | | | R45: 10 minutes |
| | 424.0 | | | | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 425<br>-383.0 | R46-HQ<br>5 ft<br>88%<br>429.0 | 30 | >10<br>>10<br>>10<br>1<br>>10<br>NR | 420.2-420.6' - Fracture zone, <10 deg at 420.2', no visible orientation elsewhere; fragments up to 2-3/8", mostly smaller varying sizes, trace dark brown-black staining<br>424.7-424.9' - Fracture zone, no visible orientation, subangular fragments up to <5/8"', fine to very fine grained fill<br>425.3-425.5' - Fracture zone, no visible orientation, fragments up to 1-3/16", angular, trace very fine fill<br>425.8-426.2' - Fracture zone, large fragments up to 3", possible multiple mechanical breaks<br>426.4-427.0' - Fracture zone, fragments up to 4", subangular to angular, multiple mechanical breaks during extraction | | 410.45-412.6' - yellowish gray, (5Y 7/2), fine to medium grained, delayed mild HCl reaction, very weak (R1), trace voids <1/16"<br>**No Recovery 412.6-414.0'**<br>**Limestone**<br>414.0-414.5' - Same as 410.45-412.6'<br>414.5-415.3' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), medium grained, mild to moderate HCl reaction, very weak (R1), voids to <1/16" over 10-20% of surface<br>**Silty Clay (CL-ML)**<br>415.3-415.9' - dark greenish gray transition to greenish gray, (5GY 4/1 to 5GY 6/1), very fine to fine grained, no HCl reaction, extremely weak (R0) | 424.4': Man-made break<br>R46: 12 minutes |
| 430<br>-388.0 | R47-HQ<br>4 ft<br>100%<br>433.0 | 46 | 1<br>>10<br>>10<br>>10 | 427.2' - Mechanical break<br>427.5' - Fracture, horizontal, smooth, bedding plane parting<br>427.8-428.4' - Fracture zone or mechanical break, fragments up to 3", trace dark gray/blue staining<br>429.5' - Fracture, horizontal, smooth, undulating, bedding plane parting<br>430.1-430.2' - Fracture zone, no visible orientation, fragments up to 1-3/16", trace fine to very fine infill<br>430.7' - Fracture, horizontal, smooth, undulating, bedding plane parting | | **Limestone**<br>415.9-418.4' - yellowish gray, (5Y 8/1), fine to medium grained, very weak (R1), moderate to strong HCl reaction where pulverized<br>**No Recovery 418.4-419.0'**<br>**Limestone**<br>419.0-419.9' - yellowish gray, (5Y 7/2), fine to medium grained, weak to medium strong (R2 to R3), strong HCl reaction when pulverized, clays are very fine to fine grained, extremely weak (R0), no HCl reaction, medium plasticity | 429.5' and 429.8': Man-made breaks<br>Only able to obtain 4.0' run due to core blockage<br>R47: 12 minutes |
| 435<br>-393.0 | R48-HQ<br>6 ft<br>100%<br>439.0 | 56 | 2<br>2<br>1<br>3<br>>10<br>2 | 430.85' - Fracture, 80 deg, rough, undulating<br>431.0' - Fracture, horizontal, smooth, bedding plane parting<br>431.5' - Fracture, 45 deg, rough, undulating, fragments of quartz up to 1/2", angular to subangular<br>431.9-433.0' - Fracture zone, no visible orientation, fragments up to 2", angular, trace fine to very fine fill<br>433.4, 433.6' - Fractures or mechanical break (2), horizontal, bedding plane parting, trace black staining<br>434.0' - Fracture, horizontal, smooth, undulating<br>434.5' - Fracture or mechanical break, <10 deg, smooth<br>435.1-435.5' - Fracture or mechanical break, 45-50 deg, rough, stepped | | **Limestone**<br>419.9-421.1' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), fine grained, slightly delayed strong HCl reaction, weak to medium strong (R2 to R3), <1/16" voids on 10-20% of surface<br>**No Recovery 421.1-424.0'**<br>**Limestone**<br>424.0-424.7' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), fine to medium grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids <1/16" on surface 10-20% | SC-6 collected at 435.3-436.2'<br>R48: 20 minutes |
| 440<br>-398.0 | R49-HQ<br>5 ft<br>46%<br>444.0 | 0 | >10<br>>10<br>NR | 436.3' - Fracture, horizontal, smooth, trace fill<br>436.5, 436.6' - Fractures (2), 20-30 deg, rough, undulating, large solid fragment 1-3/16" in between<br>437.1-437.6' - Fracture zone, no visible orientation, fragments up to 2-3/8", angular to subangular, trace amounts of very fine fill<br>437.6-438.1' - Fracture, 80 deg, rough, undulating<br>438.1' - Fracture, horizontal, smooth, bedding plane parting<br>438.4' - Fracture or mechanical break, 40 deg, rough, undulating | | **Clayey Gravel (limestone Fragments) (GC)**<br>424.7-425.55' - yellowish gray, (5Y 8/1), moderate to mild HCl reaction, extremely weak (R0), fine to medium grained limestone gravels, <1/2"<br>**Limestone**<br>425.55-426.2' - yellowish gray, (5Y 8/1), fine grained, very weak (R1), strong HCl reaction where pulverized | R49: 10 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 445<br>-403.0 | R50-HQ<br>5 ft<br>94% | 53 | >10 | 439.0-439.6' - Fracture zone, no visible orientation, weak fragments <1/2", angular to subangular | | **Clayey Gravel (limestone Fragments) (GC)**<br>426.2-426.4' - Same as 424.7-425.55' except slightly delayed strong HCl reaction, clay, low to medium plasticity | |
| | | | 2 | 439.6' - Bedding plane, horizontal<br>439.8' - Fracture, <5 deg, clay and gravels <1/2" fill | | | |
| | | | 2 | 440.0-441.3' - Fracture zone, no visible orientation, fragments up to 2", mostly <1", subangular, possibly fine grained fill | | **Limestone**<br>426.4-428.4' - Same as 425.55-426.2' except very fine to fine grained, slightly delayed moderate to strong HCl reaction, medium strong to strong (R3 to R4), laminations | Manual break above 446.5' to fit in box |
| | | | 2 | 444.0-444.8' - Fracture zone, fragments up to 1-3/16"', subround, including quartz fragments | | | |
| | | | 1 | 444.8' - Fracture, horizontal<br>445.6, 445.9' - Fractures or mechanical break (2), horizontal, rough, undulating | | **No Recovery 428.4-429.0'** | R50: 14 minutes |
| | 449.0 | | NR | | | | |
| 450<br>-408.0 | R51-HQ<br>5 ft<br>44% | 13 | 3 | 446.6, 446.8' - Fractures or mechanical break, 10-20 deg, rough, undulating, fractures same direction | | **Limestone**<br>429.0-430.2' - alternating yellowish gray and very light gray, (5Y 8/1 and N8), fine grained, delayed mild HCl reaction, very weak to weak (R1 to R2), laminar planar bedding with some variation<br>430.2-430.7' - yellowish gray, (5Y 8/1), very fine to fine grained, delayed mild HCl reaction, medium strong to strong (R3 to R4), trace voids <1/16" | |
| | | | >10 | 447.5, 447.7' - Fractures, 10-20 deg, fractures angled in opposite directions: 447.5' angled toward ground surface, 447.7' angled away from horizontal | | | |
| | | | NR | 448.3' - Fracture, horizontal, smooth, undulating<br>449.3' - Fracture, horizontal, smooth, undulating, bedding plane parting<br>449.7' - Fracture, 30-40 deg, rough, undulating<br>449.7-450.0' - Fracture or mechanical break, >80 deg, rough, undulating | | **Clay (CL)**<br>430.7-431.0' - dark greenish gray, (5G 4/1), very fine grained, low to medium plasticity, no HCl reaction, extremely weak (R0) | R51: 14 minutes |
| | 454.0 | | | | | | |
| 455<br>-413.0 | R52-HQ<br>5 ft<br>86% | 0 | >10 | 450.0-450.9' - Fracture zone, fragments up to 2-3/8", angular to subangular, trace black staining | | **Limestone**<br>431.0-431.5' - yellowish gray, (5Y 7/2), fine to medium grained, extremely weak (R0)<br>431.5-431.9' - Same as 429.0-430.2' except yellowish gray, (5Y 7/2), weak to medium strong (R2 to R3), laminations | |
| | | | 2 | 454.0-454.3' - Fracture zone, no visible orientation, fragments up to 1-3/4", subangular | | | |
| | | | >10 | 454.3-454.9' - Fracture, rough, gradually undulating<br>454.6, 454.8' - Fractures or mechanical break (2), horizontal to <10 deg | | **Clayey Gravel (limestone Fragments) (GC)**<br>431.9-433.0' - yellowish gray, (5Y 7/2), moderate HCl reaction, weak to medium strong (R2 to R3), very fine to fine grained gravel, low to medium plasticity clay | |
| | | | >10 | 454.9' - Fracture, 45 deg, rough, undulating<br>455.2, 455.3' - Fractures or mechanical break (2), horizontal to <10 deg, rough, undulating, large angular gravels, 1-3/4" | | | R52: 17 minutes |
| | 459.0 | | NR | 455.7-456.9' - Fracture zone, no visible orientation, fragments up to 4", mostly <1-3/16", including quartz - no HCl reaction | | | |
| 460<br>-418.0 | R53-HQ<br>2 ft<br>95% | 0 | >10 | 457.0' - Fracture, 20-30 deg, rough, undulating | | **Limestone**<br>433.0-436.2' - light olive gray, (5Y 5/2), fine to medium grained, weak to medium strong (R2 to R3), strong HCl reaction when pulverized, undulating lamination | R53: 8 minutes |
| | | | 1 | 457.3-457.5' - Fracture zone, fragments <1-3/16", including quartz | | | |
| | 461.0 | | NR | 457.9-458.3' - Fracture zone, angular fragments up to 2-3/8", horizontal bedding plane at 457.9' | | | |
| | R54-HQ<br>3 ft<br>100% | 39 | 2 | 459.1-460.4' - Fracture zone, no visible orientation, fragments up to 2-3/8", subangular, including quartz | | 436.2-437.5' - yellowish gray, (5Y 7/2), fine to medium grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), voids <1/16" over 20% of surface | 461.65': circular void with drusy crystals |
| | | | >10 | 460.7' - Fracture, <10 deg, rough, undulating, fragments of quartz infill | | | |
| | | | 2 | 461.1' - Fracture or mechanical break, horizontal, rough, undulating | | | R54: 10 minutes |
| | 464.0 | | | | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| 465 -423.0 | R55-HQ 5 ft 82% | 17 | >10 | 461.9' - Mechanical break, horizontal, rough, undulating | | 437.5-438.0' - dark greenish gray with dusky yellow, yellowish gray, very light gray, (N8 with 5Y 6/4, 5GY 8/1, 5Y 4/1), very fine to fine grained, very strong delayed HCl reaction, strong (R4), trace chert layers | |
| | | | 1 | 462.2' - Fracture, horizontal, smooth, bedding plane parting | | | |
| | | | >10 | 462.7-463.15' - Fracture zone: at 462.7', 20-30 deg; at 463.15', 20-30 deg (opposite directions), elsewhere no visible orientation, fragments up to 1-3/4", angular to subangular | | 438.0-439.0' - yellowish gray, (5Y 7/2), moderate to strong delayed HCl reaction, strong (R4), <1/16" voids over <5% of surface, trace organics (peat or coal) | R55: 15 minutes |
| | | | >10 | 463.4' - Fracture, horizontal, rough, undulating, bedding plane parting | | | |
| | | | NR | 463.7' - Fracture, horizontal, rough, undulating | | **Coal** 439.0-439.5' - black, (N1), very fine to fine grained, extremely weak (R0), trace amounts of limestone fragments: dusky yellow (5Y 6/4), fine to medium grained, mild HCl reaction, trace calcite crystals to 1/8" | Milky white quartz found on table after core was boxed; possibly from fracture zone, not found somewhere in run (after boxed) |
| | 469.0 | | | 464.3-465.0' - Fracture zone, no visible orientation, angular fragments up to 1-13/16" | | | |
| | | | | 465.3' - Fracture, horizontal, rough, undulating | | | |
| 470 -428.0 | R56-HQ 5 ft 90% | 42 | >10 | 465.7-466.8' - Fracture zone, (465.7-466.1': fine to medium infill with limestone fragments); fragments up to 1-3/4", black staining, mostly infill at 466.6-466.8' | | **Limestone Fragments** 439.5-441.3' - moderate olive brown, (5Y 4/4), fine to medium grained, extremely weak (R0), fine grains have strong HCl reaction, gravels have moderate HCl reaction, 20-30% voids on gravel, some weak (R1) gravel | |
| | | | 4 | 467.4-467.9' - Fracture zone, rough, undulating, horizontal at 467.4', no visible orientation elsewhere, fragments up to 2-1/16", angular to subangular, similar infill to 465.7-466.8', fine to medium grained, <10% black staining | | | SC-7 collected at 470.85 to 472.05' |
| | | | 0 | | | **No Recovery 441.3-444.0'** | |
| | | | >10 | 469.0-470.0' - Fracture zone, rough, undulating, fragments to 2-3/8", horizontal plane at 470.0'; possible bedding plane parting | | **Limestone** 444.0-447.4' - yellowish gray, (5Y 7/2), fine to medium grained, very weak to weak (R1 to R2), strong HCl reaction where pulverized, voids to <1/16" over <5% of surface | R56: 10 minutes |
| | 474.0 | | NR | | | | |
| 475 -433.0 | R57-HQ 5 ft 100% | 65 | 1 | 470.6, 470.7, 470.75, 470.85' - Fractures (4), horizontal, rough, undulating | | **Limestone** 447.4-448.7' - grayish orange, (10YR 7/4), fine grained, medium strong (R3), strong HCl reaction where pulverized | |
| | | | 3 | 472.0, 472.3' - Fractures or mechanical break (2), 20 deg, rough, undulating, opposite directions | | | |
| | | | 3 | 472.6' - Fracture, horizontal, rough, undulating | | **No Recovery 448.7-449.0'** | |
| | | | 1 | 472.6-473.3' - Fracture zone, no visible orientation, fragments up to 4", mostly <2-3/8" | | **Limestone** 449.0-450.0' - yellowish gray with light gray laminations, (5Y 8/1 and N7), fine to medium grained, mild to moderate HCl reaction, alternating very weak (R1) and weak (R2) | |
| | | | 3 | 474.3-474.5' - Fracture, horizontal to <10 deg, open with fragment 2-3/8" | | | R57: 13 minutes |
| | 479.0 | | | 475.0' - Fracture or mechanical break, horizontal to <10 deg, rough, undulating | | | |
| | | | | 475.3' - Fracture, 20-30 deg, rough, with fragment 1-3/16", subangular | | | |
| 480 -438.0 | R58-HQ 5 ft 96% | 22 | >10 | 475.9' - Fracture or mechanical break, horizontal, rough, undulating, bedding plane parting | | **Limestone Fragments** 450.0-451.2' - transition from yellowish gray to moderate yellowish brown, (5Y 7/2 to 10YR 5/4), fine to medium grained, moderate to strong HCl reaction, medium strong (R3) in yellowish gray fragments, strong (R4) in moderate yellowish brown gravels | |
| | | | >10 | 476.3, 476.4' - Fractures (2), horizontal to <10 deg, rough, undulating | | | |
| | | | >10 | 476.5' - Fracture, 40-50 deg, rough, undulating, with large fragments | | | |
| | | | 1 | 477.4' - Fracture or mechanical break, 10-20 deg, rough, undulating | | **No Recovery 451.2-454.0'** | |
| | | | 2 | 478.2, 478.5' - Fractures or mechanical break (2), <10 deg, rough, undulating, black staining | | | R58: 10 minutes |
| | 484.0 | | | 478.8' - Mechanical break, 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 485<br>-443.0 | R59-HQ<br>4 ft<br>88%<br>488.0 | 0 | NR<br>>10<br>2<br>>10<br>3<br>NR | 478.9' - Fracture or mechanical break, 40-50 deg, rough, undulating<br>479.4-479.7' - Fracture zone, horizontal at 479.7', no visible orientation elsewhere, fragments up to 1-3/4"<br>479.7-480.0' - Fracture or mechanical break, 80-90 deg, rough, undulating<br>480.0' - Fracture, 30-40 deg, rough, undulating<br>480.0-480.4' - Fracture zone, fragments up to 1-3/4", angular<br>480.4' - Fracture, horizontal, rough, undulating, bedding plane parting | | **Limestone**<br>454.0-456.8' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine to medium grained, strong HCl reaction, medium strong to strong (R3 to R4), <1/16" voids on 0-10% of surface<br>456.8-457.3' - moderate yellowish brown, (10YR 5/4), medium grained, moderate HCl reaction, very weak (R1), trace organics<br>**Limestone Fragments**<br>457.3-458.3' - Same as 454.0-456.8' except more fragmented<br>**No Recovery 458.3-459.0'** | R59: 13 minutes |
| 490<br>-448.0 | R60-HQ<br>6 ft<br>70%<br>494.0 | 38 | 3<br>>10<br>>10<br>>10<br>>10<br>NR | 480.9-481.3' - Fracture zone, no visible orientation, fragments up to 1-3/4", angular to subangular<br>481.7' - Fracture, 30 deg, slightly rough, slightly undulating<br>481.9-482.2' - Fracture zone, no visible orientation, fragments up to 1-3/16"<br>482.9' - Fracture, horizontal to <10 deg, rough, undulating<br>483.3' - Fracture, <5 deg, rough, undulating<br>483.6-483.7' - Fracture, horizontal, rough, large fragment in between 1-3/16"<br>484.0-484.1' - Fracture zone, no visible orientation, fragments up to 1-5/8", mostly <5/8", subangular<br>484.3, 484.5' - Fractures (2), horizontal, slightly rough, slightly undulating, bedding plane partings | | **Limestone**<br>459.0-460.0' - white to very light gray, (N9 to N8), fine to medium grained, mild to moderate HCl reaction, medium strong to strong (R3 to R4), voids to <1/16" over 10-20% surface area, laminations<br>460.0-460.4' - Same as 456.8-457.3' except yellowish gray, (5Y 7/2), fine to medium grained<br>460.4-460.9' - Same as 459.4-460.0' except moderate HCl reaction<br>**No Recovery 460.9-461.0'**<br>**Limestone**<br>461.0-462.2' - Same as 459.0-460.0' except fine grained, strong HCl reaction | SC-8 collected at 490.35-491.25'<br>R60: 20 minutes |
| 495<br>-453.0 | R61-HQ<br>6 ft<br>62%<br>500.0 | 22 | 3<br>>10<br>1<br>>10<br>NR | 484.7, 484.8' - Fractures or mechanical break (2), horizontal, rough, undulating<br>484.9-485.2' - Fracture zone, fragments up to 2-3/8", rough, angular; horizontal fractures at 484.9' and 485.2': rough, undulating<br>485.4, 485.5' - Fractures or mechanical break (2), <10 deg, rough, undulating, possible bedding partings<br>485.8-486.3' - Fracture zone, fragments up to 3", mostly <5/8", subangular to angular<br>486.6' - Fracture or mechanical break, horizontal, rough, undulating<br>486.8, 487.0, 487.2' - Fractures or mechanical break (3), horizontal, rough, undulating<br>487.2-487.5' - Mechanical break, >80 deg, rough, undulating | | 462.2-463.0' - Same as 460.0-460.4' except yellowish gray with olive gray laminations, (5Y 7/2 with 5Y 3/2)<br>463.0-464.0' - Same as 461.0-462.2' except very light gray with light bluish gray, (N8 with 5B 7/1), fine to medium grained, strong to very strong HCl reaction, <10% voids on surface<br>**Limestone**<br>464.0-465.7' - pale greenish yellow, (10Y 8/2), fine to medium grained, strong HCl reaction, very weak to weak (R1 to R2), long voids to 1-1/2", mostly <1/16", over 20-30% of surface, possible dissolution features | R61: 18 minutes |
| 500<br>-458.0 | | | | 488.0-488.3' - Fracture, 70 deg, rough, undulating<br>488.3' - Fracture or mechanical break, horizontal, rough, undulating<br>488.9' - Fracture or mechanical break, horizontal, rough, undulating, bedding plane parting<br>489.3' - Fracture, horizontal, rough, undulating, open with large rock fragment 1-3/4", angular<br>489.8-490.3' - Fracture zone, horizontal fragments, two large <4", mostly <1-3/16", trace silty infill | | **Silty Limestone Fragments (GM)**<br>465.7-466.8' - dusky yellow, (5Y 6/4), medium grained, moderate to strong HCl reaction, extremely weak (R0)<br>**Limestone**<br>466.8-467.4' - yellowish gray, (5Y 7/2), fine to medium grained, moderate to strong HCl reaction, weak (R2), <10% voids to <1/16" on surface, undulating laminations transition to planar, trace organics | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 491.2-492.2' - Fracture zone, or multiple mechanical breaks, fragments up to 2-1/2"-5", mostly <2-3/8", angular with variable orientation<br>494.2' - Fracture, horizontal, smooth, undulating<br>494.6' - Fracture or mechanical break, 20-30 deg, rough, undulating<br>494.7-495.7' - Fracture zone, horizontal at 494.7', elsewhere no visible orientation, fragments up to 3", angular<br>496.2' - Fracture, horizontal, rough, undulating, possible bedding plane parting<br>497.1' - Fracture or mechanical break, horizontal, rough, undulating<br>497.4-497.7' - Fracture zone, subangular fragments up to 1-3/4" | | **Limestone With Peat**<br>467.4-468.1' - grayish black and dusky yellow, (N2 and 5Y 6/4), medium grained, dusky yellow has moderate to strong HCl reaction, extremely weak to very weak (R0 to R1), prevalent organics<br>**No Recovery 468.1-469.0'**<br>**Limestone Fragments**<br>469.0-469.5' - yellowish gray, (5Y 7/2), with milky white quartz fragments, fine with medium coarse gravels, weak to medium strong (R2 to R3) gravels, extremely weak (R0) fines, fragments up to 4", limestone gravels mild HCl reaction, quartz no HCl reaction<br>**Limestone**<br>469.5-473.5' - transition from yellow gray to light olive gray, (5Y 7/2 to 5Y 5/2), fine to medium grained, moderate to strong HCl reaction, medium strong to strong (R3 to R4), variable voids, mostly <30% up to 1/4" diameter, 470.4-<470.85': calcite crystals in voids up to 1-1/2", mostly <1/4" for 50-60% voids, at 470.8' linear features - possible burrows or dissolution features 1-1/2" to 2" long, 1/4" wide<br>**No Recovery 473.5-474.0'**<br>**Limestone**<br>474.0-479.0' - from light olive gray to yellowish gray with depth, (5Y 5/2 to 5Y 7/2), fine to medium grained fining with depth, moderate to strong HCl reaction increasing with depth, weak (R2), at 478.2' <1-3/16" zone of extremely weak to very weak (R0 to R1) with strong HCl reaction, voids <1/16" on 10-20% of surface<br>479.0-483.8' - yellowish gray, (5Y 7/2), fine to medium grained, moderate to strong HCl reaction, weak (R2), voids to <1/16" on 25% of surface, fossiliferous (casts and molds), 479.5-480.3': coarse pebble size fragments, very pale orange (10YR 8/2), hardness and reactivity same as surrounding lithology, 481.6-481.9': silty gravels, same as surrounding lithology, 482.4-483.1': quartz in voids, crystalline growth<br>**No Recovery 483.8-484.0'** | |

| 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 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES | | | SYMBOLIC LOG | LITHOLOGY | COMMENTS |
|---|---|---|---|---|---|---|---|
| | | R Q D (%) | FRACTURES PER FOOT | DESCRIPTION<br>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. |
| | | | | | | **Limestone**<br>484.0-487.5' - yellowish gray, (5Y 7/2), fine to medium grained, weak (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 HCl reaction, all other properties same as surrounding lithology, very similar to 474.0-479.0' and 479.0-483.5'<br>**No Recovery 487.5-488.0'**<br>**Limestone**<br>488.0-492.2' - yellowish gray, (5Y 7/2), fine to medium grained, strong HCl reaction (slightly weaker with depth), weak (R2), voids to <1/16" cover 15-25% surface, voids to 1/2" with crystals that strongly react to HCl, very similar to 474.0-479.0' and 484.0-487.5'<br>**No Recovery 492.2-494.0'**<br>**Limestone**<br>494.0-497.7' - yellowish gray, (5Y 7/2), fine to medium grained decreasing with depth (fining down), moderate to strong HCl reaction increasing with depth, very weak (R1) to weak (R2) slightly increasing with depth, <1/16" voids on 0-10% surface<br>**No Recovery 497.7-500.0'** | |
| | | | | | | Bottom of Boring at 500.0 ft bgs on 9/7/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (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 | | **Limestone**<br>200.0-201.9' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), sand to gravel-sized broken fragments, infill in section, trace voids (<1/16") over surface<br>201.9-202.5' - yellowish gray, (5Y 7/2), fine to medium grained, moderate to strong HCl reaction, very weak (R1)<br>**No Recovery 202.5-204.0'** | Boring AD-2 blind drilled to approximately 200 feet below ground surface before beginning sampling/logging.<br>Start Drilling at 08:45 09/08/07, Water level 3.0' below ground surface<br>Logger is J. Burkard<br>R1: 7 minutes |
| | R1-HQ 4 ft 63% | 0 | >10 | 200.9-201.6' - Fracture zone, angular fragments up to 2" in diameter | | | |
| | | | >10 | 202.1-202.5' - Mechanical break | | | |
| | | | NR | | | | |
| | 204.0 | | | | | | |
| | | | >10 | 204.0-204.7' - Fracture zone, broken fragments | | **Limestone**<br>204.0-204.7' - very pale orange, (10Y 8/2), fine to medium grained, moderate to strong HCl reaction, very weak (R1), voids <1/16" over 15-30% of surface<br>204.7-205.6' - yellowish gray, (5Y 7/2), fine to medium grained, mild to moderate HCl reaction, very weak to weak (R1 to R2), trace voids less than 1/16" of surface<br>**Silty Sand (SM)**<br>205.6-206.4' - silty sand sized particles with broken limestone fragments up to 1/2" in diameter | |
| 205<br>-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 | | | |
| | R2-HQ 5 ft 80% | 15 | >10 | | | | |
| | | | >10 | 207.2-207.8' - Fracture, vertical, rough, undulating, split core in two halves<br>207.5' - Mechanical break | | | |
| | | | NR | 207.8-208.0' - Mechanical break | | | R2: 9 minutes |
| | 209.0 | | | | | | |
| | | | >10 | 209.3-210.3' - Fracture zone, angular fragments up to 2" in diameter | | **Limestone**<br>206.4-207.8' - pale greenish yellow, (10Y 8/2), very fine to fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), laminar bedding planes <1/16"<br>207.8-208.0' - yellowish gray, (5Y 7/2), strong HCl reaction, very weak to extremely weak (R1 to R0)<br>**No Recovery 208.0-209.0'**<br>**Limestone**<br>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 surface<br>209.7-210.3' - pale greenish yellow, (10Y 8/2), very fine to fine grained, strong HCl reaction, very weak (R1), <1/16" horizontal bedding planes<br>210.3-210.8' - very pale orange, (10Y 8/2), fine grained, strong HCl reaction, very weak (R1), silt infill<br>**No Recovery 210.8-214.0'**<br>**Limestone**<br>214.0-219.0' - yellowish gray to pale greenish yellow, (5Y 7/2 to 10Y 8/2), fine to medium grained, moderate to strong HCl reaction, very weak to weak (R1 to R2), fossil casts and molds, voids (<1/16") throughout from 214.0-214.4' and 215.0-216.5' | |
| 210<br>-167.7 | | | >10 | 210.4-210.8' - Mechanical break | | | |
| | R3-HQ 5 ft 36% | 7 | NR | | | | R3: 11 minutes |
| | 214.0 | | | | | | |
| | | | 8 | 214.0-214.4' - Fracture zone, rough, undulating, broken fragments up to 2" in diameter | | | |
| 215<br>-172.7 | | | 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, undulating, minor black organic staining | | | |
| | R4-HQ 5 ft 100% | 40 | >10 | 215.7-216.4' - Fracture zone, rough, undulating, rock fragments up to 3" in diameter | | | |
| | | | 3 | 217.5-217.7' - Mechanical break | | | |
| | | | 1 | | | | SC-1 collected at 217.8-218.9'<br>R4: 9 minutes |
| | 219.0 | | | | | | |
| 220 | | | 4 | | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (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 | 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 | | **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 | |
| | | | >10 | 219.9, 223.0' - Fractures, 60-90 deg, rough, undulating | | **Limestone** 219.3-220.0' - yellowish gray, (5Y 7/2), fine grained, mild to moderate HCl reaction, weak to medium strong (R2 to R3), laminar bedding planes | |
| | | | 4 | 221.5-221.8' - Fracture zone, fragments up to 1/2" in diameter | | | |
| | | | NR | | | 220.0-223.1' - pale greenish yellow, (10Y 8/2), moderate to strong HCl reaction, weak (R2), fossil molds and casts, surface cavities (trace amounts) up to 1/4" wide and 1/4" in height, pitting on surface | R5: 9 minutes |
| | 224.0 | | | | | | |
| 225 -182.7 | R6-HQ 5 ft 98% | 43 | >10 | 224.1, 225.1, 225.5, 226.1, 226.7, 227.1, 227.6, 228.3' - Mechanical break (8), rough to smooth, undulating | | **No Recovery 223.1-224.0'** | |
| | | | 3 | 224.4-224.8' - Fracture zone, multiple breaks, angular fragments up to 1" in diameter | | **Limestone** 224.0-228.9' - pale greenish yellow, (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 | |
| | | | 1 | | | | |
| | | | >10 | | | | |
| | | | >10 | 227.7-228.0' - Fracture zone, smooth to rough, along bedding planes, horizontal along bedding planes to 40 deg | | | R6: 9 minutes |
| | 229.0 | | NR | 228.6' - Bedding plane, horizontal, smooth | | **No Recovery 228.9-229.0'** | |
| 230 -187.7 | R7-HQ 5 ft 80% | 60 | 6 | | | **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 | |
| | | | 1 | 230.0-230.3' - Fracture zone, rough, angular rock fragments | | | SC-2 collected at 230.5-231.55' |
| | | | 1 | 230.5, 231.8, 232.6, 232.8' - Mechanical break, 0-30 deg, rough, undulating<br>231.5' - Mechanical break | | | |
| | | | 2 | 232.5' - Mechanical break | | | |
| | | | NR | | | **No Recovery 233.0-234.0'** | R7: 12 minutes |
| | 234.0 | | | | | | |
| 235 -192.7 | R8-HQ 5 ft 96% | 0 | >10 | 234.0, 234.6, 235.5-235.8, 236.1-236.7, 237.1-237.5, 237.8-238.8' - Fracture zone (6) | | **Limestone** 234.0-236.7' - yellowish gray, (5Y 7/2), fine to medium grained, moderate HCl reaction, extremely weak to very weak (R0 to R1), surface pitting throughout entire section | |
| | | | >10 | | | | |
| | | | >10 | | | | |
| | | | >10 | | | **Silt (ML)** 236.7-237.1' - yellowish gray, (5Y 7/2), mild HCl reaction, mottling present | |
| | | | >10 | | | | R8: 8 minutes |
| | 239.0 | | NR | | | | |
| 240 | | | 1 | | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -197.7 | R9-HQ 5 ft 88% | 53 | 2 | 239.5, 240.1, 241.6, 241.8, 242.3, 242.7, 243.0, 243.3' - Mechanical break, 0-10 deg, rough, undulating | | **Limestone** 237.1-238.8' - yellowish gray, (5Y 7/2), fine to medium grained, moderate HCl reaction, extremely weak to very weak (R0 to R1), with 1/4" sections of very fine grain limestone | |
| | | | >10 | 241.1-241.3' - Fracture zone | | | |
| | | | 3 | | | **No Recovery 238.8-239.0'** | |
| | | | 1 | | | **Limestone** 239.0-243.4' - pale greenish yellow, (10Y 8/2), fine to medium grained, moderate to strong HCl reaction, very weak (R1), surface pitting throughout section, trace voids (1/16") throughout section | R9: 7 minutes |
| | 244.0 | | NR | | | | |
| | R10-HQ 5 ft 100% | 22 | >10 | 244.0-244.7' - Fracture zone | | | |
| 245 -202.7 | | | 3 | 245.0, 245.5, 245.9, 246.1, 246.5, 246.8, 246.9, 247.3, 247.5, 247.8, 247.9' - Mechanical break (11), 0-10 deg, rough, undulating | | **No Recovery 243.6-244.0'** **Limestone** 244.0-249.0' - pale greenish yellow, (10Y 8/2), fine to medium grained, moderate to strong HCl reaction, very weak (R1), surface pitting throughout section, very brittle rock | |
| | | | 4 | | | | |
| | | | 4 | | | | |
| | | | >10 | 248.1-248.5, 248.7-250.0' - Fracture zone (2), rough, undulating | | | R10: 6 minutes |
| | 249.0 | | | | | | |
| | R11-HQ 5 ft 100% | 23 | 3 | 249.4, 249.6, 250.1, 250.5, 251.6, 252.7' - Mechanical break (6), 0-30 deg, rough, undulating | | 249.0-254.0' - yellowish gray to pale greenish yellow, (5Y 7/2 to 10Y 8/2), medium grained, moderate to strong HCl reaction, very weak to weak (R1 to R2), with fine grained interbeds at 250.7-251.1' and at 253.0 to 254.0', wavy bedding planes throughout section | |
| 250 -207.7 | | | 4 | | | | |
| | | | 4 | 250.8-251.1' - Bedding plane, horizontal, smooth, undulating | | | |
| | | | 6 | 252.3-252.4, 253.1-253.2' - Fracture zone (2), rough, undulating | | | |
| | | | 3 | 253.0' - Bedding plane, horizontal, smooth | | | R11: 9 minutes |
| | 254.0 | | | | | | |
| | R12-HQ 5 ft 100% | 73 | 2 | 254.2, 254.3, 255.1, 255.2, 255.8, 256.3, 256.9, 257.2, 257.4, 257.7, 258.3, 258.8' - Mechanical break (12), smooth to rough, undulating to stepped | | 254.0-259.0' - yellowish gray, (5Y 7/2), fine to medium grained, moderate to strong HCl reaction, very weak to weak (R1 to R2), wavy bedding planes 1/16" thick throughout the section, densely concentrated section of fossil casts and molds from 255.4-255.5' | |
| 255 -212.7 | | | 3 | | | | |
| | | | 2 | | | | |
| | | | 3 | | | | |
| | | | 7 | 258.4-258.5' - Fracture zone, angular rock fragments | | | R12: 9 minutes |
| | 259.0 | | | | | | |
| 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: 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 bedding planes less than 1/16" in thickness throughout intact sections, voids to 1/16" over 5-10% of surface | |
| | | | 2 | | | | |
| | | | >10 | 262.1-262.2' - Fracture zone, angular rock fragments up to 1/2" | | | |
| | | | 8 | 262.5-263.1' - Fracture zone, rough, undulating, 10 angular rock fragments up to 2" in diameter | | | R13: 8 minutes |
| | 264.0 | | | | | **No Recovery 263.8-264.0'** | |
| 265 -222.7 | R14-HQ 5 ft 94% | 40 | >10 | 264.3-265.0' - Fracture zone, rough, undulating, up to 1" in length angular rock fragments | | **Limestone** 264.0-266.9' - pale greenish yellow, (10Y 8/2), fine to medium grained, moderate to strong HCl reaction, very weak (R1), wavy bedding plane from 265.0-265.5' <1/16" in thickness, 1/16" voids over 0-5% of surface | |
| | | | 5 | 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 | | | |
| | | | 4 | | | | |
| | | | 5 | 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 | |
| | | | 1 | | | | R14: 8 minutes |
| | 269.0 | | NR | | | 267.6-268.7' - pale greenish yellow, (10Y 8/2), fine to medium grained, moderate to strong HCl reaction, very weak to weak (R1 to R2) | |
| | R15-HQ 5 ft 82% | 33 | >10 | 269.0-271.0' - Fracture zone | | | |
| 270 -227.7 | | | >10 | 269.8-269.9' - Fracture zone | | **No Recovery 268.7-269.0'** | |
| | | | 1 | 271.3, 272.3, 272.7, 273.0' - Mechanical break (4), 0-30 deg, rough, undulating to stepped | | **Limestone** 269.0-271.9' - light olive gray, (5Y 5/2), fine to medium grained, moderate HCl reaction, very weak to weak (R1 to R2), with angular gravel-sized rock fragments | SC-3 collected at 270.95-272.35' |
| | | | 4 | | | 271.9-272.3' - yellowish gray, (5Y 7/2), fine grained, moderate to strong HCl reaction, very weak to weak (R1 to R2), trace voids | |
| | | | NR | | | | R15: 7 minutes |
| | 274.0 | | | | | 272.3-273.1' - yellowish gray, (5Y 8/1), moderate to strong HCl reaction, very weak to weak (R1 to R2), bedding planes transition from wavy to laminar | End drilling for the day at 16:43, 09/08/07 Continue drilling 09/09/07, Water level 3' below ground surface |
| 275 -232.7 | R16-HQ 5 ft 46% | 13 | >10 | 274.3' - Fracture, horizontal, rough, undulating, tight | | **No Recovery 273.1-274.0'** | |
| | | | >10 | 274.45' - Fracture, 85 deg, rough, undulating, tight | | **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' | |
| | | | >10 | 274.55-274.8' - Fracture zone, multiple intersecting fractures with rock fragments up to 1-3/16" in diameter | | | |
| | | | NR | 275.0' - Bedding plane, horizontal, smooth, tight; 275.4' - Fracture, horizontal, rough, undulating, open (3/8"), organic layering; 275.7-276.3' - Fracture zone, fragments up to 1-3/16" in diameter | | **No Recovery 276.3-279.0'** | R16: 11 minutes |
| | 279.0 | | | | | | |
| 280 | | | NA | 279.25' - Mechanical break, horizontal, rough, undulating | | | R. Bitely begins logging |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (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 | 279.45' - Fracture, 60 deg, rough, undulating, tight | | **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 HCl reaction, trace laminated bedding | |
| | | | >10 | 279.65-280.0' - Fracture zone, multiple intersecting fractures with rock fragments up to 1-3/16" in diameter | | | |
| | | | 7 | 280.3' - Fractures (2), 60 deg, rough, undulating, tight | | **Limestone** 280.0-283.1' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, very weak (R1), voids up to 9/16" diameter over 3-4% of rock surface, poorly fossiliferous, bedding plane laminations from 282.0-283.1' | |
| | | | NR | 280.5' - Fracture, 30 deg, rough, undulating | | | |
| | 284.0 | | | 280.7-280.8' - Fracture zone, slight brown staining, fragments up to 3/4" in diameter | | | R17: 9 minutes |
| | | | | 280.95' - Fracture, 60 deg, rough, undulating, tight | | | |
| 285 -242.7 | R18-HQ 5 ft 100% | 46 | >10 | 281.3' - Fracture, horizontal, rough, undulating, slight brown-black staining, open 1-3/16" calcite crystallization | | **No Recovery 283.1-284.0'** | |
| | | | >10 | 281.55-281.8' - Fracture zone, fragments up to 3/4" in diameter | | **Limestone** 284.0-289.0' - yellowish gray, (5Y 7/2), very fine to coarse grained, moderate HCl reaction, extremely weak to very weak (R0 to R1), voids up to 3/8" diameter over 5% of rock surface, solution cavities up to 1-3/16" in diameter over 5% of rock surface, poorly fossiliferous, trace bedding plane laminations, trace organics | |
| | | | 3 | 281.9, 282.05, 282.25, 282.45, 282.8, 282.85' - Bedding plane (6), horizontal, smooth | | | |
| | | | | 282.65' - Fracture, rough, undulating, open | | | |
| | | | 1 | 284.25-284.4' - Fracture zone, multiple intersecting fractures with rock fragments up to 3/4" in diameter | | | |
| | | | 1 | 284.75' - Fracture, 60 deg, rough, undulating, open to 3/8" | | | R18: 9 minutes |
| | 289.0 | | | 285.2' - Fracture, horizontal, rough, undulating, open from 1/2" to 1" | | | |
| 290 -247.7 | R19-HQ 5 ft 52% | 22 | >10 | 285.3' - Mechanical break | | 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 | |
| | | | >10 | 285.4' - Mechanical break or fracture, horizontal, rough, undulating | | | SC-4 collected at 289.75-290.55' |
| | | | >10 | 285.7-285.9' - Fracture zone, rock fragments up to 1-3/16" | | | |
| | | | >10 | 286.4, 286.45, 286.7' - Bedding plane (3), horizontal, smooth | | | |
| | | | NR | 287.4' - Mechanical break, horizontal, rough, undulating, open to 3/8" | | **No Recovery 291.6-294.0'** | |
| | | | | 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 | | | R19: 10 minutes |
| | 294.0 | | | 289.8' - horizontal, rough, undulating, open to 3/8" | | | |
| 295 -252.7 | R20-HQ 5 ft 78% | 14 | >10 | 290.6-291.6' - Fracture zone, rock fragments up to 1-9/16" 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% carbonate sandy silt | |
| | | | >10 | 294.0-294.9' - Fracture zone, rock fragments up to 1-3/16" in diameter | | | |
| | | | >10 | 295.6-297.0' - Fracture zone, rock fragments up to 1-3/16" in diameter | | | |
| | | | >10 | 297.3' - Fracture, horizontal, rough, undulating, tight | | | |
| | | | NR | | | **No Recovery 297.9-299.0'** | R20: 19 minutes |
| | 299.0 | | | | | | |
| 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: 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 | 299.5, 299.6, 300.2, 300.3' - Fractures (4), horizontal, rough, undulating, trace black organic staining, tight | | **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 to mild organic odor, fossiliferous, transition to a carbonate silt with depth | |
| | | | NA | 301.0' - Fracture zone, rock fragments up to 3/4" in diameter 301.2' - Mechanical break, 20 deg | | | |
| | | | NA | 301.8-301.9, 302.2-302.7' - Fracture zone (2), rock fragments up to 3/4" in diameter | | | |
| | | | NR | | | | R21: 12 minutes |
| | 304.0 | | | | | | |
| | R22-HQ 5 ft 90% | 40 | >10 | | | | |
| 305 -262.7 | | | 10 | 304.65, 305.4, 305.7, 306.35, 306.75' - Bedding plane or mechanical break (5), <10 deg, smooth to rough, planar to undulating | | **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 HCl reaction, limestone fragments as sand sized fraction >50% | |
| | | | >10 | 305.95-306.35' - Fracture zone, rough, undulating to planar, rock fragments <2" in diameter | | | |
| | | | 0 | 306.9-307.0' - Fracture zone, rough, undulating, rock fragments <1" in diameter | | | |
| | | | 4 | | | | R22: 12 minutes |
| | 309.0 | | NR | 308.3-308.5' - Fracture zone, rough, undulating, rock fragments <1-1/2" in diameter | | | |
| | R23-HQ 5 ft 100% | 58 | >10 | | | **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 | |
| 310 -267.7 | | | 3 | 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 | | | |
| | | | >10 | 310.5' - Fracture or mechanical break, 30 deg, rough, undulating | | | |
| | | | 6 | 312.0, 312.05, 312.1, 312.2' - Fractures (4), 0-90 deg, rough, undulating | | **Silt (ML)** 305.1-305.4' - Same as 304.0-304.6' | |
| | | | 3 | 312.45, 313.05, 313.45, 313.95' - Fractures or mechanical break (4), <10 deg, rough, undulating | | **Limestone** 305.4-308.5' - Same as 304.6-305.1' **No Recovery 308.5-309.0'** | R23: 7 minutes |
| | 314.0 | | | | | **Limestone** 309.0-314.0' - yellowish gray, (5Y 7/2), fine to medium grained, moderate to strong HCl 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-HQ 5 ft 98% | 30 | 2 | | | | |
| 315 -272.7 | | | 2 | 314.9, 315.2' - Fractures or mechanical break (2), 10 deg and 40 deg, rough, undulating | | | |
| | | | >10 | 315.7-316.75' - Fracture zone, rough, undulating, silt lenses, rock fragments <3" in diameter | | | |
| | | | >10 | 317.1, 317.5' - Fractures or mechanical break (2), 70 deg and 50 deg, rough, undulating | | | |
| | | | >10 | 317.5-317.9' - Fracture zone, rough, undulating, rock fragments <3" in diameter | | | R24: 9 minutes |
| | 319.0 | | NR | 318.2' - Fractures or mechanical break, <10 deg, rough, undulating | | | |
| 320 | | | >10 | | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -277.7 | R25-HQ 5 ft 100% | 27 | >10 | 318.65-318.9' - Fracture zone or mechanical break, rough, undulating, rock fragments <2" in diameter | | 314.0-318.9' - yellowish gray, (5Y 7/2), fine to medium grained, moderate to strong HCl reaction, extremely weak to medium strong (R0 to R3), highly variable trace voids <1/16", poorly fossiliferous, trace organic laminations, interlaminated silt lenses and limestone rock fragments at 314.4-314.55' and 315.7-316.75' | |
| | | | >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 <1" in diameter, friable | | | |
| | | | >10 | 319.9, 321.1, 321.2, 321.3, 322.8, 323.8' - Fractures or mechanical break (6), 20 deg, rough, undulating | | | R25: 9 minutes |
| | | | 10 | | | **No Recovery 318.9-319.0'** | |
| | 324.0 | | | | | **Limestone** | |
| 325 -282.7 | R26-HQ 5 ft 100% | 42 | 2 | 324.45, 324.95, 325.4, 325.8, 326.3' - Fractures or mechanical break (5), <10-30 deg, rough, undulating | | 319.0-324.0' - yellowish gray, (5Y 7/2), very fine to medium grained, moderate to strong HCl reaction, extremely weak to very weak (R0 to R1), with friable carbonate silts with <50% sand-sized limestone fragments, poorly fossiliferous | |
| | | | 2 | | | | |
| | | | 2 | 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 HCl reaction, moderately fossiliferous, fossil shells to 1/2" | |
| | | | NA | | | | R26: 13 minutes |
| | 329.0 | | | | | **Sandy Silt With Limestone (ML)** | |
| 330 -287.7 | R27-HQ 5 ft 92% | 67 | >10 | 329.0-329.3' - Fracture zone, rough, undulating, rock fragments <1" in diameter | | 326.7-329.0' - very fine to fine grained, low to medium plasticity, mild to moderate HCl reaction, sandy silt (carbonate), carbonate silt with <50% limestone fragments as sand fraction; limestone interbeds, extremely weak to very weak (R0 to R1), strong to very strong odor (crude petroleum and hydrogen sulfide), poorly fossiliferous | |
| | | | 2 | 329.4, 329.45' - Fractures or mechanical break (2), 40 deg and 20 deg, rough, undulating | | | |
| | | | 1 | 329.7, 330.4, 330.85, 331.9' - Bedding plane or mechanical break (4), <10 deg, rough, undulating | | | SC-5 collected at 330.85-331.9' |
| | | | >10 | 332.15-332.35' - Fracture zone, rough, undulating, rock fragments <2" diameter | | **Limestone** | |
| | | | 0 | | | 329.0-333.6' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate to strong HCl reaction, extremely weak to weak (R0 to R2), voids <1/16" over 10% of surface, one cavity or fossiliferous cast 1" in diameter, few cavities <1/4" in diameter, trace organic lenses, moderately fossiliferous, trace laminated organics | R27: 8 minutes |
| | 334.0 | | NR | | | **No Recovery 333.6-334.0'** | |
| 335 -292.7 | R28-HQ 5 ft 88% | 8 | >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, undulating, sandy silt lenses with rock fragments <2" in diameter | | | |
| | | | >10 | | | | |
| | | | >10 | 335.45, 335.7, 335.95' - Bedding plane or mechanical break (3), <10 deg, rough, undulating | | | |
| | | | >10 | | | | |
| | | | >10 | | | | R28: 12 minutes |
| | 339.0 | | NR | | | | |
| | | | 2 | | | | J. Townes begins logging |
| 340 | | | | | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -297.7 | | | >10 | 339.4' - Mechanical break, horizontal, silt lens with angular rock fragments up to 3/4" in diameter | | **Limestone** 334.0-338.4' - yellowish gray, (5Y 7/2), very fine to medium grained, moderate to strong HCl reaction, extremely weak (R0), silt lenses interbedded with extremely weak rock, 80% of core is sandy silt carbonate material of low to medium plasticity, >50% limestone fragments as sand fraction, trace decomposing organic odor | |
| | R29-HQ 5 ft 94% | 62 | 2 | 339.6' - Mechanical break, horizontal, rough, undulating, along bedding plane<br>340.25-340.4' - Fracture zone or mechanical break, silt lens | | | |
| | | | 0 | 341.35, 341.7' - Bedding plane (2), horizontal, fractures along contact of silt lens | | | |
| | | | 1 | 343.25' - Fracture, horizontal, rough, undulating, tight | | | R29: 7 minutes |
| | 344.0 | | NR | | | **No Recovery 338.4-339.0'** | |
| | | | 1 | | | **Limestone** 339.0-339.85' - yellowish gray, (5Y 7/2), very fine to medium grained, moderate HCl reaction, extremely weak to very weak (R0 to R1), limestone fragments up to 3/4" in diameter, calcite crystals, moderate yellow | |
| 345 -302.7 | | | 2 | 344.8, 345.55, 345.9, 346.4, 346.6, 346.9, 347.45, 348.9' - Bedding plane (8), horizontal, rough, undulating, tight | | | |
| | R30-HQ 5 ft 100% | 71 | 3 | | | **Organic Material (OH)** 339.85-340.0' - dark brown to black, mild HCl reaction, organic layer, bedding laminations | |
| | | | 1 | | | | |
| | | | 1 | | | **Limestone** 340.0-340.4' - Same as 339.0-339.85' | SC-6 collected at 347.8-348.8'<br>R30: 7 minutes |
| | 349.0 | | | | | 340.4-343.7' - light gray, (N7), very fine to medium grained, moderate to strong HCl reaction, very weak (R1), black organic mottling over 20% of rock surface | Complete drilling at 17:00 on 09/09/07, water level at surface |
| | | | 0 | | | | |
| 350 -307.7 | | | 2 | 350.35, 350.9, 351.85, 352.4' - Bedding plane or mechanical break (4), horizontal, rough, undulating, tight | | **No Recovery 343.7-344.0'** | |
| | R31-HQ 5 ft 97% | 76 | 1 | | | **Limestone** 344.0-349.0' - light gray, (N7), very fine to medium grained, moderate to strong HCl reaction, very weak to weak (R1 to R2), black and blue mottling over 20% or rock surface, trace laminations | |
| | | | 2 | | | | |
| | | | 1 | 352.9, 353.6' - Mechanical break (2), 0-90 deg, rough, undulating | | | R31: 10 minutes |
| | 354.0 | | NR | | | 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. | |
| | | | 1 | 354.4, 357.0, 357.9' - Fractures (3), horizontal, rough, undulating, open up to 3/8" | | | |
| 355 -312.7 | | | 0 | | | | |
| | R32-HQ 5 ft 100% | 94 | 1 | 356.3, 356.5' - Mechanical break (2) | | **No Recovery 353.85-354.0'** | |
| | | | 1 | | | **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 | |
| | | | 0 | | | | R32: 11 minutes |
| | 359.0 | | | | | | |
| | | | 2 | | | | |
| 360 | | | | | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -317.7 | R33-HQ 5 ft 98% | 62 | 2 | 359.6' - Mechanical break, horizontal, rough, undulating, 3/4" relief<br>359.8' - Mechanical break, vertical, rough, undulating | | **Limestone**<br>359.0-363.9' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), voids up to 3/16" over 10% of rock surface and are fossil molds, cavities up to 3/4" in diameter over 1-2% of rock surface, trace organics, moderately fossiliferous | |
| | | | 1 | 360.2' - Bedding plane, horizontal, rough, undulating, bedding plane fracture along organic layer | | | |
| | | | 2 | 360.5, 361.3, 362.5, 362.9, 363.55' - Mechanical break, horizontal, rough, undulating | | | |
| | | | 1 | 361.5' - Mechanical break | | | R33: 8 minutes |
| | 364.0 | | NR | | | **No Recovery 363.9-364.0'** | |
| 365 -322.7 | R34-HQ 5 ft 98% | 82 | 1 | 364.6, 365.45' - Bedding plane, horizontal, rough, undulating | | **Limestone**<br>364.0-366.55' - 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 10% of rock surface and are fossil molds, trace organic laminations, fossiliferous | |
| | | | 1 | | | | |
| | | | >10 | 366.5-366.65' - Fracture zone, rock fragments up to 3/4" in diameter | | 366.55-368.55' - white to very light gray, (N9 to N8), very fine to fine grained, strong HCl reaction, medium strong (R3), voids up to 3/8" over 20% of rock surface and are fossil molds, cavities up to 1-3/16" over 5% or rock surface, fossiliferous | |
| | | | 1 | 367.3, 368.3' - Mechanical break (2), horizontal, rough, undulating | | | SC-7 collected at 367.3-368.3' |
| | | | 1 | | | | R34: 9 minutes |
| | 369.0 | | NR | | | 368.55-368.9' - Same as 364.0-366.55' | |
| 370 -327.7 | R35-HQ 5 ft 91% | 66 | 2 | 369.45, 369.85' - Fractures (2), horizontal, rough, undulating, tight | | **No Recovery 368.9-369.0'** | |
| | | | 1 | 370.5' - Bedding plane, horizontal, smooth, tight, fracture along organic layering | | **Limestone**<br>369.0-373.55' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, medium strong (R3), voids up to 3/8" over 20% of rock surface and are fossil molds, trace organic layering, moderately fossiliferous | |
| | | | >10 | 371.4-371.5' - Fracture zone, rock fragments up to 3/4" in diameter | | | |
| | | | >10 | 372.1' - Fracture, horizontal, rough, undulating, tight | | | |
| | | | 0 | 372.8-373.1' - Fracture zone, rock fragments up to 1-9/16" in diameter | | | R35: 8 minutes |
| | 374.0 | | NR | | | **No Recovery 373.55-374.0'** | |
| 375 -332.7 | R36-HQ 5 ft 90% | 46 | 4 | 374.25, 374.4, 374.75, 374.95, 375.3, 375.5, 376.45, 377.7, 378.15' - Mechanical break or bedding plane (9), horizontal, rough, undulating, tight | | **Limestone**<br>374.0-378.5' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, medium strong (R3), voids up to 3/8" over 10% of rock surface and are fossil molds, trace organic layering, fossiliferous, cavities up to 9/16" over 1-2% of rock surface and are dissolution fossil molds | |
| | | | 2 | | | | |
| | | | 1 | | | | |
| | | | 3 | 377.1, 377.35' - Mechanical break or bedding plane (2), horizontal, rough, undulating, tight | | | |
| | | | 1 | | | | R36: 8 minutes |
| | 379.0 | | NR | | | **No Recovery 378.5-379.0'** | |
| 380 | | | >10 | 379.0-379.3' - Fracture zone, rock fragments up to 1-9/16" in diameter | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -337.7 | R37-HQ 5 ft 82% | 36 | 3 | 379.6, 379.8, 380.0' - Fractures (3), horizontal, smooth, tight | | **Limestone** 379.0-383.1' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, medium strong (R3), voids up to 3/8" over 20% of rock surface and are fossil molds, fossiliferous | |
| | | | 1 | 380.2-380.4' - Fracture zone, rock fragments up to 1-9/16" in diameter<br>380.8, 381.4' - Fractures (2), horizontal, rough, undulating, open to 3/4" | | | |
| | | | >10 | | | | |
| | | | 0 | 382.7-382.9' - Fracture zone, rock fragments up to 1-9/16" in diameter | | **No Recovery 383.1-384.0'** | R37: 8 minutes |
| | | | NR | | | | |
| | 384.0 | | | | | | |
| 385 -342.7 | R38-HQ 5 ft 88% | 53 | >10 | 384.0-384.5' - Fracture zone, rock fragments up to 1-9/16" in diameter | | 384.0-384.5' - 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 20% of rock surface and are fossil molds, moderately fossiliferous | |
| | | | >10 | 384.7, 384.95' - Fractures (2), horizontal, rough, undulating, 3/4" relief | | | |
| | | | 2 | 385.6-385.75' - Fracture zone, rock fragments up to 3/4" in diameter<br>386.2, 386.55, 387.15' - Fractures (3), horizontal, rough, undulating, 3/8" relief | | 384.5-385.75' - light gray, (N7), very fine to coarse grained, strong HCl reaction, medium strong to strong (R3 to R4), voids up to 3/32" over 10% of rock surface and are fossil molds, cavities up to 3/8" over 3-5% of rock surface | |
| | | | 1 | 386.4-386.8' - Mechanical break | | | |
| | | | 0 | | | | R38: 8 minutes |
| | | | NR | | | | |
| | 389.0 | | | | | | |
| 390 -347.7 | R39-HQ 5 ft 54% | 9 | >10 | 389.0-389.9' - Fracture zone, rock fragments up to 1-9/16" in diameter | | 385.75-385.95' - Same as 384.5-385.75' except organic laminated limestone<br>385.95-388.4' - Same as 384.0-384.5' | |
| | | | >10 | 390.0' - Fracture, vertical, rough, undulating, tight | | **No Recovery 388.4-389.0'** | |
| | | | >10 | 390.1, 390.3' - Fractures (2), horizontal, rough, undulating, tight<br>390.5-390.6' - Fracture zone, rock fragments up to 3/4" in diameter | | **Limestone** 389.0-391.7' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, very weak (R1), voids up to 1/16" over 1-2% of rock surface, poorly fossiliferous, trace organic laminations | |
| | | | NR | 390.8, 391.95, 391.2' - Fractures (3), horizontal, rough, undulating, tight<br>391.5' - Mechanical break | | **No Recovery 391.7-394.0'** | R39: 8 minutes |
| | 394.0 | | | | | | |
| 395 -352.7 | R40-HQ 5 ft 100% | 46 | 1 | | | **Limestone** 394.0-399.0' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, very weak to weak (R1 to R2), voids up to 3/16" over 10% of rock surface and are fossil molds, moderately fossiliferous, trace laminations | |
| | | | 3 | 395.0, 395.4, 395.75, 396.0, 396.4' - Fractures (5), horizontal, rough, undulating, tight to open | | | |
| | | | >10 | 396.7-397.1' - Fracture zone, rock fragments up to 1-3/16" in diameter | | | |
| | | | 4 | 397.45, 397.65, 397.9' - Fractures (3), horizontal, rough, undulating, tight | | | R40: 6 minutes |
| | | | >10 | 398.3-399.0' - Fracture zone, rock fragments up to 1-9/16" in diameter | | | |
| | 399.0 | | | | | | |
| 400 | | | 4 | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: AD-02 | SHEET 11 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -357.7 | R41-HQ 5 ft 69% | 31 | 4<br>2<br>1<br>NR | 399.2, 399.6, 399.8, 400.0, 400.2, 400.4, 400.6, 400.9, 401.05, 401.45, 402.05' - Fractures (11), horizontal, rough, undulating, tight, to 3/8" relief | | **Limestone**<br>399.0-402.45' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, weak (R2), voids up to 3/32" over 20% of rock surface and are fossil molds, moderately fossiliferous<br>**No Recovery 402.45-404.0'** | R41: 6 minutes |
| 404.0 | | | | | | | |
| 405<br>-362.7 | R42-HQ 5 ft 86% | 25 | 3<br>3<br>>10<br>>10<br>2<br>NR | 404.5, 404.75, 404.9, 405.15, 405.35, 405.95, 406.1, 406.2, 406.4, 406.7, 406.85, 407.1' - Fractures (12), horizontal, rough, undulating, tight, open<br>406.0' - Fracture zone, fragments up to 1-9/16" in diameter<br>407.4-408.3' - Fracture zone, fragments up to 1-9/16" in diameter, quartz grains up to 3/8" found as infill material | | **Limestone**<br>404.0-408.3' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids up to 3/8" over 10% of rock surface and are fossil molds, secondary quartz mineralization found in fractured material near bottom of run, trace organic laminations near top of run<br>**No Recovery 408.3-409.0'** | R42: 8 minutes |
| 409.0 | | | | | | | |
| 410<br>-367.7 | R43-HQ 5 ft 100% | 58 | >10<br>1<br>1<br>1<br>3 | 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, undulating, tight to open 1/2"<br>409.7-410.05' - Fracture zone, rough, undulating, rock fragments with carbonate silt matrix, fragments <1" in diameter | | **Limestone**<br>409.0-414.0' - yellowish gray, (5Y 7/2), very fine to medium grained, strong HCl reaction, extremely weak to very weak (R0 to R1), laminated organics over 20% of rock surface, voids <1/16" over <10% of rock surface especially along bedding planes, trace cavities up to 1" diameter, carbonate silt and limestone fragments at 409.7-410.5', carbonate clay/silt with limestone fragments at 412.8-413.0' | Complete drilling at 15:15 on 09/10/07 due to proximal lighting, water level at surface<br>R. Bitely begins logging<br>R43: 8 minutes |
| 414.0 | | | | | | | |
| 415<br>-372.7 | R44-HQ 5 ft 94% | 26 | >10<br>10<br>NA<br>NA<br>3<br>NR | 414.5-415.0' - Fracture zone, rough, undulating, rock fragments <2" in diameter<br>415.2, 415.4, 416.35, 416.5, 418.35, 418.45, 418.55' - Bedding plane or mechanical break, <10 deg, rough, undulating, tight to open 1/2"<br>415.6-415.85' - Fracture zone, rough, undulating, rock fragments <2" in diameter<br>416.55-416.7, 417.1-417.15, 417.4-417.45, 417.65-418.05' - Fracture zone (4), rough, undulating, organic silt and rock fragments <2" in diameter with carbonate silt lenses interbedded. | | 414.0-416.6' - yellowish gray, (5Y 7/2), very fine to medium grained, moderate to strong HCl reaction, extremely weak to very weak (R0 to R1), voids <1/16" over 30% of surface, few cavities 1/2" in diameter, moderately fossiliferous<br>**Organic Elastic Silt To Organic Fat Clay (MH-CH)**<br>416.6-417.4' - dark greenish gray, (5G 4/1), no HCl reaction, extremely weak (R0), laminated, poorly fossiliferous, moderate hydrogen sulfide odor | R44: 10 minutes |
| 419.0 | | | | | | | |
| 420 | | | >10 | | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -377.7 | R45-HQ 5 ft 88% | 13 | >10 | 419.0-419.4, 419.6-419.7, 419.8-420.4, 421.75-422.4, 422.65-423.4' - Fracture zone (5), silt infilling, rock fragments <2" in diameter | | **Limestone** 417.4-418.7' - yellowish gray, (5Y 7/2), very fine to medium grained, moderate to strong HCl reaction, extremely weak to very weak (R0 to R1), voids <1/16" over 30% of surface, few cavities 1/2" in diameter, moderately fossiliferous **No Recovery 418.7-419.0'** | |
| | | | >10 | 419.5, 420.6, 420.9, 421.65' - Bedding plane or mechanical break (4), <10 deg, rough, undulating, tight, open <1/2" | | | |
| | | | >10 | | | | |
| | | | >10 | | | **Limestone** 419.0-423.4' - yellowish gray, (5Y 7/2), very fine to medium grained, moderate HCl reaction, extremely weak to very weak (R0 to R1), interbedded carbonate silt lenses, voids <1/16" over 10% of surface, cavity up to 0.5' long from 421.75-422.25' with crystalline quartz growth, laminated bedding over 10% of surface **No Recovery 423.4-424.0'** | R45: 8 minutes |
| | | | NR | | | | |
| | 424.0 | | | | | | |
| 425 -382.7 | R46-HQ 5 ft 80% | 16 | >10 | 424.5' - Bedding plane or mechanical break, horizontal, rough, undulating | | **Limestone** 424.0-428.0' - yellowish gray, (5Y 7/2), very fine to medium grained, moderate HCl reaction, extremely weak to medium strong (R0 to R3), variable voids <1/16" over 30% of rock surface from 424.0-424.5', trace voids , <1/16" of remaining core, laminated organics from 424.5-424.8' over 20%, trace grayish blue (5PB 5/2) mottling over core from 425.6-427.0', all poorly fossiliferous **No Recovery 428.0-429.0'** | |
| | | | >10 | 424.8-424.9, 425.1-425.6, 426.2-426.3, 427.1-428.0' - Fracture zone (4), rough, undulating, rock fragments <2" in diameter | | | |
| | | | >10 | 425.9, 426.75' - Fractures or mechanical break (2), <10 deg, rough, undulating, tight, open <1/2" | | | |
| | | | >10 | | | | |
| | | | NR | | | | R46: 12 minutes |
| | 429.0 | | | | | | |
| 430 -387.7 | R47-HQ 5 ft 92% | 8 | >10 | 429.3, 429.6' - Mechanical break (2), 50 deg and 60 deg | | **Limestone** 429.0-433.6' - yellowish gray to grayish black, (5Y 7/2 to N2), strong HCl reaction, extremely weak to medium strong (R0 to R3), organic lenses, organics as laminae and lenses up to 1" thick comprising 20% of core especially 432.0-432.6', mottled coloration along bedding planes, especially in stronger limestone, poorly fossiliferous, trace voids <1/16" **No Recovery 433.6-434.0'** | |
| | | | >10 | 429.85-430.15, 430.6-431.0, 431.8-432.7, 433.0-433.6' - Fracture zone (4), rough, undulating, rock fragments <2" in diameter | | | |
| | | | >10 | 431.2, 431.7' - Bedding plane or mechanical break (2), horizontal and 30 deg, smooth to rough, undulating, intersection at 431.2' | | | |
| | | | >10 | | | | |
| | | | >10 | | | | R47: 15 minutes |
| | 434.0 | | NR | | | | |
| 435 -392.7 | R48-HQ 5 ft 100% | 48 | NA | | | **Limestone** 434.0-434.3' - light gray, (N7), very fine grained, mild HCl reaction, strong (R4) | |
| | | | NA | | | | |
| | | | >10 | 436.35' - Bedding plane or mechanical break, horizontal, rough, stepped to undulating, tight | | **Organic Carbonate To Coal Seam** 434.3-434.6' - black to greenish black, (N1 to 5GY 2/1), no HCl reaction, laminated, friable | SC-8 collected at 436.35-437.35' |
| | | | 0 | 437.35' - Mechanical break | | | |
| | | | 3 | 438.25' - Bedding plane or mechanical break, horizontal, rough, stepped to undulating, tight | | | R48: 13 minutes |
| | 439.0 | | | | | | |
| 440 | | | >10 | 438.75, 438.9' - Fractures or mechanical break (2), 50 deg and 80 deg, rough, undulating | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -397.7 | R49-HQ 5 ft 64% | 11 | >10 | 439.0-439.3, 439.5-440.15, 440.7-441.1, 441.9-442.2' - Fracture zone (4), rough, undulating, rock fragments <2" in diameter | | **Clay (CL)** 434.6-436.2' - dark greenish gray, (5GY 4/1), carbonate, varve-like laminated organics, few silica nodules to subhedral quartz up to 1/2" diameter at 435.2' | |
| | | | >10 | 440.35, 440.6, 441.8' - Fractures or mechanical break (3), <10 deg, rough, undulating, open <1/2" | | **Limestone** 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, varve-like organic laminations, trace limestone casts or secondary carbonate mineralization up to 1" diameter, poorly fossiliferous | |
| | | | >10 | | | | |
| | | | NR | | | | R49: 14 minutes |
| | 444.0 | | | | | | |
| 445 -402.7 | R50-HQ 5 ft 66% | 7 | >10 | 444.0-445.5' - Fracture zone, multiple intersecting fractures with rock fragments up to 1-9/16" in diameter | | 439.0-439.7' - yellowish gray, (5Y 7/2), mild HCl reaction, weak to medium strong (R2 to R3), with interbedded carbonate silt lenses, voids <1/16" over 20% of surface, poorly fossiliferous, 1/4" organic peat lens at 439.35' | |
| | | | >10 | 445.1, 445.9' - Fractures (2), 45 deg, rough, undulating, tight | | | |
| | | | 3 | 446.4' - Fracture, 45 deg, rough, undulating, tight | | | |
| | | | 0 | 446.5' - Mechanical break | | | |
| | | | NR | 446.9, 447.0' - Fractures (2), horizontal, rough, undulating, tight | | **Silt (ML)** 439.7-440.2' - medium plasticity, <50% limestone fragments as sand sized fraction, organic peat lens at 440.2' | R50: 16 minutes |
| | 449.0 | | | | | | |
| 450 -407.7 | R51-HQ 5 ft 66% | 24 | 3 | 449.45' - Fracture, 45 deg, rough, undulating, tight | | **Limestone** 440.2-441.25' - medium light gray to yellowish gray, (N6 to 5Y 7/2), mild HCl reaction, strong (R4), voids <1/16" over 30% of rock surface, cavities <1" diameter over 10% of surface, mottled coloration due to secondary mineralization of cavities, organic associated with cavities, with calcite crystals at 440.2-441.25' and 441.27-442.2' | J. Townes begins logging |
| | | | >10 | 449.7, 449.95' - Fractures (2), horizontal, rough, undulating, tight | | | |
| | | | >10 | 450.5' - Fracture, horizontal, rough, undulating, tight | | | |
| | | | >10 | 450.9-451.2' - Fracture zone, rock fragments up to 1-9/16" in diameter | | | |
| | | | >10 | 451.6-452.3' - Fracture zone, rock fragments up to 1-9/16" in diameter | | | |
| | | | NR | | | 441.25-442.2' - moderate yellowish brown, (10YR 5/4), very weak to weak (R1 to R2), faintly laminated organics | R51: 9 minutes |
| | 454.0 | | | | | | |
| 455 -412.7 | R52-HQ 5 ft 82% | 28 | >10 | 454.0-455.5' - Fracture zone, multiple, high angle, intersecting fractures, rock fragments up to 2-3/8" in diameter | | **No Recovery 442.2-444.0'** **Limestone** 444.0-447.3' - medium light gray, (N6), very fine grained, strong HCl reaction, strong (R4), voids up to 3/32" over 20% of rock surface, cavities up to 9/16" over 1-2% of rock surface and some are filled with quartz crystallization | |
| | | | >10 | 455.6, 456.0, 456.4, 456.9, 457.0, 457.1' - Fractures (6), horizontal, rough, undulating, tight | | | |
| | | | >10 | 456.6-456.7' - Fracture zone, rock fragments up to 3/4" in diameter | | | |
| | | | >10 | 457.45-457.65' - Fracture zone, rock fragments up to 1-3/16" in diameter | | **No Recovery 447.3-449.0'** | |
| | | | NR | | | | R52: 15 minutes |
| | 459.0 | | | | | | |
| 460 | | | >10 | 459.0-459.3' - Fracture zone, rough, undulating, rock fragments <2" in diameter | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -417.7 | R53-HQ 5 ft 80% | 46 | >10 | 459.9-460.05' - Fracture zone, rough, undulating, rock fragments <1" in diameter | | **Limestone** 449.0-452.3' - light brownish gray to light brown, (5YR 6/1 to 5YR 6/4), very fine to fine grained, strong HCl 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 are filled with crystallization, trace organic laminations at 451.5' | |
| | | | 3 | 460.3-460.75' - Fracture zone, rough, undulating, rock fragments <3" in diameter, 2 vertical fractures from 460.4-460.7' | | | |
| | | | 1 | 460.85, 461.25, 461.95, 462.3' - Bedding plane or mechanical break (4), rough, undulating, tight, open to <1/2" | | | |
| | | | NR | 461.5' - Mechanical break | | **No Recovery 452.3-454.0'** | R53: 14 minutes |
| | 464.0 | | | | | | |
| 465 -422.7 | R54-HQ 5 ft 78% | 0 | >10 | 464.3' - Fractures (3), horizontal and vertical, rough, undulating, tight, three intersecting fractures | | **Limestone** 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 3/16" over 5% of surface, trace organic laminations at 456.9' | |
| | | | NA | 464.6-465.4' - Fracture zone, rock fragments up to 1-3/16" in diameter | | | |
| | | | NA | 465.6-465.9' - Fracture zone, rock fragments up to 3/4" in diameter | | **No Recovery 458.1-459.0'** | |
| | | | NA | 466.2' - Bedding plane, horizontal, rough, undulating, tight | | **Limestone** 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, cavities <3/4" from 462.0-463.0', trace laminated organics, cavity infilling, crystalline growth of calcite/aragonite, very weak to weak transition from 461.25-461.55' | |
| | | | NR | 466.5-467.9' - Fracture zone, rock fragments up to 1-9/16" in diameter | | | R54: 10 minutes |
| | 469.0 | | | | | | |
| 470 -427.7 | R55-HQ 5 ft 98% | 44 | >10 | 469.0-469.6' - Fracture zone, multiple high angle, intersecting fractures, rock fragments up to 2-3/8" in diameter | | **No Recovery 463.0-464.0'** | |
| | | | 3 | 469.9' - Fracture, horizontal, rough, undulating | | **Limestone** 464.0-464.9' - light brownish gray to light brown, (5YR 6/1 to 5YR 6/4), very fine to fine grained, strong HCl reaction, medium strong to strong (R3 to R4), trace organic increasing with depth, voids up to 3/32" over 1-2% of rock surface | |
| | | | 2 | 470.1' - Bedding plane, horizontal, smooth, stepped, intersecting fractures, rock fragments up to 2-3/8" in diameter | | | |
| | | | 2 | 470.2' - Fracture, 30 deg, rough, undulating, tight | | | |
| | | | 1 | 470.5' - Fracture, 45 deg, rough, undulating, tight | | **Silt With Limestone Fragments (ML)** 464.9-465.9' - fine grained, strong HCl reaction, extremely weak (R0), with limestone fragments, high organic content, strong organic odor | R55: 12 minutes |
| | 474.0 | | NR | 471.75, 472.0, 472.15, 472.75, 473.1' - Fractures (5), horizontal, rough, undulating, except 45 deg at 472.75' | | | |
| 475 -432.7 | R56-HQ 5 ft 100% | 36 | 3 | 474.3' - Fracture, horizontal, rough, undulating, tight | | **Limestone** 465.9-466.5' - Same as 464.0-464.9' | Complete drilling at 17:00 on 09/11/07, water level at surface |
| | | | 4 | 474.7' - Fracture, 30 deg, rough, undulating, tight | | **Silt With Limestone Fragments (ML)** 466.5-467.9' - Same as 464.9-465.9' | |
| | | | >10 | 474.9' - Fracture, horizontal, rough, undulating | | **No Recovery 467.9-469.0'** | |
| | | | 3 | 475.3' - Fracture, 30 deg, rough, undulating, tight | | **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 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 organics near top of run | |
| | | | >10 | 475.9' - Fracture, horizontal, rough, undulating, high relief at 3/4" | | | |
| | | | 1 | 475.6, 475.9' - Fractures (2), horizontal, rough, undulating, tight | | | R56: 15 minutes |
| | 479.0 | | | 476.4, 475.9' - Fracture zone, horizontal, rough, undulating, tight, rock fragments to 3/4" | | **No Recovery 473.9-474.0'** | |
| 480 | | | | | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -437.7 | R57-HQ 5 ft 96% | 37 | 4 | 476.75, 477.0, 477.65, 478.0, 478.35' - Fractures (5), horizontal, rough, undulating, tight | | **Limestone** 474.0-479.0' - yellowish gray, (5Y 7/2), very fine to fine grained, mild to strong HCl reaction, medium strong to strong (R3 to R4), voids up to 3/16" over 10% of rock surface and are fossil molds, cavities up to 3/8" diameter over 1-2% of rock surface, moderately fossiliferous, secondary mineralization from 478.0-479.0' 479.0-483.8' - yellowish gray to light gray, (5Y 7/2 to N7), very fine to fine grained, mild to strong HCl reaction, medium strong to strong (R3 to R4), with and extremely weak carbonate sandy silt lens from 481.5-481.8', voids up to 3/8" over 10% of rock surface and are fossil molds, trace organics, moderately fossiliferous **No Recovery 483.8-484.0'** **Limestone** 484.0-487.8' - light brownish gray, (5YR 6/1), very fine to fine grained, mild to strong HCl reaction, strong (R4), voids up to 3/16" diameter over 20% of rock surface are fossil molds, quartz crystallization at 487.2', 1-9/16" diameter and contains carbonate crystallization **No Recovery 487.8-489.0'** **Limestone** 489.0-493.05' - light brownish gray, (5YR 6/1), very fine to fine grained, mild to strong HCl reaction, strong (R4), voids up to 3/16" over 10% of rock surface and are fossil molds, cavities up to 1-3/8" over 1% of rock surface are filled with carbonate crystallization and found from 489.0-490.0', moderately fossiliferous **No Recovery 493.05-494.0'** **Limestone** 494.0-498.4' - light brownish gray, (5YR 6/1), very fine to fine grained, mild to strong HCl reaction, medium strong to strong (R3 to R4), carbonate sandy silt, extremely weak rock from 497.3-497.9', voids up to 3/16" over 10% of rock surface and are fossil molds, cavities up to 9/16" diameter over 1% of rock surface and are filled with aragonite crystallization, trace organics **No Recovery 498.4-500.0'** | R57: 12 minutes SC-9 collected at 485.8-486.85' R58: 11 minutes R59: 12 minutes R60: 10 minutes, 6' run to 500' below ground surface 9/12/07 at 10:30, total depth at 500.0' below ground surface |
| | | | >10 | 478.6-478.8' - Fracture zone, rock fragments up to 1-3/16" in diameter | | | |
| | | | 3 | 479.6, 480.15, 480.45, 480.6, 480.95, 481.25' - Fractures (6), horizontal, rough, undulating, tight | | | |
| | | | >10 | 481.5-481.8' - Fracture zone, rock fragments to 3/4" diameter | | | |
| | 484.0 | | NR | 481.9, 482.1, 482.75, 482.95, 483.2, 483.4' - Fractures (6), horizontal, rough, undulating, open to 3/4" | | | |
| 485 -442.7 | R58-HQ 5 ft 76% | 42 | >10 | 482.85' - Fracture, vertical, rough, undulating, tight | | | |
| | | | 4 | 483.55-483.7' - Fracture zone, rock fragments up to 1-3/16" in diameter | | | |
| | | | 2 | 484.0-484.5' - Fracture zone, rock fragments up to 2" in diameter 484.85, 485.0, 485.3, 485.4, 485.8, 486.9, 487.0' - Fractures (7), horizontal, rough, undulating, tight | | | |
| | | | 1 | 487.2' - Fracture, horizontal, rough, undulating, open to 3/4" | | | |
| | | | NR | | | | |
| | 489.0 | | | | | | |
| 490 -447.7 | R59-HQ 5 ft 81% | 64 | 3 | 489.2' - Fracture, horizontal, rough, undulating, aragonite crystallization | | | |
| | | | 0 | 489.45, 489.9' - Fractures (2), horizontal, rough, undulating, tight | | | |
| | | | >10 | 491.45-491.6' - Fracture zone, rock fragments up to 1-3/16" in diameter | | | |
| | | | 1 | 492.4' - Fracture, horizontal, rough, undulating, tight | | | |
| | | | NR | | | | |
| | 494.0 | | | | | | |
| 495 -452.7 | R60-HQ 6 ft 73% | 19 | 5 | 494.2, 494.3, 494.45, 494.75, 495.1, 495.55, 495.9' - Fractures (7), horizontal, rough, undulating, trace brown staining, tight | | | |
| | | | 4 | 495.65' - Fracture, vertical, rough, undulating, tight, intersecting with horizontal fractures at 495.55 and 495.9' | | | |
| | | | 4 | 496.2, 496.45, 496.65' - Fractures (3), horizontal, rough, undulating, tight | | | |
| | | | >10 | 497.0' - Fracture, 0-90 deg, rough, undulating to stepped, tight | | | |
| | | | 1 | 497.3-497.6' - Fracture zone, rock fragments up to 3/4", soft material | | | |
| | | | NR | 498.15' - Fracture, horizontal, rough, undulating, tight | | | |
| 500 | 500.0 | | | | | | |
| | | | | | | Bottom of Boring at 500.0 ft bgs on 9/12/2007 | |

| 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -157.6 | 200.0 | | >10 | 200.0-200.6' - Fracture, vertical, rough, undulating, open | | **Limestone** | Boring AD-3 blind drilled to approximately 200 feet below ground surface before beginning sampling/logging. |
| | | | | 200.6-201.4' - Fracture zone, angular fragments, 1-3" in size | | 200.0-203.6' - light olive gray to yellowish gray, (5Y 5/2 to 5Y 7/2), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), trace voids (<1/16") | "Water level is based on Ground Water Monitoring at LNP site (FSAR Table 2.4.12.08)" |
| | | | >10 | 201.7-202.2' - Fracture zone, angular fragments, 1" to 2-1/2" | | 201.4-201.5' - horizontal black organic laminae | Logger: C. Sump (limited space in header) |
| | R1-HQ 5 ft 100% | 0 | >10 | 202.4' - Fracture, horizontal, smooth, undulating, open | | 202.8-203.1' - horizontal black organic laminae | Approximately 1.8' of slough (from 0.0-200.0' drilling) removed from top of run |
| | | | >10 | 202.5-202.7' - Fracture (3), 60 deg, rough, undulating, 1/8" relief | | 203.6-205.0' - pale yellowish brown, (10YR 6/2), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), 30% voids (<1/16"), trace casts/cavities (<1/16") | R1: 12 minutes |
| | | | >10 | 202.9' - Fracture, horizontal, rough, undulating, open | | | |
| 205 | 205.0 | | | 203.1-204.7' - Fracture zone, fragments 1/4-3" | | | |
| -162.6 | | | >10 | 204.7-205.0' - Fracture zone, fragments 2-3" | | 205.0-207.1' - light olive gray to medium gray, (5Y 5/2 to N5), fine grained, moderate HCl reaction, medium strong (R3), trace medium to coarse subrounded fragments | |
| | | | | 205.0-205.5' - Fracture zone, fragments 1/2' to 2" in size | | | |
| | | | >10 | 205.5-206.5' - Fracture zone, fragments 1/4-1" in size | | | |
| | R2-HQ 4 ft 100% | 0 | 9 | 205.8, 206.0, 207.1, 207.3, 207.4, 207.5, 207.5, 207.6, 207.7, 207.8, 207.9' - Fractures or bedding plane (11), horizontal, rough, planar to undulating, 1/8" open | | 206.5-207.1' - 5 to 10% voids to 1/16", trace cavities up to 3/4 x 1-3/16" | 15:25: Segment of R2 clogged, removed for logging and resumed R2 - HQ at 206.5' |
| | | | >10 | 208.1, 208.15, 208.2' - Fractures or bedding plane (3), smooth to rough, planar to undulating, 1/8-1/4" open | | 207.1-209.0' - pale yellowish brown to yellowish gray, (10Y 5/4 to 5Y 7/2), fine grained, weak HCl reaction, trace voids to 1/16", strong HCl reaction in pulverized material | Driller's Remark: R2 - HQ was a 4.0' run due to blockage in core barrel |
| | 209.0 | | | | | | R2: 14 minutes |
| | | | >10 | 208.3-208.6' - Fracture zone, smooth to rough, planar to undulating, 1/4-2" open | | 209.0-209.85' - grayish orange pink, (5YR 7/2), fine grained, moderate HCl reaction, medium strong to strong (R3 to R4), voids (<3/16") over 70% of surface, moderately fossiliferous | |
| 210 | | | | 208.6-209.0' - Fracture zone, fragments 2-3" | | | |
| -167.6 | | | 4 | 209.0-209.85' - Fracture zone, multiple high angle intersecting fractures, rock fragments up to 1/8" | | | |
| | R3-HQ 4 ft 43% | 8 | NR | 210.25' - Bedding plane, horizontal, smooth | | 209.85-210.7' - moderate orange pink, (5YR 8/4), very fine grained, mild to moderate HCl reaction, weak to medium strong (R2 to R3), voids over 10% of surface, cavities up to 3/8" over 1% of surface, laminated, very poorly fossiliferous | |
| | | | | 210.3' - Fracture, vertical, rough, undulating, <1/16" open | | | |
| | | | | 210.4' - Fracture, horizontal, rough, undulating, 3/8" open | | | |
| | 213.0 | | | 210.6' - Fracture, vertical, rough, undulating, <1/16" open | | | R3:15 minutes |
| | | | >10 | 213.0-213.4' - Fracture zone, multiple high angle intersecting fractures, rock fragments up to 1/8" | | **No Recovery 210.7-213.0'** | |
| | | | >10 | 213.6' - Fracture, horizontal, rough, undulating, 3/8" open | | **Limestone** | |
| 215 | | | | | | 213.0-217.0' - grayish orange pink, (5YR 7/2), very fine grained, mild to moderate HCl reaction, medium strong (R3), voids <1/16" over 50% of surface, few cavities up to 3/4", poorly fossiliferous | |
| -172.6 | | | >10 | 214.05' - Fracture, rough, undulating, 3/16" open | | | |
| | R4-HQ 6 ft 67% | 6 | | 214.25-216.15' - Fracture zone, multiple high angle intersecting fractures, rock fragments up to 1-9/16" | | | |
| | | | >10 | 216.3, 216.55, 216.65' - Fracture (3), horizontal, smooth, bedding plane, very low relief | | | |
| | | | NR | 216.65-217.0' - Fracture zone, multiple high angle intersecting fractures, rock fragments up to 1-3/16" | | **No Recovery 217.0-219.0'** | R4:16 minutes |
| | 219.0 | | | | | | |
| | | | >10 | 219.0-220.8' - Fracture zone, multiple high angle intersecting fractures, rock fragments up to 1-3/16" | | | J. Townes continues logging |
| 220 | | | | | | | |

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|---|---|
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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -177.6 | R5-HQ 5 ft 36% | 0 | >10 | | | **Limestone** 219.0-220.8' - yellowish gray to grayish orange pink, (5Y 7/2 to 5YR 7/2), very fine to fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids <1/16" over 5% of surface, poorly fossiliferous **No Recovery 220.8-224.0'** | |
| | | | NR | | | | R5:13 minutes |
| 224.0 | | | | | | | |
| 225 -182.6 | R6-HQ 5 ft 58% | 12 | 2 | 224.7-224.9' - Fracture, 10 deg, rough, undulating, high relief (3/4") due to fossil molds | | **Limestone** 224.0-226.9' - yellowish gray, (5Y 7/2), very fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids <1/16" over 60% of surface, cavities up to 3/8" over 10% of surface, fossil molds, moderately fossiliferous **No Recovery 226.9-229.0'** | |
| | | | >10 | 225.2-226.9' - Fracture zone, multiple high angle intersecting fractures, rock fragments up to 1-3/16" | | | |
| | | | >10 | | | | |
| | | | NR | | | | R6:5 minutes |
| 229.0 | | | | | | | |
| 230 -187.6 | R7-HQ 5 ft 46% | 0 | >10 | 229.4' - Fracture, 10 deg, rough, undulating, ~3/32" open, thin black material over 25% of fracture surface | | **Limestone** 229.0-231.3' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, weak (R2), voids up to 1/16" over 20% of surface, cavities up to 3/4" over 1-2% of surface, fossil molds, poorly fossiliferous, trace laminations **No Recovery 231.3-234.0'** | |
| | | | >10 | 229.55' - Fracture, 10 deg, rough, undulating, <1/16" open | | | |
| | | | >1 | 229.7-231.0' - Fracture zone, multiple high angle intersecting fractures, rock fragments up to 1-3/16" | | | |
| | | | NR | 231.0' - Fracture, vertical, rough, undulating, ~3/8" open | | | R7:7 minutes |
| 234.0 | | | | | | | |
| 235 -192.6 | R8-HQ 5 ft 30% | 8 | >10 | 234.0-234.5' - Fracture zone, multiple high angle intersecting fractures, rock fragments up to 1-3/16" | | **Limestone** 234.0-235.5' - yellowish gray, (5Y 7/2), very fine grained, moderate HCl reaction, weak (R2), voids <1/16" over 5% of surface, cavities up to 1" over 1-2% of surface, fossil molds, trace laminations, poorly fossiliferous **No Recovery 235.5-239.0'** | |
| | | | >10 | 234.9-235.5' - Fracture zone, multiple high angle intersecting fractures, rock fragments up to 1-3/16" | | | |
| | | | NR | | | | R8:7 minutes |
| 239.0 | | | | | | | |
| 240 | | | >10 | 239.0-240.0' - Fracture zone, multiple high angle intersecting fractures, rock fragments up to 1-9/16" | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -197.6 | R9-HQ 5 ft 24% | 0 | 1<br>NR | 240.1' - Fracture, 60 deg, rough, undulating | | **Limestone**<br>239.0-240.2' - yellowish gray, (5Y 7/2), very fine grained, mild HCl reaction, weak (R2), voids up to 3/32" over 30% of surface, fossil molds, poorly fossiliferous, trace laminations<br>**No Recovery 240.2-244.0'** | R9:7 minutes |
| 244.0 | R10-HQ 5 ft 10% | 0 | >10<br>NR | 244.0-244.5' - Fracture zone, multiple high angle intersecting fractures, rock fragments up to 1-3/16" | | **Limestone**<br>244.0-244.5' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate to strong HCl reaction, very weak to weak (R1 to R2), voids <1/16" over 50% of surface, trace laminations, area of oxidized pyrite 3/4", poorly fossiliferous<br>**No Recovery 244.5-249.0'** | Driller's Remark: Smooth drilling, no loss of resistance or rod drops; incompetent material being ground up and washed out<br>R10:7 minutes |
| 245<br>-202.6 | | | | | | | |
| 249.0 | R11-HQ 5 ft 12% | 0 | >10<br>NR | 249.0-249.6' - Fracture zone, multiple high angle intersecting fractures, rock fragments to 1-3/16" | | **Limestone**<br>249.0-249.6' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, extremely weak to very weak (R0 to R1), trace laminations, nonfossiliferous<br>**No Recovery 249.6-254.0'** | R11: 7 minutes |
| 250<br>-207.6 | | | | | | | |
| 254.0 | R12-HQ 5 ft 28% | 0 | >10<br>2<br>NR | 254.0-255.0' - Fracture zone, rough, undulating, multiple high angle intersecting fractures, rock fragments up to 1.5"<br>255.2' - Fractures (2), 60 deg and horizontal, rough, undulating, 3/16" open | | **Limestone**<br>254.0-256.5' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, very weak to weak (R1 to R2), trace laminations, cavities up to 3/8" over 5% of surface, fossil molds, poorly fossiliferous<br>**No Recovery 256.5-259.0'** | R12: 7 minutes |
| 255<br>-212.6 | | | | | | | |
| 259.0 | | | >10 | | | | |
| 260 | | | | | | | |

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|---|---|
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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -217.6 | R13-HQ 5 ft 22% | 0 | >10 NR | 259.0-259.3' - Fracture zone, rough, undulating, multiple intersecting fractures, fragments up to 0.5" with one larger piece 1.5"<br>259.4' - Fracture, <10 deg, rough, undulating, 9/16" open<br>259.7' - Bedding plane, <10 deg, rough, undulating, 3/8" open<br>259.7' - Mechanical break, vertical<br>259.9-259.95' - Fracture, 45 deg and horizontal, rough, undulating, intersecting fractures, ~3/8" open, due to fossil molds<br>259.95-260.1' - Fracture zone, fragments up to 1" | | **Limestone**<br>259.0-260.1' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate to strong HCl reaction, weak (R2), voids <1/16" over 60% of surface, cavities up to 3/4" over 10% surface, fossil molds, moderately fossiliferous<br>**No Recovery 260.1-264.0'** | R13: 7 minutes |
| 264.0 | | | | | | | |
| 265 -222.6 | R14-HQ 5 ft 22% | 0 | >10 >10 NR | 264.0-264.35' - Fracture zone, rough, undulating, fragments up to 2"<br>264.45, 265.8, 265.95' - Bedding plane or mechanical break (3), <10 deg, smooth to rough, planar to undulating | | **Limestone**<br>264.0-264.5' - yellowish gray, (5Y 7/2), very fine to medium grained, strong HCl reaction, weak to strong (R2 to R4), voids <1/16" over 10% surface, few small dissolution cavities (<1x1/2"), trace shell laminae (<1/2"), poorly to moderately fossiliferous<br>**Interbedded Silt And Limestone**<br>264.5-264.7' - yellowish gray, (5Y 7/2), dry to moist, nonplastic to low plasticity, moderate to strong HCl reaction, coarse angular fragments, <50% limestone fragments, all carbonate | R14: 6 minutes |
| 269.0 | | | | | | | |
| 270 -227.6 | R15-HQ 5 ft 6% | 0 | 10 NR | 269.0-269.3' - Bedding plane, <10 deg and 80 deg, smooth to rough, undulating to planar, intersecting fractures | | **Limestone**<br>264.7-264.95' - Same as 264.0-264.5'<br>**Interbedded Silt And Limestone**<br>264.95-265.1' - Same as 264.5-264.7'<br>**No Recovery 265.1-269.0'**<br>**Limestone**<br>269.0-269.3' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl reaction, medium strong to strong (R3 to R4)<br>**No Recovery 269.3-274.0'** | R15: 6 minutes |
| 274.0 | | | | | | | |
| 275 -232.6 | R16-HQ 5 ft 20% | 0 | >10 NR | 274.0-274.4' - Fracture zone, rough, undulating, coarse fragments <1.5"<br>274.6' - Bedding plane or mechanical break, or fracture, <10 deg, rough to smooth, undulating | | **Limestone**<br>274.0-275.0' - yellowish gray, (5Y 7/2), very fine to medium grained, mild HCl reaction, weak to strong (R2 to R4), voids <1/16" over 10% of surface, moderately fossiliferous with fossil cast lenses<br>**No Recovery 275.0-279.0'** | R16: 6 minutes |
| 279.0 | | | | | | | |
| 280 | | | >10 | 279.0-280.7' - Fracture, <10 deg, rough, fragments <2", intersecting horizontal and vertical fragments | | | |

| 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -237.6 | R17-HQ 5 ft 34% | 0 | >10<br>NR | | | **Limestone**<br>279.0-280.7' - yellowish gray, (5Y 7/2), very fine grained, moderate HCl reaction, medium strong to strong (R3 to R4)<br>**No Recovery 280.7-284.0'** | R17: 10 minutes |
| 284.0 | R18-HQ 5 ft 62% | 12 | >10<br>>10<br>>10<br>NR | 284.0-284.55' - Fracture zone, rough, undulating, multiple intersecting fractures<br>284.8' - Bedding plane, 10 deg, rough, undulating<br>285.15' - Fracture, <10 deg, rough, undulating, intersecting fractures<br>285.2' - Fracture, 55 deg, rough, undulating, intersecting fractures<br>285.25' - Fracture, <10 deg, rough, undulating, intersecting fractures<br>285.75' - Fracture or mechanical break, <10 deg, rough, undulating<br>286.4' - Fracture or mechanical break, <10 deg, rough, undulating<br>286.6-287.1' - Fracture or mechanical break, 40 deg, rough, undulating, multiple intersecting fractures<br>286.61' - Fracture or mechanical break, <10 deg, rough, undulating | | **Limestone**<br>284.0-284.9' - yellowish gray, (5Y 7/2), very fine to fine grained, medium strong to strong (R3 to R4), <1/16" voids over 10% of surface, fossiliferous<br>284.9-285.4' - grayish orange pink to yellowish brown, (10YR 6/2 to 10YR 5/4), fine to medium grained, moderate HCl reaction, extremely weak to weak (R0 to R2)<br>285.4-285.5' - fine to medium grained, moderate HCl reaction<br>285.5-287.1' - yellowish gray, (5Y 7/2), fine to medium grained, mild HCl reaction, very weak to weak (R1 to R2), voids <1/16" over 20% of surface, trace fossil casts<br>**No Recovery 287.1-289.0'** | R18: 6 minutes |
| 285<br>-242.6 | | | | | | | |
| 289.0 | R19-HQ 5 ft 30% | 0 | >10<br>>10<br>NR | 289.0-290.5' - Fracture zone, rough, undulating, multiple intersecting fractures, rock fragments <4"x1"<br>290.4' - Fracture, rough, undulating, potential healed fractures, intersecting | | **Limestone**<br>289.0-290.5' - yellowish gray, (5Y 7/2), very fine to medium grained, mild HCl reaction, extremely weak to medium strong (R0 to R3), voids over 15 to 30% of surface (<1/16"), poorly to moderately fossiliferous<br>**No Recovery 290.5-294.0'** | R19: 5 minutes |
| 290<br>-247.6 | | | | | | | |
| 294.0 | R20-HQ 5 ft 38% | 10 | >10<br>3<br>10<br>NR | 294.3' - Fracture, 70 deg, rough, undulating<br>294.6' - Fracture, 70 deg, rough, undulating<br>294.6-295.0' - Fractures, multiple intersecting fractures, fragments <2"<br>295.2' - Bedding plane or mechanical break, <10 deg, smooth to rough, undulating<br>295.3' - Fracture or mechanical break, 60 deg, rough, undulating<br>295.8-295.9' - Fracture zone, rough, undulating, >3 fractures intersect | | **Limestone**<br>294.0-295.9' - yellowish gray, (5Y 8/1), very fine to fine grained, extremely weak to weak (R0 to R2), laminated bedding, <5% voids (1/16") over surface, trace secondary infill on clast inclusion<br>**No Recovery 295.9-299.0'** | Driller's Remark: Slow rotation to approx. 400 rpm to achieve better recovery in softer material<br>M. Faurote continues logging<br>R20: 5 minutes |
| 295<br>-252.6 | | | | | | | |
| 299.0 | | | 3 | 299.35' - Mechanical break or bedding plane, <10 deg, smooth to rough | | | |
| 300 | | | | | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -257.6 | R21-HQ 5 ft 82% | 51 | >10 | 299.45' - 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 laminations | |
| | | | >10 | 299.7' - Mechanical break or bedding plane, <10 deg, smooth to rough, slickensided; 300.4-300.65' - Fracture zone, rough, undulating, gravel sized fragments <2" | | 299.3-299.35' - olive gray, (5Y 4/1), very fine grained, no HCl reaction, extremely weak (R0) | |
| | | | 1 | 301.0-301.1' - Fracture zone, rough, undulating, sand sized fragments | | 299.35-301.0' - yellowish gray to light olive gray, (5Y 8/1 to 5Y 6/1), very fine to medium grained, moderate HCl reaction, extremely weak to very weak (R0 to R1), laminated bedding | SC-1 collected at 302.0-302.8' |
| | | | 0 | 301.5' - Fracture or mechanical break, <10 deg, smooth to rough, undulating | | | R21: 7 minutes |
| | 304.0 | | NR | 301.9-302.1' - Fracture, <10 deg, smooth to rough, undulating, gravel sized fragments <1" | | | |
| 305 -262.6 | R22-HQ 5 ft 38% | 0 | >10 | 302.85' - Fracture or mechanical break, <10 deg, rough, undulating; 304.0-305.9' - Fracture zone, rough, undulating, gravel sized fragments <2" | | 301.0-303.1' - yellowish gray, (5Y 7/2), very fine to fine grained, mild to moderate HCl reaction, laminated bedding, voids <1/16" over 10% of surface | |
| | | | >10 | | | **No Recovery 303.1-304.0'** | |
| | | | NR | | | **Limestone** 304.0-305.9' - yellowish gray, (5Y 8/1), mottled colorations with trace organics, very fine grained, moderate HCl 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 | R23-HQ 5 ft 76% | 33 | >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, moderate HCl reaction, extremely weak to weak (R0 to R2) | |
| | | | >10 | 310.25-310.35' - Fracture zone, rough, undulating, gravel sized fragments <1" | | 309.0-310.8' - very fine grained, mottled laminations | |
| | | | 3 | 310.8, 311.15, 311.55, 311.95, 312.1' - Bedding plane (5), <10 deg, rough, undulating | | 310.8-312.8' - very fine to fine grained, laminated bedding, with voids (<1/16") over 30% of surface | |
| | | | >10 | 312.3-312.8' - Fracture zone, rough, undulating, gravel sized fragments <1" | | | |
| | | | NR | | | **No Recovery 312.8-314.0'** | R23: 5 minutes |
| | 314.0 | | | | | | |
| 315 -272.6 | R24-HQ 5 ft 32% | 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 weak to weak (R0 to R2), voids <1/16" over 10% of surface | |
| | | | >10 | | | **No Recovery 315.6-319.0'** | |
| | | | NR | | | | |
| | | | | 318.0-320.0' - Fracture zone, rough, undulating, gravel sized fragments <2" | | | R24: 5 minutes |
| | 319.0 | | | | | | |
| 320 | | | >10 | | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -277.6 | R25-HQ 5 ft 30% | 0 | 4 | 320.1' - Fracture, 30 deg, rough, undulating, 4 intersecting fractures<br>320.3' - Fracture, 70 deg, rough, undulating, 4 intersecting fractures | | **Limestone**<br>319.0-320.5' - yellowish gray, (5Y 8/1), very fine to medium grained, mild to moderate HCl reaction, very weak to weak (R1 to R2)<br>**No Recovery 320.5-324.0'** | R25: 6 minutes |
| | | | NR | | | | |
| 324.0 | | | | 324.0-326.1' - soil interval | | **Silty Sand (SM)**<br>324.0-326.1' - yellowish gray, (5Y 7/2), moist, dense, fine to coarse grained, mild HCl reaction, 40 to 60% carbonate sands, 40 to 60% low plasticity carbonate silts<br>**No Recovery 326.1-329.0'** | Begin drilling at 8:00 on 8/22/07; water level at 3' below ground surface<br>Driller's Remark: No slough in boring, clean to 324' below ground surface<br>Driller's Remark: Moderate to slow advancement rate; very consistent advancement<br>Driller's Remark: Slow rotation rate to approx. 300 rpm to achieve better recovery in softer material<br>R26: 7 minutes |
| 325<br>-282.6 | R26-HQ 5 ft 42% | 0 | NA | | | | |
| | | | NA | | | | |
| | | | NR | | | | |
| 329.0 | | | | | | **Sandy Silt (ML)**<br>329.0-331.3' - yellowish gray, (5Y 7/2), dry to moist, very dense, fine to coarse grained, >50% low plasticity carbonate silts, carbonate sands | |
| 330<br>-287.6 | R27-HQ 5 ft 88% | 40 | NA | | | | |
| | | | NA | | | | |
| | | | NA | | | | |
| | | | 2 | 331.5' - Mechanical break, boxing core<br>331.7' - Bedding plane or mechanical break, <10 deg, rough, undulating | | **Limestone**<br>331.3-333.4' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, extremely weak to very weak (R0 to R1), trace organic laminations<br>**No Recovery 333.4-334.0'** | R27: 6 minutes |
| | | | 2 | 331.85' - Bedding plane or mechanical break, <10 deg, rough, undulating | | | |
| | | | 0 | 332.5' - Fracture or mechanical break, 60 deg, rough, undulating | | | |
| 334.0 | | | NR | 332.9' - Bedding plane or mechanical break, <10 deg, rough, undulating | | **No Recovery 334.0--339.0'** | Driller's Remark: Possible void space; low torque on drill indicating very soft material or no material; no fluid return; fluid return at higher flow rate of approx. 25 gpm and not drilling (approx. 25% circulation) |
| 335<br>-292.6 | R28-HQ 5 ft 0% | 0 | NR | | | | |
| | | | | | | | R28: 7 minutes |
| 339.0 | | | | | | **No Recovery 339.0-342.0'** | |
| 340 | | | | | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (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 | | | | 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 recovery from 342 to 344' |
| | | | 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 | |
| | | | NA | | | 343.4-343.7' - bluish gray, yellowish gray, (5B 7/1, 5Y 7/2), moderate HCl reaction, weak (R2) | |
| | 344.0 | | NR | | | **No Recovery 343.7-344.0'** | R29: 6 minutes |
| 345 -302.6 | R30-HQ 5 ft 74% | 32 | 7 | 344.3-344.4' - Fracture zone, vertical and horizontal, multiple fractures on and through the zone, broken fragments | | **Silt (ML)** 344.0-344.3' - brown to orange gray, carbonate grains | |
| | | | >10 | 345.5-345.75' - Fracture zone, fragments 1/4" to 3/4", in transition between lithologic units | | **Limestone** 344.3-345.7' - very fine to coarse grained, strong HCl reaction, very weak (R1), bedded at 345.7' | |
| | | | 3 | 346.1' - Mechanical break<br>346.4' - Mechanical break | | | |
| | | | 2 | 346.95' - Mechanical break or bedding plane | | | |
| | | | NR | 347.3' - Bedding plane, horizontal, smooth, planar, organic, trace iron oxide<br>347.4' - Bedding plane, horizontal, smooth, planar, organic, trace iron oxide | | 345.7-347.4' - light gray, (N8), very fine grained, strong HCl reaction, medium strong (R3), pyrite mottling | R30: 7 minutes |
| | 349.0 | | | | | **Silt (ML)** 347.4-347.7' - compact, carbonate | |
| | | | | | | **No Recovery 347.7-349.0'** | |
| 350 -307.6 | R31-HQ 5 ft 98% | 56 | >10 | 349.5' - Fracture, 65 deg, planar to undulating | | **Limestone** 349.0-350.5' - light gray to white, (N8 to N9), very fine grained, strong HCl reaction, medium strong (R3) | |
| | | | >10 | 349.6-350.4' - Fracture zone, heavily fractured, fragmented | | 350.5-352.0' - yellowish gray, (5Y 8/1), very fine grained, strong HCl reaction, very weak (R1), laminated bedding, trace organics, trace pyrite | |
| | | | 3 | 350.7-351.1' - Bedding plane, horizontal, planar, silt to sand horizon between weak rock | | | |
| | | | 2 | 351.7' - Mechanical break, 0-10 deg, rough, undulating to planar<br>352.0' - Mechanical break, 0-10 deg, rough, undulating to planar | | 352.0-354.0' - white, light gray, yellowish gray, (N9, N8, 5Y 8/1), very fine grained, strong HCl reaction, weak (R2), trace iron, pyrite | |
| | | | 2 | 352.6' - Mechanical break, 0-10 deg, rough, undulating to planar | | | R31: 6 minutes |
| | 354.0 | | | 353.05' - Mechanical break, 0-10 deg, rough, undulating to planar | | | |
| 355 -312.6 | R32-HQ 5 ft 100% | 24 | 0 | 353.55' - Mechanical break, 0-10 deg, rough, undulating to planar | | **Sandy Silt (ML)** 354.0-354.4' - pinkish gray, (5YR 8/1), carbonate derived, friable | |
| | | | NA | 354.4' - Bedding plane, horizontal, smooth, undulating, light to moderate organic<br>354.6' - Bedding plane, horizontal, smooth, undulating, light to moderate organic staining | | **Limestone** 354.4-354.8' - pale orange, (10YR 8/2), strong HCl reaction, weak (R2), <10% voids <1/16" | |
| | | | >10 | 354.8-356.4' - Fracture zone, 0-80 deg, organic staining, fragments 1/4" x 1/2" | | **Silt (ML)** 354.8-356.0' | |
| | | | >10 | 357.0-357.5' - Fracture zone, 0-75 deg, multiple fragments 1/2" x 1/2" | | **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" | |
| | | | >10 | 357.5-358.3' - Fracture zone or bedding plane, 0-60 deg, random fractures, multiple sizes | | | R32: 8 minutes |
| | 359.0 | | | 358.4' - Fractures, 75 deg and 60 deg, smooth, intersecting | | | |
| 360 | | | 2 | 359.4' - Bedding plane, rough, undulating | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -317.6 | R33-HQ 5 ft 82% | 50 | >10 | 359.95' - Bedding plane, rough, undulating<br>360.2-360.4' - interbedded, generally horizontal | | **Limestone**<br>358.2-361.1' - pale orange, (10YR 8/2), very fine grained, weak to medium strong (R2 to R3), 20% voids (<1/16"), fossiliferous<br>361.1-361.3' - very fine grained, transition zone, irregular, convoluted surface, laminar, horizontal bedding, organic interbedding, rip-up clasts<br>361.3-363.1' - yellowish gray, (5Y 8/1), trace mottling, very fine to medium grained, moderate to strong HCl reaction, weak (R2), fossil casts (1/16 to 3/8") over 10 to 15% of the surface, faint bedding | |
| | | | 3 | 360.95' - Mechanical break<br>361.5' - Fracture or bedding plane, horizontal and vertical, rough, undulating | | | SC-2 collected at 361.75-362.65' |
| | | | >10 | 361.6' - Fracture or bedding plane, horizontal and vertical, rough, undulating | | | |
| | | | NR | 361.7' - Fracture or bedding plane, horizontal and vertical, rough, undulating<br>362.7-363.1' - Fracture zone, smooth to rough, undulating, multiple fragments, no visible orientations | | | R33: 6 minutes |
| 364.0 | | | | | | | |
| 365 -322.6 | R34-HQ 5 ft 100% | 52 | 7 | 364.25-364.45' - Bedding plane, smooth, undulating | | **No Recovery 363.1-364.0'**<br>**Limestone**<br>364.0-364.25' - pale orange, (10YR 8/2), trace mottling, very fine grained, moderate to strong HCl reaction, weak (R2), fossil casts (1/16 to 3/8") over 10 to 15% of the surface, faint bedding<br>364.25-364.9' - pale orange, (10YR 8/2), very fine grained, strong HCl reaction, medium strong (R3), granular, voids (<1/16") over 15% of surface, cavities (up to 1/2 to 1/4") over 10% of surface (fossil molds)<br>364.9-366.15' - grayish orange, (10YR 7/4), very fine grained, strong to very strong HCl reaction, medium strong (R3), trace organics as laminae at top of interval<br>366.15-368.2' - white, pale orange, (N9, 10YR 8/2), very fine grained, medium strong to strong (R3 to R4), 20% burrows, molds, and 5% voids (<1/16"), trace organics<br>368.2-368.6' - pale orange, (10YR 8/2), very fine grained, very weak to weak (R1 to R2), granular, 1/8" organic layer at 368.3', few voids, few cavities | |
| | | | 0 | 364.7' - Fracture, 85 deg and vertical, rough, undulating | | | |
| | | | 2 | 364.9' - Bedding plane, horizontal, smooth, contact, with 45 deg fracture<br>366.2' - Bedding plane, rough, contact very irregular | | | |
| | | | >10 | 366.9-368.0' - Fracture zone, smooth, undulating, irregular contact with uneven surfaces | | | |
| | | | 1 | | | | R34: 6 minutes |
| 369.0 | | | | 368.7' - Bedding plane, horizontal | | | |
| 370 -327.6 | R35-HQ 5 ft 74% | 44 | >10 | 369.35-369.8' - Fracture zone or bedding plane, 0-90 deg, smooth to rough, planar to undulating, iron oxides and trace organics | | | |
| | | | >10 | 370.1' - Fractures, horizontal and 8 deg, rough, undulating | | | |
| | | | 1 | 370.6-370.7' - Fracture zone<br>371.5' - Mechanical break | | | |
| | | | 1 | 371.9' - Mechanical break<br>372.6' - Mechanical break | | | |
| | | | NR | | | | R35: 5 minutes |
| 374.0 | | | | | | | |
| 375 -332.6 | R36-HQ 5 ft 66% | 12 | >10 | 374.0-374.3' - Fracture zone, fragments 1/4" to 3/4"<br>374.3' - Bedding plane, horizontal and 5 deg, smooth, undulating | | **Limestone**<br>369.4-370.5' - white to pale orange, (N9 to 10YR 8/2), very fine grained, strong HCl reaction, medium strong (R3), trace organics, burrows and molds create cavities to 1/2", 10% voids (<1/16")<br>370.5-372.7' - yellowish gray, (5Y 7/2), very fine grained, strong HCl reaction, medium strong to strong (R3 to R4), 20 to 25 % voids (<1/16") and fossil molds and casts<br>**No Recovery 372.7-374.0'** | |
| | | | >10 | 374.4' - Bedding plane, horizontal and 5 deg, smooth, undulating | | | |
| | | | >10 | 374.6' - Bedding plane, horizontal and 5 deg, smooth, undulating<br>374.85' - Fracture, 20 deg, rough, undulating | | | |
| | | | NR | 374.9-375.3' - Fracture zone, multiple orientations, fragments are 1/2"x1" to 2"x1"<br>375.55' - Mechanical break<br>375.7-375.95' - Fracture zone<br>376.55' - Fracture zone, horizontal and 25 deg, rough, undulating | | | R36: 7 minutes |
| 379.0 | | | | | | | |
| 380 | | | 2 | 376.6-376.8' - Fracture zone, trace iron oxide staining | | | |

| PROJECT NUMBER: | BORING NUMBER: |
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| 338884.FL | AD-03 SHEET 10 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | RQD (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -337.6 | R37-HQ 5 ft 82% | 18 | 5 | 380.1, 380.2, 380.45' - Bedding plane (3), horizontal<br>380.8, 380.9' - Mechanical break (2)<br>381.05' - stepped fracture over 3/4", angular | | **Limestone**<br>374.0-374.45' - grayish orange, (10YR 7/4), fine to medium grained, moderate HCl reaction, very weak (R1), laminated bedding, organic interbedding | |
| | | | 4 | 381.4' - Bedding plane, smooth, undulating, stepped | | 374.45-377.3' - yellowish gray, (5Y 8/2), very fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), 25 to 35 % burrows, cavities (molds), 5 to 10% voids (<1/16"), locally heavily fractured | |
| | | | 4 | 381.7, 381.9, 382.15, 382.6' - Bedding plane (4), smooth, undulating<br>382.7, 382.9' - Bedding plane (2), rough, undulating | | | R37: 6 minutes |
| | | | NR | | | **No Recovery 377.3-379.0'** | |
| 384.0 | | | | | | | |
| | R38-HQ 5 ft 96% | 39 | 8 | 384.2, 384.4, 384.5, 384.7' - Bedding plane or mechanical break (4) | | **Limestone**<br>379.0-381.75' - grayish orange, (10YR 7/4), very fine to fine grained, strong HCl reaction, very weak to weak (R1 to R2), nonreactive granular material, localized laminated bedding with trace organics | |
| 385<br>-342.6 | | | 6 | 384.9' - mid point of vertical fracture along center of core<br>385.05, 385.2, 385.7, 385.9' - rough, multiple fragments, angular to spike random angles | | | |
| | | | >10 | 386.0' - Fracture, 20 deg<br>386.6-387.5' - Fracture zone, multiple fragments up to 2", crosses lithology change | | 381.0-381.3' - extremely weak (R0), friable, dissembles in water | |
| | | | >10 | | | 381.75-383.1' - yellowish gray, (5Y 8/1), very fine grained, strong HCl reaction, medium strong (R3), 10% voids (<1/8") | |
| | | | 0 | 387.8' - Bedding plane, 10 deg, smooth, undulating | | | SC-3 collected at 387.8-388.8'<br>R38: 7 minutes |
| 389.0 | | | NR | | | 382.7-383.1' - very weak to weak (R1 to R2)<br>**No Recovery 383.1-384.0'** | |
| | R39-HQ 5 ft 94% | 27 | 4 | 389.05' - Mechanical break<br>389.4-389.5' - Bedding plane, horizontal and 5 deg, smooth, undulating, silt/clay infill | | **Limestone**<br>384.0-384.5' - yellowish gray, (5Y 7/2), very fine grained, very strong HCl reaction, extremely weak (R0) | |
| 390<br>-347.6 | | | 2 | 390.5-391.5' - Fracture zone, fragments to 2", subangular to angular, 40-60% infill <1" | | 384.5-387.0' - grayish orange, (10YR 7/4), very fine grained, strong HCl reaction, medium strong (R3), 20% <1/16" voids, trace organics, cavities to 3/4" | |
| | | | 2 | 391.5-391.8' - Bedding plane, horizontal, smooth, undulating, rock partings on both ends | | | |
| | | | 1 | 391.8-392.6' - Fracture zone, fragments to 1-1/2", subangular to angular | | 387.0-388.8' - light gray, light blue gray, (N7, 5B 7/1), very fine to fine grained, strong HCl reaction, weak to medium strong (R2 to R3), 25% fossil casts (1/16 to 9/16" max.) of forams, pelecypods, and echinoderms | |
| | | | >10 | 392.9' - Bedding plane, smooth, undulating, contact rock with silt/sand | | | R39: 8 minutes |
| 394.0 | | | NR | | | | |
| | R40-HQ 5 ft 36% | 0 | >10 | 393.4-393.7' - Fracture zone, fine infill, angular fragments to 1" | | | |
| 395<br>-352.6 | | | >10 | 394.0-394.55' - Fracture zone, fractures from horizontal to vertical, immediately below 3/8" gravel sized fragments, clay/silt rock fragments to end of run | | **No Recovery 388.8-389.0'** | |
| | | | NR | | | **Limestone**<br>389.0-393.7' - grayish orange, very pale orange (392.0'), (10YR 7/4, 10YR 8/2), strong HCl reaction, extremely weak to very weak (R0 to R1), fracture zone, breccia begins at 390.5', 15-18% voids (<1/16") in rock fragments<br>**No Recovery 393.7-394.0'** | |
| 399.0 | | | | | | **Limestone**<br>394.0-395.8' - Same as 389.0-393.7'<br>395.6' - becomes tacky, heavy silt content | R40: 6 minutes |
| 400 | | | 1 | 399.65' - Bedding plane, smooth, horizontal | | **No Recovery 395.8-399.0'** | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -357.6 | R41-HQ 5 ft 88% | 67 | 2 | 400.0' - Fracture, horizontal, rough, undulating<br>400.1' - Fracture, vertical, rough, undulating | | **Limestone**<br>399.0-399.25' - very pale orange, (10YR 8/2), moderate HCl reaction, very weak (R1), 30% voids (<1/8") (fossil molds), sand-sized grains, fossil fragments | |
| | | | 1 | 401.0' - Mechanical break | | | SC-4 collected at 401.5-402.65' |
| | | | 1 | | | 399.25-403.4' - yellowish gray, (5Y 8/1), mild to strong HCl reaction, weak (R2), trace iron oxides on shell casts, 15% <1/16" voids with sporadic fossil casts to 1/4" | |
| | | | 1 | 402.7' - Fracture, 45 deg, planar | | | R41: 6 minutes |
| | | | NR | | | **No Recovery 403.4-404.0'** | |
| | 404.0 | | | | | | |
| | R42-HQ 5 ft 99% | 86 | 2 | 404.1' - Bedding plane, 5 deg, undulating | | **Limestone**<br>404.0-408.95' - grayish orange pink, (5YR 7/2), fine to medium grained, moderate HCl reaction, very weak (R1), HCl reaction delayed, brecciated at 410.2-410.35' | |
| 405<br>-362.6 | | | 1 | 404.85' - Fracture, 15 deg, smooth, planar<br>405.05' - Bedding plane or mechanical break, core contacts spun against each other | | | |
| | | | 1 | 406.65' - Bedding plane, horizontal and 5 deg, smooth, undulating | | | |
| | | | 2 | 407.05' - Bedding plane, 10 deg, smooth, planar | | | |
| | | | 1 | 407.75' - Mechanical break | | | R42: 6 minutes |
| | 409.0 | | | | | | |
| | | | NR | 408.85' - Mechanical break, probably when breaking core run off bottom | | **No Recovery 408.95-409.0'** | |
| 410<br>-367.6 | R43-HQ 5 ft 60% | 14 | >10 | 409.7-410.0' - Mechanical break, undulating, heavily fractured near vertical planes, probably mechanically induced | | **Limestone**<br>409.0-411.3' - Same as 404.0-408.95' | |
| | | | >10 | 410.3' - Fracture, 40 deg and 45 deg, zone infilled with 1/8" or less rock fragments in silt matrix | | | |
| | | | >10 | 410.6-412.0' - Fracture zone, horizontal and vertical, multiple fragments of varying size ranging to 3"x1-1/2"x1", organic (coatings) on planar surfaces and lining casts from 411.3-412' | | **Limestone**<br>411.3-412.0' - mild HCl reaction, very weak (R1), dark organic laminae, trace iron oxides on bedding plane surfaces | |
| | | | NR | | | **No Recovery 412.0-414.0'** | R43: 7 minutes |
| | 414.0 | | | | | | |
| | R44-HQ 5 ft 89% | 57 | 5 | 414.15' - Bedding plane, horizontal, smooth, planar | | **Limestone**<br>414.0-414.6' - very pale orange, (10YR 5/2), very fine grained, very strong HCl reaction, weak (R2), 5% (<1/16") voids on surface, trace organics | |
| 415<br>-372.6 | | | 3 | 414.4' - Fracture, vertical and 60 deg<br>414.6' - Bedding plane, rough, undulating<br>414.95, 415.2, 415.5, 415.8' - Mechanical break (4) | | **Conglomerate**<br>414.6-414.8' - strong HCl reaction, variegated, silica gravel up to 3/8", limestone grains | |
| | | | 2 | 416.4' - Mechanical break, horizontal | | **Limestone**<br>414.8-418.45' - very pale orange, (10YR 8/2), very fine grained, strong HCl reaction, weak to medium strong (R2 to R3), 5 to 20% (<1/16") voids, fossil molds, some including cavities up to 1/2", trace organic material | |
| | | | 2 | 416.8' - Fracture, 65 deg, planar to undulating, 1/16" separation<br>417.15, 417.25' - Fracture (2), horizontal and 80 deg, 1/16" to 1/16" separation | | | |
| | | | 1 | | | | R44: 8 minutes |
| | 419.0 | | NR | 418.4' - Bedding plane, smooth, undulating | | | |
| 420 | | | 1 | 419.2' - Bedding plane, probable organic stain and/or infill | | **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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -377.6 | | | 1 | 419.75' - Mechanical break | | **Peat**<br>419.0-419.2' - brownish black, (5YR 2/1), malleable | |
| | R45-HQ<br>5 ft<br>96% | 65 | 2 | 421.3' - Fracture, vertical, smooth, undulating<br>421.7-422.5' - Bedding plane or fracture zone, rough, undulating, irregular contact with uneven surfaces | | **Limestone**<br>419.2-421.8' - very pale orange, (10YR 8/2), very fine grained, strong HCl reaction, medium strong (R3), fossil mold rich, 25% (<1/16") voids, trace organics | |
| | | | >10 | | | | |
| | | | >10 | 423.1' - Mechanical break<br>423.4-423.8' - Fracture zone, horizontal and vertical, rough, undulating, may be extensively broken from/by breaking core for retrieval | | 421.8-423.8' - very pale orange to pale yellowish brown, (10YR 8/2 to 10YR 6/2), very fine grained, moderate to strong HCl reaction, medium strong to weak (R3 to R2), voids (<1/16") over 10-15% of surface, 3-8% cavities (1" x 1/4"), weak (R2) rock (last 1' of interval), trace organics, laminar interbeds with fossil coatings | R45: 9 minutes |
| 424.0 | | | NR | | | | |
| | | | 1 | | | | |
| 425<br>-382.6 | | | 2 | 424.9' - Mechanical break<br>425.4' - Fracture, rough, undulating, angular | | | |
| | R46-HQ<br>5 ft<br>100% | 86 | 4 | 425.65' - Bedding plane, 5 deg and 15 deg, undulating, organic infilling<br>426.45' - Bedding plane or mechanical break | | **No Recovery 423.8-424.0'**<br>**Limestone**<br>424.0-428.3' - Same as 421.8-423.8' | |
| | | | 2 | 426.5' - Mechanical break, 10 deg and vertical, undulating, short<br>426.7' - Bedding plane, trace organic staining, open to 1" | | | |
| | | | 3 | 427.3' - Bedding plane, rough, undulating, open channel interface<br>427.6' - Fracture, rough, undulating, 1/16" opening | | 428.3-433.3' - very pale orange, (10YR 8/2), very fine grained, moderate to strong HCl reaction, very weak (R1), voids (1/16"-1/8") over <10% of surface , 1/16"-3/16" fossil casts, at 428.3-429.0' vertical channel-like voids (1/2"-1-1/2" wide) | R46: 8 minutes<br>Driller's Remark: Lost circulation at 428.2-429.3' |
| 429.0 | | | | | | | |
| | | | 3 | 428.05, 428.2, 428.7' - Bedding plane (3), organic infill, stains | | | |
| 430<br>-387.6 | | | 3 | 429.2, 429.45, 429.8, 430.1' - Bedding plane (4), smooth, planar to undulating<br>430.2' - Fracture, organic or iron oxide healed, 1/16" | | | SC-5 collected at 430.5-431.55' |
| | R47-HQ<br>5 ft<br>98% | 50 | 1 | 430.35, 430.5, 431.55, 434.55, 434.7' - Bedding plane (5), smooth, planar to undulating | | | |
| | | | 1 | 432.3' - Mechanical break | | | |
| | | | 2 | | | | R47: 9 minutes |
| 434.0 | | | NR | | | **Peat**<br>433.3-433.9' - black to dark brown black, (N1 to 5YR 2/1), laminated to thin bedding, organic and silt | |
| | | | 2 | 434.55, 434.7' - Bedding plane, between rock and clay or organic detritus | | **No Recovery 433.9-434.0'** | SC-7S collected at 434.0-434.25' |
| 435<br>-392.6 | | | 1 | | | **Peat**<br>434.0-434.65' - Same as 433.3-433.9 | |
| | | | | 435.65' - Bedding plane, rough, undulating | | **Limestone**<br>434.65-435.7' - limestone fragments, variegated, random size and type in variable matrix, trace to some organics | |
| | R48-HQ<br>5 ft<br>88% | 22 | 3 | 436.2' - Bedding plane, horizontal and 7 deg, rough, undulating, fossil cast openings<br>436.4' - Bedding plane, smooth, undulating, rock with silica rich gravel | | | |
| | | | >10 | 436.75' - Fracture, 35 deg and vertical, smooth, filled with carbonate fragments and silty clay | | 435.7-436.5' - yellowish gray, (5Y 7/2), very fine grained, moderate to strong HCl reaction, very strong (R5), voids (<1/16") over 5-10% of surface, angular cavities (1/2 to 3/4") and open | R48: 12 minutes |
| | | | 1 | | | | |
| 439.0 | | | NR | 436.9-437.7' - Fracture zone, multiple fragments up to 1-1/2" some organic infill and stain | | | |
| 440 | | | 1 | 438.0' - Mechanical break | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -397.6 | | | 3 | 439.9, 440.5, 441.0' - Mechanical break (3) | | **Peat**<br>436.5-436.6' - brownish black, (5YR 2/1), platy, malleable, parting tendencies, HCl reaction on parting surfaces | |
| | R49-HQ<br>5 ft<br>94% | 42 | 4 | 441.25, 441.4' - Bedding plane (2), rough, planar, 1/16" open | | **Conglomerate**<br>436.6-436.95' - strong HCl reaction, extremely weak (R0), variegated, limestone fragments (1/2"x3/8") and silica grains (up to 5/16"), trace organics, angular silica | |
| | | | >10 | 441.6' - Bedding plane, 60 deg, rough, planar, 1/16" open, planar fracture with organic material as sporadic blebs | | | |
| | | | >10 | 442.2-444.0' - Fracture zone, very strongly broken rock fragments in silty sand or sandy silt | | | R49: 10 minutes |
| | 444.0 | | NR | | | **Limestone**<br>436.95-437.5' - grayish orange, (10YR 7/4), very fine grained, moderate HCl reaction, medium strong (R3), thin bedding, 5 to 10% discontinuous organic stringers and blebs<br>437.5-437.7' - very pale orange, (10YR 8/2), very fine grained, strong HCl reaction, extremely weak (R0), laminated bedding, organic partings, undulant to scour like bedding<br>437.7-438.4' - moderate orange pink, (5YR 8/4), very fine grained, mild HCl reaction, weak (R2), voids (1/16") over <5% of surface, trace organics, fossil molds infilled, recrystallized carbonate minerals<br>**No Recovery 438.4-439.0'**<br>**Limestone**<br>439.0-441.25' - yellowish gray, (5Y 7/2), very fine grained, very strong HCl reaction, very strong (R5), 5-10% blebs and stringers of organic material, voids (<1/8") over 5% of surface, 1-1/2 x 1/2" cavities, lined or partially lined with calcite | |
| | | | 2 | | | | |
| 445<br>-402.6 | | | | 444.6, 444.95' - Bedding plane (2), rough, stepped to undulating, fragmented separations | | | |
| | | | 2 | 445.3' - Fracture, 75 deg, rough, irregular, trace organics | | | |
| | R50-HQ<br>5 ft<br>92% | 8 | >10 | 446.1-446.3' - Fracture, vertical, multiple small fractures throughout | | | |
| | | | >10 | | | | |
| | | | >10 | | | | R50: 8 minutes |
| | 449.0 | | NR | | | | |
| | | | >10 | 449.0-450.1' - Fracture zone, random orientations, fragments to 2-1/2" x 2" | | | |
| 450<br>-407.6 | | | | | | | |
| | | | >10 | 450.6' - Fracture, 70 deg, rough, planar | | | |
| | R51-HQ<br>5 ft<br>52% | 8 | >10 | 450.7-454.0' - Bedding plane or fracture zone, smooth, undulating | | | |
| | | | NR | | | **Peat**<br>441.25-441.5' - black, (N1), above carbonate derived silt | R51: 13 minutes |
| | 454.0 | | | | | **Limestone**<br>441.5-443.7' - pale brown to pale yellowish brown, (5Y 5/2 to 10YR 6/2), moderate HCl reaction, extremely weak to very weak (R0 to R1), limestone fragments, trace organics<br>**No Recovery 443.7-444.0'**<br>**Peat**<br>444.0-444.1' - black, (N1), amorphous<br>**Limestone**<br>444.1-448.6' - light brown, (5YR 5/6), very fine to fine grained, mild to moderate HCl reaction, very weak to strong (R1 to R4), voids (<1/8") over 15% of surface<br>**No Recovery 448.6-449.0'** | |
| | | | >10 | 454.0-454.6' - Fracture zone | | | |
| 455<br>-412.6 | | | | 454.8, 454.95' - Fracture (2), 15 deg and 30 deg, rough, undulating, recrystallized | | | |
| | | | 2 | 455.15, 455.6' - Bedding plane (2), smooth, planar | | | |
| | R52-HQ<br>5 ft<br>58% | 20 | >10 | 455.7' - Fracture, 75 deg, undulating to planar | | | |
| | | | NR | 457.2-459.0' - Bedding plane or fracture zone, horizontal, smooth, undulating | | | R52: 12 minutes |
| | 459.0 | | | | | | |
| | | | >10 | 459.0-460.0' - Fracture zone, fragments to 3"x2"x1" | | | |
| 460 | | | | | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -417.6 | | | | | | | |
| | R53-HQ 5 ft 84% | 0 | 5 | 460.3, 460.4, 460.6, 460.65, 460.95' - Mechanical break or bedding plane (5), 60 deg, trace organic staining | | **Limestone** 449.0-451.5' - yellowish gray, (5Y 7/2), very fine grained, mild to very strong HCl reaction, strong to very strong (R4 to R5), voids (<1/8") over 10% of surface | |
| | | | >10 | 461.3' - Fracture, 60 deg, rough, undulating, intersecting | | | |
| | | | >10 | 461.7-462.0' - Fracture zone, 60 deg, rough, undulating, angular | | **No Recovery 451.5-454.0'** | |
| | | | | 462.1' - Bedding plane, smooth | | **Peat** 454.0-454.1' - brown black, (5YR 2/1) | |
| | | | 2 | 462.4, 462.6' - Fracture (2), 45 deg, undulating, one healed is parallel to these, tight | | **Limestone** 454.1-456.9' - light brown to pale yellowish brown, (5YR 6/4 to 10YR 6/2), very fine grained, mild to very strong HCl reaction, very strong (R5), voids (<1/16") over 5-8% of surface, trace cavities (1/2" x 1/4"), trace organics | R53: 14 minutes |
| | | | NR | | | | |
| 464.0 | | | | | | | |
| | R54-HQ 5 ft 86% | 17 | 2 | 462.8' - Fracture, 85 deg, rough, undulating | | | |
| | | | | 463.2' - Fracture, 30 deg and vertical, smooth, undulating | | | |
| 465 -422.6 | | | >10 | 463.3' - Fracture, vertical, smooth, undulating | | | |
| | | | | 464.1' - Fracture, 45 deg, rough, undulating | | | |
| | | | | 464.6' - Mechanical break, 10 deg, core pieces spun against each other | | **No Recovery 456.9-459.0'** | |
| | | | >10 | 465.1' - Fracture zone, 70 deg, rough, planar, may extend to 496' with multiple fragments between | | **Silt (ML)** 459.0-459.2' - with subrounded gravel to 1/2" | |
| | | | >10 | 466.0-467.0' - Fracture zone, fragments to 2", sporadic organic staining | | **Limestone** 459.2-461.8' - moderate yellow brown, (10YR 5/4), very fine to fine grained, mild to strong HCl reaction, very weak to weak (R1 to R2), thin bedding, voids (<1/16") over 10-15% of surface | R54: 13 minutes |
| | | | >10 | 467.8' - Fracture, 15 deg, rough, undulating, angular | | | |
| | | | NR | 468.0' - Fracture, 20 deg, rough, undulating, angular | | | |
| 469.0 | | | | | | | |
| | R55-HQ 5 ft 90% | 31 | 2 | 469.3' - Bedding plane, rough, stepped to planar, organic staining locally | | | |
| 470 -427.6 | | | 5 | 469.6' - Bedding plane, rough, stepped to planar, organic staining | | **Fine Sand (SP)** 461.8-462.0' - dusky yellow, (5Y 6/4), carbonate | |
| | | | | 470.05' - Bedding plane, smooth, undulating, contact | | **Limestone** 462.0-462.75' - moderate yellow brown, (10YR 5/4), very fine to fine grained, mild to strong HCl reaction, very weak to weak (R1 to R2), thin bedding, voids (<1/8") over 10-15% of surface | |
| | | | >10 | 470.4' - Fracture, 45 deg, smooth, planar, intersecting, fractures at a bedding plane parting with veneer to laminar bedded black (organic) material | | | |
| | | | 2 | 471.05' - Fracture, rough, irregular, trace organics | | | |
| | | | 2 | 471.1-471.5' - Fracture zone, stepped, irregular, fracture along suture type material | | **Silty Sand (SM)** 462.75-463.0' - very fine grained, carbonate | |
| 474.0 | | | NR | | | | |
| | R56-HQ 5 ft 94% | 24 | | 471.9' - Bedding plane, stepped to undulating | | **Limestone** 463.0-463.2' - yellowish gray, (5Y 7/2), very fine grained, moderate HCl reaction, very weak (R1), small blebs of black organics throughout | |
| | | | 4 | 472.55' - Fracture, horizontal, rough, undulating | | | |
| 475 -432.6 | | | >10 | 472.8' - Fracture, 60 deg, smooth, undulating, trace organics | | | |
| | | | | 473.3' - Fracture, 15 deg, rough, undulating | | **No Recovery 463.2-464.0'** | |
| | | | | 474.6' - Fracture, vertical, rough, planar | | **Limestone** 464.0-464.65' - pale reddish brown, (10R 5/4), very fine grained, moderate HCl reaction, strong (R4), voids (<1/16") over 5% of surface | |
| | | | 3 | 474.95' - Fracture, vertical, rough, undulating, angular | | | |
| | | | | 475.2-476.1' - Fracture zone | | | |
| | | | 3 | 476.5' - Fracture, 15 deg, rough, undulating, angular | | 464.65-466.1' - grayish orange, (10YR 7/4), very fine grained, delayed mild HCl reaction, medium strong (R3), thin bedding, irregular bedding | |
| | | | | 476.7' - Fracture, 75 deg, rough, undulating | | | |
| | | | 2 | 477.2' - Fracture, 60 deg, rough, undulating, infilled, limestone fragments and fines | | | R56: 9 minutes |
| 479.0 | | | NR | 477.6' - Fracture, 5 deg and 30 deg, bottom of previous fracture area | | | |
| | | | >10 | 477.9' - Fracture, 85 deg, rough, undulating | | | |
| 480 | | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: AD-03 | SHEET 15 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -437.6 | R57-HQ 5 ft 74% | 26 | >10 | 478.15' - Fracture, 60 deg, smooth, planar<br>478.35' - Mechanical break<br>479.0-481.0' - Fracture zone, 60 deg, random fragments 1/2 to 2", 480.7-481.6' is single fragment with fracture | | **Limestone**<br>466.1-468.3' - dusky yellow, (5Y 6/4), very fine to medium grained, mild to moderate HCl reaction, extremely weak to strong (R0 to R4), granular, voids (<1/16") over 18-20% of surface | Driller's Remark: Lost circulation on this run, water column dropped to 50' below top of casing |
| | | | >10 | 481.0-481.3' - Fracture zone, random angles, sizes from 1/4" to 2", average about 3/8" | | **No Recovery 468.3-469.0'** | |
| | | | 0 | 482.2' - Bedding plane, 0-5 deg, smooth, undulating | | **Limestone**<br>469.0-470.15' - Same as 466.1-468.3'<br>470.15-471.5' - light brown, (5YR 6/4), very fine grained, moderate to strong HCl reaction, weak (R2), laminated to very thin bedding, black beds, lenticels and lenses, at 470.45' and 471.0' beds to 1/4" | R57: 6 minutes |
| | | | 1 | | | | |
| | 484.0 | | NR | | | | |
| | R58-HQ 5 ft 95% | 43 | 3 | 484.3' - Mechanical break, 15 deg, smooth, undulating | | | |
| 485<br>-442.6 | | | 1 | 484.55' - Mechanical break, 15 deg, smooth, undulating<br>484.75' - Bedding plane, 30 deg, smooth, undulating | | 471.5-482.25' - light brown, (5YR 5/6), very fine to fine grained, weak to very strong HCl reaction, very weak to medium strong (R1 to R3) | Driller's Remark: Lost circulation in large cavity where the two opposing fragments do not match indicating the cavity exceeds the apparent volume |
| | | | 3 | 485.8' - Mechanical break<br>486.2' - Fracture, edges do not match, could be up to 0.3' separation | | **No Recovery 473.7-474.0'** | |
| | | | >10 | 486.7' - Mechanical break or bedding plane, smooth, undulating | | **Limestone**<br>475.2-475.8' - limestone fragments in carbonate silt, fracture or cavity infill, fragments subangular to subrounded, 15% voids (<1/8") and fossil molds (up to 3/8") | R58: 10 minutes |
| | | | >10 | 487.6-488.3' - Fracture zone, fragments from 1/8" to 1" | | | |
| | 489.0 | | NR | 488.4' - Fracture, 65 deg, rough, planar, flat | | | |
| | R59-HQ 5 ft 82% | 19 | 9 | 489.05, 489.35, 489.5, 489.6' - Bedding plane (4), smooth, flat | | **Breccia**<br>477.0-477.6' - sand and silt matrix | |
| 490<br>-447.6 | | | 6 | 489.75, 489.85' - Bedding plane (2), 65 deg, rough, planar<br>489.9, 490.0, 490.15, 490.3, 490.6, 490.85, 491.05, 491.3, 491.5, 491.68, 491.9' - Bedding plane (11), smooth, flat | | **No Recovery 478.7-479.0'** | |
| | | | 5 | | | **Limestone**<br>482.85-487.7' - grayish orange, dark gray, (10YR 8/2, N3), very fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids (<1/8") over 5-15% of surface, fossil molds filled or partially infilled with aragonite/calcite, cavities range to greater than width of core and over 2" high, trace organics (shells or shell fragments) | |
| | | | 1 | 492.15' - Fracture, 20 deg, rough/smooth, undulating | | | SC-6 collected at 492.2-493.15' |
| | | | NR | | | | R59: 10 minutes |
| | 494.0 | | | | | | |
| | R60-HQ 6 ft 92% | 62 | 2 | | | **No Recovery 482.7-484.0'** | |
| 495<br>-452.6 | | | 4 | 494.6' - Fracture, 15 deg, smooth, undulating<br>494.9, 495.0, 495.15, 495.3, 495.9' - Fracture (5), horizontal and 10 deg, smooth, undulating | | **Limestone**<br>487.7-491.7' - dusky yellow to light brown with 1 to 2" grayish orange, (5YR 6/4 to 10YR 7/4), very fine to fine grained, mild to strong HCl reaction, very weak to medium strong (R1 to R3), voids (<1/16") over 15-30% of surface, solution cavities (1/2" to 2-1/2"x2") | |
| | | | 2 | 496.1' - Bedding plane, horizontal, smooth, planar, lithology change<br>496.5' - Mechanical break | | | |
| | | | 2 | 497.5' - Fracture, rough, planar, angular, stepped | | **No Recovery 488.75-489.0'** | |
| | | | 2 | 497.95' - Fracture, 55 deg, rough, planar, gently arcuate | | **Limestone**<br>490.1-492.0' - numerous thin dissolution cavities subparallel to bedding | |
| | | | 1 | 498.4' - Fracture, horizontal and 20 deg, rough, irregular | | 491.5-497.0' - extremely weak to very weak (R0 to R1), 1/4" black organic bed at/near contact | |
| 500 | 500.0 | | NR | 498.75' - Fracture, 45 deg, rough, planar | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 499.0' - Mechanical break<br>499.2-499.5' - Fracture zone | | **Limestone**<br>491.7-500.0' - very pale orange to grayish orange, (10YR 8/2 to 10YR 7/4), very fine to fine grained, mild HCl reaction, very weak to medium strong (R1 to R3), voids (<1/16") over 10% of surface, voids (<3/8") over 5% of surface, trace larger cavities<br>**No Recovery 493.1-494.0'**<br>**Limestone**<br>495.35' - very weak to medium strong (R1 to R3), wavy to undulant silt sized laminae with organic interbeds, <1/2" total thickness<br>496.2' - very weak to medium strong (R1 to R3), wavy to undulant silt sized laminae with organic interbeds, <1/2" total thickness<br>498.45' - very weak to medium strong (R1 to R3), wavy to undulant silt sized laminae with organic interbeds, <1/2" total thickness<br>**No Recovery 499.5-500.0'**<br>Bottom of Boring at 500.0 ft bgs on 8/24/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -157.4 | | | | | | **No Recovery 200.0-212.0'** | Boring AD-4 blind drilled to approximately 200 feet below ground surface before beginning sampling/logging. "Water level is based on Ground Water Monitoring at LNP site (FSAR Table 2.4.12.08)" 8/26-8/29/07: Sonic casing at 200.0' below ground surface, attempt advancement of HQWL with only 2.5' of advancement, no recovery of material and two rock coring bits (#636) destroyed 9/5/07: Sonic rig setup on AD-4, advances sonic 4"core barrel from 202.5-207.5' below ground surface, no recovery of material due to broken HQWL bit plugging Sonic core barrel; no voids noted; HQWL bit removed, advance 207.5-213' below ground surface |
| 205 -162.4 | | | | | | | |
| 210 -167.4 | | | | | | | Advance Sonic 4" casing to 213' below ground surface; retrieve 5.0' of crushed limestone fragments and limestone core segments, 4" long each; no void space; set Sonic 6" casing to 210.0' below ground surface; R1: 13 minutes |
| | 212.0 | | | | | | |
| | R1-HQ 2 ft 50% | 0 | >10 | 212.0-213.0' - Fracture zone, rough, angular to undulating, limestone fragments, <2" diameter fracture zone | | **Limestone** 212.0-213.0' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl reaction, weak to strong (R2 to R4), voids <1/16" over 30% of surface, poorly fossiliferous with few fossils <1/4" diameter, no organics, no cavities | |
| | | | NR | | | | |
| | 214.0 | | | | | | |
| 215 -172.4 | R2-HQ 2 ft 100% | 33 | 2 | 214.8, 215.0' - Bedding plane (2), <10 deg, rough, undulating | | **No Recovery 213.0-214.0'** 213.0-214.0' | 9/6/07: Begin rock coring after advancing HWT casing to 2.38' below ground surface, 1.0' material inside casing to 212.0', core blockage at 214.0' bgs due to fragment locking in sample barrel; no further advancement for R1, limestone inside casing to 212.0', SC-1 collected at 214.0-214.8' R2: 5 minutes |
| | | | >10 | 215.25-215.85' - Fracture zone, rough, undulating, limestone fragments <2" diameter | | **Limestone** 214.0-216.0' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl reaction, weak to medium strong (R2 to R3), voids <1/16" over 10-40% of surface decreasing with depth, few cavities, poorly to moderately fossiliferous with fossil casts <1/4" diameter, trace laminated bedding | |
| | 216.0 | | | | | | |
| | R3-HQ 5 ft 90% | 56 | >10 | | | | |
| | | | 1 | 216.8-216.95' - Fracture zone, <10 deg and <20 deg, rough, undulating, limestone fragments <3" diameter, bedding plane fractures with high angle intersecting fractures | | | |
| | | | 3 | 217.25, 218.15, 218.25, 219.15, 219.4' - Bedding plane or mechanical break (5), <10 deg, rough, undulating | | | |
| | | | >10 | | | | |
| 220 | | | | | | | |

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|---|---|---|
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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -177.4 | | | >10 | 219.4-219.85' - Fracture zone, rough, undulating, limestone fragments <2" diameter | | **Limestone** 216.0-221.0' - yellowish gray, (5Y 7/2), very fine to medium grained, strong HCl reaction, medium strong to strong (R3 to R4), voids <1/16" over 10-30% of surface, variable, moderately fossiliferous with several fossil casts/molds <1/2" diameter, few cavities <1", trace organic laminations | Consistent slow to moderate drilling rate with approx. 50% circulation return; circulated mud is losing to formation through 4" HWT's, 6" sonic casing gap |
| | 221.0 | | NR | 219.85, 220.3' - Bedding plane (2), 30 deg and 70-90 deg, rough, undulating | | | SC-2 collected at 218.3-219.15' |
| | R4-HQ 5 ft 52% | 25 | 3 | 220.3' - Fracture zone, rough, undulating, limestone fragments <2" diameter | | | R3: 9 minutes |
| | | | 3 | 221.75-221.9' - Fracture or mechanical break (2), <30 deg, rough, undulating, 3 fractures | | | |
| | | | >10 | 222.15' - Fracture or mechanical break, <10 deg, rough, undulating, 3 fractures | | | |
| | | | NR | 222.25' - Fracture or mechanical break, 40 deg, rough, undulating | | **No Recovery 220.5-221.0'** | |
| | | | | 222.5' - Bedding plane or mechanical break, rough, undulating | | **Limestone** 221.0-223.6' - yellowish gray to light gray, (5Y 7/2 to N7), very fine to medium grained, strong HCl reaction, very weak to strong (R1 to R4), strength decreasing with depth, voids <1/16" over <10-25% of surface, few cavities up to 2"x1", poorly to moderately fossiliferous with few fossil molds and casts <1/2" diameter, secondary infill present over <30% of surface; 223.2- 223.35' silt lens with limestone fragments <1" diameter, rough, calcareous silt | |
| 225 -182.4 | | | | 223.2-223.35' - Fracture zone, rough, undulating, silt lens, limestone fragments <1" diameter with silt lens | | | R4: 5 minutes |
| | 226.0 | | | | | | |
| | | | >10 | 226.3-226.9' - Fracture zone, multiple intersecting fractures with rock fragments up to 1-9/16" diameter | | | |
| | | | >10 | 226.95, 227.0, 227.1' - Fractures (3), 60 deg, rough, undulating, three intersecting fractures Y shaped, moderate relief (~3/8") | | | |
| | R5-HQ 5 ft 78% | 24 | 4 | 227.25' - Fracture, 30 deg, rough, undulating, ~3/8" relief, fossil molds | | **No Recovery 223.6-226.0'** | |
| | | | 4 | 227.7-227.9' - Fracture zone, multiple intersecting fractures with rock fragments up to 1-3/16" diameter | | **Limestone** 226.0-229.9' - yellowish gray, (5Y 7/2), very fine to fine grained, weak HCl reaction, very weak to weak (R1 to R2), voids <1/16" over 20% of rock surface mostly along bedding surfaces; cavities up to 3" diameter cover 5% of rock surface and are dissolution fossil molds; trace laminations, fossiliferous | |
| 230 -187.4 | | | NR | 228.3' - Fracture, 30 deg, rough, undulating, relief ~3/8" | | | R5: 10 minutes |
| | 231.0 | | | 228.5' - Fracture, 80 deg, rough, undulating, low relief | | | |
| | | | >10 | 228.65, 229.0, 229.35' - Bedding plane (3), 80 deg, rough, undulating, stepped, low relief | | | |
| | | | >10 | 229.8-229.9' - Fracture zone or mechanical break | | **No Recovery 229.9-231.0'** | |
| | R6-HQ 5 ft 40% | 0 | NR | 231.0-231.9' - Fracture zone, multiple intersecting fractures with rock fragments up to 1-3/16" diameter | | **Limestone** 231.0-233.0' - yellowish gray, (5Y 7/2), very fine to fine grained, weak to moderate HCl reaction, weak to medium strong (R2 to R3), voids up to 3/16" cover 10% of rock surface, poorly fossiliferous | Driller's Remark: Rapid advancement at 232.0-233.0' and 234.0-235' due to possible void space or unconsolidated material |
| | | | | 232.15' - Fracture, 50 deg, rough, undulating, 3/8" relief | | | |
| | | | | 232.3-232.4' - Fracture zone | | | |
| 235 -192.4 | | | | 232.55' - Fracture, 60 deg, rough, undulating, 3/8" relief | | **No Recovery 233.0-236.0'** | |
| | | | | 232.9-233.0' - Fracture zone | | | R6: 3 minutes |
| | 236.0 | | | | | | |
| | | | >10 | 236.0-237.2' - Fracture zone, multiple intersecting fractures with rock fragments up to 1-9/16" diameter | | **Limestone** 236.0-239.2' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids up to 3/8" 20% of rock surface, poorly fossiliferous, trace organics | |
| | | | >5 | 237.2' - Fracture, 30 deg, smooth, stepped, low relief | | | SC-3 collected at 237.2-238.0' |
| | R7-HQ 5 ft 64% | 32 | >10 | 238.0' - Mechanical break, 30 deg, rough, undulating, tight, hardness test | | | |
| | | | | 238.85-239.2' - Fracture zone | | | |
| | | | | | | **No Recovery 239.2-241.0'** | |
| 240 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -197.4 | | | NR | | | | R7: 3 minutes |
| 241.0 | | | | | | | |
| | R8-HQ 5 ft 24% | 0 | >10 | 241.0-242.2' - Fracture zone, multiple intersecting fractures with rock fragments up to 1-3/16" diameter | | **Limestone** 241.0-242.2' - yellowish gray, (5Y 7/2), very fine to fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids up to 3/32" cover 5% of rock surface, trace organics **No Recovery 242.2-246.0'** | Driller's Remark: Rapid, consistent drilling; potential cavity or silt infill washed out during drilling |
| | | | >10 | | | | |
| | | | NR | | | | |
| 245 -202.4 | | | | | | | R8: 2 minutes |
| 246.0 | | | | | | | |
| | R9-HQ 5 ft 20% | 0 | >10 | 246.0-247.0' - Fracture zone, multiple intersecting fractures with rock fragments up to 2" diameter | | **Limestone** 246.0-247.0' - yellowish gray, (5Y 7/2), very fine to fine grained, weak to moderate HCl reaction, weak to medium strong (R2 to R3), voids up to 3/32" cover 1-2% of surface, poorly fossiliferous **No Recovery 247.0-251.0'** | Driller's Remark: Potential cavity at 246.0-250.0' or silt zone washed out--consistent 50% circulation |
| | | | NR | | | | |
| 250 -207.4 | | | | | | | 9/6/07: Complete drilling at 17:00, water level at surface |
| 251.0 | | | | | | | |
| | R10-HQ 5 ft 50% | 18 | >10 | 251.2' - Mechanical break or fracture, rough, undulating, angular rock fragment potentially fallen from above onto top of run, no discernible rock contact/fracture angle | | **Limestone** 251.0-251.2' - yellowish gray, (5Y 7/2), very fine to medium grained, strong (R4), no voids, cavities or fossil, light organic stain on <30% of surface | 9/7/07: Re-spool 650.0' wireline, transmission down time for repair, start drilling at 12:15 |
| | | | >10 | 251.85-252.05' - Fracture zone, rough, undulating, multiple intersecting fractures | | | |
| | | | >10 | 252.5' - Fracture or mechanical break, 60-70 deg, rough, undulating, variable | | 251.2-252.6' - yellowish gray, (5Y 7/2), strong HCl reaction, very weak to weak (R1 to R2), voids <1/16" over 20-30% of surface, poorly fossiliferous, trace laminated bedding | Driller's Remark: at 253.0-254.0' light chatter; core blockage at 254.25' |
| | | | NR | 252.6-253.5' - Fracture zone, rough, undulating, interbedding with silt seams | | 252.6-253.5' - yellowish gray, (5Y 7/2), extremely weak (R0), silt lenses interbedded **No Recovery 253.5-256.0'** | |
| 255 -212.4 | | | | | | | R10: 5 minutes |
| 256.0 | | | | | | | |
| | R11-HQ 5 ft 75% | 15 | >10 | 256.0-257.5' - Fracture zone, rough, undulating, intersecting fractures and gravel sized fragments 3" diameter | | **Limestone** 256.0-259.75' - yellowish gray, (5Y 7/2), very fine to medium grained, strong HCl reaction, extremely weak to weak (R0 to R2), voids <1/16" over <10% of surface, poorly fossiliferous, trace organic staining/laminar from 256.0 to 257.0'; laminated bedding predominant from 258.8 to 259.75' | Driller's Remark: at 257.0-259.0' light to moderate chatter, consistent drilling rate |
| | | | >10 | | | | |
| | | | >10 | 258.3-258.5' - Fracture zone, rough, undulating, gravel sized fragments <2" diameter | | | |
| | | | >10 | 258.5' - Mechanical break or fracture, 50 deg, rough, undulating | | | |
| 260 | | | | | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -217.4 | | | NR | 258.8-259.75' - Fracture zone, rough to smooth, undulating to planar, intersecting fractures and gravel sized fragments up to <2" diameter, rough to smooth transitioning with depth, bedding plane fractures with intersecting vertical fractures prevalent from 259.0-259.75' | | **No Recovery 259.75-261.0'** | R11: 4 minutes |
| | 261.0 | | | | | **No Recovery 261.0-266.0'** | |
| | R12-HQ 5 ft 0% | 0 | NR | | | | Driller's Remark: Rapid advancement 262.0-265.0' below ground surface, possible voids or silt lens; continuous circulation (approximately 50% return) through run; minimum of pump pressure increasing intermittently through run indicating core/fluid blockage due to formation back pressure on equipment, likely silt/soil zone washed out to formation<br>R12: 5 minutes |
| 265<br>-222.4 | | | | | | | |
| | 266.0 | | | | | **No Recovery 266.0-271.0'** | |
| | R13-HQ 5 ft 0% | 0 | NR | | | | Driller's Remark: Rapid advancement 266.0-271.0' below ground surface, as above, no recovery due to unconsolidated silt/soil concentration; pressure on flow increasing during drilling indicating back pressure from formation; HQ core barrel set on formation at 271.0' below ground surface with no free rod drop: material is present but not retrievable due to unconsolidated nature<br>R13: 4 minutes |
| 270<br>-227.4 | | | | | | | |
| | 271.0 | | >10 | 271.0' - Fracture, rock limestone fragments up to 12" in size 271.0-271.1' | | **Limestone**<br>271.1-271.25' - yellowish gray, (5Y 8/1), very fine to fine grained, moderate HCl reaction, very weak (R1), 5% small voids up to 1/16" | |
| | R14-HQ 3 ft 8% | 0 | NR | | | **No Recovery 271.25-274.0'** | K. Watkins and Robert logging<br>Coring Equipment: BL 300T<br>R14: No Time Recorded |
| | 274.0 | | | | | **No Recovery 274.0-279.0'** | |
| 275<br>-232.4 | | | | | | | |
| | R15-HQ 5 ft 0% | 0 | NR | | | | Driller's Remark: Slow drilling; used 300 gallons of muck with no recovery, decision to trip out rod and barrel to check bit, bit inspected and appears intact, hole tagged at 279.0', tripped back in to try another run<br>R15: 20 minutes |
| | 279.0 | | | | | | |
| 280 | R16-HQ | | 4 | | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -237.4 | 2 ft 95% | 21 | >10 | 279.4, 279.6, 279.85, 279.9, 280.3, 280.4, 280.5, 280.65, 280.75' - Fractures, horizontal, smooth, planar to undulating, horizontal, clayey white infilling, open (1/5" pore) | | **Limestone** 279.0-279.85' - yellowish gray, (5Y 7/2), medium grained, moderate HCl reaction, very weak (R1), <1% voids on surface, <1/32" | Driller's Remark: More pieces of bit recovered R16: 6 minutes |
| 281.0 | | | NR | | | | |
| | R17-HQ 2 ft 80% | 0 | 8 | 280.0-280.15' - clay infilling 281.4, 281.5, 281.6' - Fractures (3), horizontal, rough, planar to undulating, 9/16" relief | | 279.85-280.0' - Same as 279.0-279.85' except yellowish gray, (5Y 8/1), with clayey striation | R17: 6 minutes Driller's Remark: Slow drilling |
| | | | >2 | | | | |
| 283.0 | | | NR | 281.6-281.75' - soft infill, clayey | | 280.0-280.3' - clay - white, soft, moderate HCl reaction | |
| | R18-HQ 6 ft 100% | 50 | 2 | 281.9, 281.95, 282.0, 282.1, 282.3, 282.5, 282.6' - Fractures (7), horizontal, rough, stepped | | 280.3-280.9' - yellowish gray, (5Y 8/1), very fine grained, moderate HCl reaction, medium hard, 25% surface area voids 3/16" | |
| | | | 1 | 283.0-238.5' - Fracture zone, broken/crushed 283.9' - Fracture, 85 deg, rough, stepped, 9/16" relief | | **No Recovery 280.9-281.0'** | |
| 285 -242.4 | | | 2 | 284.4, 285.0' - Fractures (2), horizontal, rough, 11-4/5" relief, infill, limestone 285.1-285.4' - Fracture zone | | **Limestone** 281.0-282.6' - light gray, (N7), fine to medium grained, mild to moderate HCl reaction, weak to medium strong (R2 to R3), abundantly fossiliferous, voids to 3/16" (molds) | |
| | | | 1 | 285.5-287.3' - Fracture zone, infill of loose medium-grained limestone | | **No Recovery 282.6-283.0'** | |
| | | | 0 | | | **Limestone** 283.0-283.5' - light gray to pale yellow brown, (N7 to 10YR 6/2), mild HCl reaction | SC-4 Collected at 287.3-288.5' R18: 16 minutes |
| | | | 1 | 288.5' - Mechanical break, horizontal, rough, stepped, 9/16" relief, across large 1" void | | 283.5-285.0' - light gray, (N7), fine to medium grained, abundant fossils, voids to 9/16" over 100% (molds) | |
| 289.0 | | | | | | | |
| | R19-HQ 5 ft 94% | 57 | 3 | 289.25, 289.5, 289.85' - Fractures (3), horizontal, rough, stepped, medium limestone, 9/16" relief | | 285.0-287.3' - loose fragments as in 283.0 to 283.5' | |
| 290 -247.4 | | | 3 | | | 287.3-288.4' - light gray to very light gray, (N7 to N8), medium grained, mild to moderate HCl reaction, very weak to weak (R1 to R2), irregularly spaced voids to 9/16"; highly fossiliferous | |
| | | | 2 | 290.9, 291.4, 291.85, 292.25, 292.8, 293.0, 294.5, 294.7' - Fractures (8), horizontal, rough, stepped, infill, loose, broken | | | |
| | | | 3 | | | 289.0-293.7' - very light gray to very light bluish gray, (N8 to 5B 8/1), very fine grained, mild to moderate HCl reaction, very weak to weak (R1 to R2), some portions clayey, <5% voids (molds) | R19: 13 minutes |
| | | | 2 | | | | |
| 294.0 | | | NR | | | **No Recovery 293.7-294.0'** | |
| | R20-HQ 5 ft 98% | 55 | >10 | 294.0-295.2' - Bedding plane, smooth, undulating, slight (mt) metal oxide staining, parting on bedding planes | | **Limestone** 294.0-295.5' - yellowish gray, (5Y 8/1), fine grained, weak (R2), poorly to moderately fossiliferous, <5% voids (molds) to 1/16" near 294.0' | |
| 295 -252.4 | | | 3 | | | | |
| | | | >10 | 295.8, 298.7' - Fractures (2), horizontal, rough, 9/16-1" relief | | 295.5-298.9' - very light gray to very light bluish gray, (N8 to 5B 8/1), mild to moderate HCl reaction, very weak to weak (R1 to R2), poorly to abundantly fossiliferous, voids to 3/4" (molds) | |
| | | | 1 | | | | |
| | | | 2 | | | | R20: 11 minutes |
| 299.0 | | | NR | | | **No Recovery 298.9-299.0'** | |
| | | | >10 | 299.0-304.0, 304.0-309.0' - Mechanical break (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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (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 | | | **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%) | |
| | | | >10 | | | | |
| | | | NR | | | **Clayey Limestone** 301.0-302.1' - light yellowish gray to 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 | R21: 16 minutes |
| | 304.0 | | | | | **No Recovery 302.1-304.0'** | |
| 305 -262.4 | R22-HQ 5 ft 90% | 28 | >10 | | | **Clayey Limestone** 304.0-308.5' - light yellowish gray with bluish gray mottling, (5Y 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 | |
| | | | >10 | | | | |
| | | | >10 | | | | |
| | | | >10 | | | | |
| | | | >10 | | | | R22: 15 minutes |
| | 309.0 | | NR | | | **No Recovery 308.5-309.0'** | |
| 310 -267.4 | R23-HQ 5 ft 90% | 43 | >10 | 309.0-310.8, 311.5-311.8, 312.6-312.8' - Mechanical break (3) | | **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) | |
| | | | >10 | | | 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) | |
| | | | >10 | 311.0, 312.2' - Fractures (2), <5 deg, smooth, planar to undulating, tight | | | |
| | | | >10 | 312.6-312.8' - Mechanical break | | | |
| | | | >10 | | | | R23: 15 minutes |
| | 314.0 | | NR | | | **No Recovery 313.5-314.0'** | |
| 315 -272.4 | R24-HQ 5 ft 92% | 17 | >10 | | | 314.0-318.6' - Same as 310.0-314.0' | |
| | | | >10 | | | | |
| | | | >10 | | | | |
| | | | >10 | | | | |
| | | | >10 | | | | R24: 15 minutes |
| | 319.0 | | NR | | | **No Recovery 318.6-319.0'** | |
| 320 | | | >10 | 319.0-319.9, 320.8-322.9, 323.4-323.8' - Mechanical break (3) | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -277.4 | | | >10 | 320.05, 320.3' - Mechanical break (2), <5 deg, smooth, undulating, tight to 1/4" open | | **Limestone**<br>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% | |
| | R25-HQ<br>5 ft<br>96% | 30 | >10 | | | | |
| | | | >10 | | | | |
| | | | >10 | 320.5-320.8, 322.9-323.4' - Mechanical break or fracture zone (2), smooth, undulating | | | R25: 15 minutes |
| | 324.0 | | NR | | | **No Recovery 323.4-324.0'** | |
| | | | >10 | 324.4-324.7' - Mechanical break, multiple breaks | | **Limestone**<br>324.0-324.5' - light gray with bluish gray mottling, (N7 to 5B 8/1), moderate HCl reaction, weak (R2), brown organic peat staining<br>324.5-328.8' - yellowish gray, (5Y 7/2), medium grained, strong HCl reaction, very weak (R1), to unconsolidated | |
| 325<br>-282.4 | | | >10 | | | | |
| | R26-HQ<br>5 ft<br>95% | 32 | 3 | | | | |
| | | | >10 | | | | |
| | | | >10 | | | | R26: 15 minutes |
| | 329.0 | | NR | | | **No Recovery 328.8-329.0'** | |
| | | | >10 | 329.0-330.0' - Fracture zone, loose | | **Limestone**<br>329.0-330.0' - light yellowish gray, (5Y 7/2), medium grained, strong HCl reaction, extremely weak (R0), loose<br>330.0-330.2' - medium dark gray, (N4), medium strong (R3), very hard with calcite filled bioturbation voids | |
| 330<br>-287.4 | | | >10 | 330.0-330.4' - Mechanical break, fracture/breakage zone across friable rocks<br>330.4-331.5' - Mechanical break | | | Driller's Remark: 15:26 - pulling core |
| | R27-HQ<br>5 ft<br>74% | 15 | 1 | | | **Clayey Limestone**<br>330.2-332.0' - yellowish gray, (5Y 8/1), medium grained, strong HCl reaction, extremely weak (R0), loose<br>332.0-332.7' - Same as 330.0-332.0' except very weak (R1) | |
| | | | 0 | 331.95' - Bedding plane, horizontal, smooth, undulating, tight to 1/4" open | | | |
| | | | NR | | | **No Recovery 332.7-334.0'** | R27: No Time Recorded |
| | 334.0 | | | | | | |
| | | | 3 | | | **Limestone**<br>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" | |
| 335<br>-292.4 | | | 2 | 334.6' - Mechanical break, 40 deg, rough, undulating, 3/8" relief (mechanical)<br>334.75' - Fracture, horizontal, rough, planar, 1/16" relief | | | |
| | R28-HQ<br>5 ft<br>100% | 62 | 1 | 335.1' - Fracture, horizontal, rough, 9/16" relief<br>335.8, 336.7, 337.2' - Fractures (3), 30 deg, rough, undulating, 15 deg, and horizontal, 9/16" relief | | | SC-5 Collected at 335.9-336.6' |
| | | | 3 | 337.6' - Fracture, horizontal, rough, planar, loose infill | | | 5.6' of recovery in R28 on 5' run; upper break point of core matches lower break point of R27 |
| | | | >10 | 337.8-339.2' - abundant breaks in very loose limestone | | | R28: 13 minutes |
| | 339.0 | | | | | | |
| 340 | | | >10 | | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -297.4 | | | >10 | | | **Limestone** 339.0-343.8' - yellowish gray, (5Y 7/2), medium grained, mild to moderate HCl reaction, extremely weak to very weak (R0 to R1), voids 1/32-1/16" throughout; friable | |
| | R29-HQ 5 ft 96% | 0 | >10 | | | | |
| | | | >10 | 342.4' - Fracture, smooth, undulating, brown organic staining, tight, ~1/8" thick | | | |
| | | | >10 | | | | R29: 15 minutes |
| | 344.0 | | NR | | | **No Recovery 343.8-344.0'** | |
| | | | 1 | | | **Limestone** 344.0-348.8' - light bluish gray with medium bluish gray mottling, (5B 7/1 with 5B 5/1), very fine grained, strong HCl reaction, very weak (R1), clayey, voids (bioturbation); otherwise <1% voids | |
| 345 -302.4 | | | >10 | 344.7' - Mechanical break or bedding plane, 10 deg, smooth, undulating, 1/16" relief 345.0-345.7' - Fracture zone, large angular, brittle limestone | | | |
| | R30-HQ 5 ft 96% | 75 | 1 | 346.6' - Mechanical break, rough, planar, along bedding plane | | | |
| | | | 1 | 347.0' - Fracture, horizontal, rough, undulating, 3/16" relief | | | SC-6 Collected at 347.0-347.9' |
| | | | 1 | 348.0, 348.8' - Fractures or bedding plane (2), horizontal, rough | | | R30: 10 minutes |
| | 349.0 | | NR | | | **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, smooth, undulating, tight to 1/4" open, bedding planes | | **Limestone** 349.0-353.5' - bluish white with light bluish gray mottling, (5B 9/1 with 5 B 7/1), very fine grained, strong HCl reaction, very weak to weak (R1 to R2), friable, <1% visible voids | |
| 350 -307.4 | | | 1 | 349.8, 349.9' - Fractures (2), 60 deg, smooth, undulating, tight | | | |
| | R31-HQ 5 ft 96% | 42 | >10 | 350.35' - Mechanical break, <5 deg, rough, stepped, tight 351.0-351.5' - Fracture zone | | | |
| | | | 5 | 352.2' - Fracture, vertical, smooth, undulating, 1.1' long fracture, tight | | | |
| | | | 1 | | | | R31: 8 minutes |
| | 354.0 | | NR | 353.5' - Mechanical break, <5 deg, rough, undulating, tight | | **No Recovery 353.5-354.0** | |
| | | | 1 | 353.6' - Fracture, vertical, smooth, undulating, 4" long fracture, tight | | | |
| 355 -312.4 | | | 3 | 354.8' - Fractures (2), 40 deg, smooth, undulating, two intersecting fractures, tight 354.9' - Fractures (2), vertical, smooth, undulating, two 2-7/16" fractures, tight | | | |
| | R32-HQ 5 ft 100% | 48 | >10 | 355.05, 355.55, 355.8, 355.91, 356.05, 356.2, 357.85' - Bedding plane (7), horizontal, smooth, planar to undulating, tight to 1/4" open | | **Limestone** 355.7-356.5' - yellowish gray, (5Y 8/1), medium grained, moderate to strong HCl reaction, weak (R2), abundantly fossiliferous, primarily foraminiferous <1/32" molded voids (forams) throughout; brown organic silt partings | |
| | | | 2 | 356.2-357.2' - Fracture zone, fragments, 3" diameter | | | |
| | | | 1 | 358.2' - Fractures (2), 10 deg and 40 deg, rough, undulating, broken up there, force not tight, broken at 1" fossil cast | | | R32: 10 minutes |
| | 359.0 | | | | | 356.5-359.0' - Same as 349.0-355.7' except bluish white to yellowish gray, (5B 9/1 to 5Y 8/1), scarce bioturbation | |
| | | | 2 | 359.2' - Fracture, 60 deg, smooth, undulating, tight to 1/4" open, 4-3/16" long | | | |
| 360 | | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: AD-04 | SHEET 9 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -317.4 | R33-HQ 5 ft 100% | 50 | >10 | 359.9, 360.2, 360.45, 360.6, 362.15, 362.35, 362.55, 362.65, 363.45' - Bedding plane (9), horizontal, smooth, undulating, tight to 1/4" open | | **Limestone** 359.0-365.5' - yellowish gray, (5Y 7/2), medium grained, mild to moderate HCl reaction, very weak to weak (R1 to R2), moderately to abundantly fossiliferous, forams, pelecypods, bryozoa; <1/32" voids and foraminiferous molds ~ 50% bioturbated and finer grained, 359.0 to 360.2' and 363.0 to 365.5' | |
| | | | >10 | 360.6-360.95, 361.25-362.15, 362.55-362.65' - Fracture zone (3), fragments 3" diameter | | | |
| | | | >10 | | | | |
| | | | 2 | | | | R33: 12 minutes |
| | 364.0 | | | 363.75' - Fracture, vertical, smooth, undulating, 6" long, tight | | | |
| | R34-HQ 5 ft 100% | 60 | 2 | 364.6, 365.6, 364.9, 366.0' - Bedding plane (4), horizontal, smooth, undulating, tight to 1/4" open | | | |
| 365 -322.4 | | | 2 | 365.0' - Fracture or mechanical break, 20 deg, rough, undulating, open, fragment missing | | **Limestone** 365.5-366.8' - yellowish gray, (5Y 8/1), fine grained, mild to moderate HCl reaction, weak (R2), friable, silty, voids over <5% | |
| | | | 1 | 365.4' - Fracture or mechanical break, 30 deg, rough, undulating to stepped, missing fragments, tight to 1" open | | | SC-7 Collected at 366.8-367.7' |
| | | | 1 | 366.5-366.8' - Fracture zone, fragments to 1-2" | | 366.8-367.7' - pale yellow gray to very light gray, (5Y 7/2 to N8), weak to medium strong (R2 to R3), >50% bioturbated with voids over 60% of sample, abundantly fossiliferous | |
| | | | 2 | 368.05-368.6' - Fracture zone, fragments to 2-3" rock weakened by fossiliferous zone | | | R34: 12 minutes |
| | 369.0 | | | | | 367.7-369.0' - yellowish gray, (5Y 7/2), very fine to fine grained, mild to moderate HCl reaction, abundantly fossiliferous (pelecypods, forams) voids, molds up to 1/16" >50% bioturbated | |
| 370 -327.4 | R35-HQ 5 ft 88% | 35 | 4 | 369.2' - Bedding plane, horizontal, moderately smooth, planar, 1/16-3/16" open (typ) | | | |
| | | | 3 | 369.4, 369.6, 369.8, 370.1, 370.3' - Bedding plane (5), horizontal, moderately smooth, planar, 1/16-3/16" open (typ) | | 369.0-370.3' - yellowish gray, (5Y 7/2), fine to medium fine grained, mild HCl reaction, very weak to weak (R1 to R2), <1/32" voids (primarily foraminifera molds), friable, silty | |
| | | | 3 | 370.3-370.7' - Fracture zone, lithology change | | | |
| | | | 1 | 371.1' - Fracture, rough, undulating, 9/16" relief, break across void<br>371.5, 371.8, 371.9, 373.0' - Bedding plane (4), 0-10 deg, rough, undulating, 3/16-3/4" open | | 370.3-373.7' - very light gray, (N8), with <5% light bluish gray mottling, moderate to strong HCl reaction, abundantly fossiliferous (primarily foraminifera), molds <1/32-3/16", >50% bioturbated | |
| | 374.0 | | NR | | | **No Recovery 373.7-374.0'** | R35: 12 minutes |
| | R36-HQ 4 ft 70% | 10 | 2 | 374.3, 374.6, 375.1' - Fractures (3), horizontal, rough, undulating, 3/16-9/16" open | | **Limestone** 374.0-374.9' - yellowish gray, (5Y 8/1), strong HCl reaction, very weak to weak (R1 to R2), voids to 3/16"; friable and very weak rock (R1)rock at 374.0-374.3' | |
| 375 -332.4 | | | >10 | | | | Driller's Remark: Hard rocks lodged in inner core, only advanced 4' |
| | | | >10 | 375.5-376.8' - fragments, silty limestone | | | |
| | | | NR | | | 374.9-376.8' - yellowish gray, (5Y 8/1), strong HCl reaction, weak (R2), friable, as at 374-374.3' above, but with occasional olive gray organic streaks | R36: 15 minutes |
| | 378.0 | | | | | **No Recovery 376.8-378.0'** | |
| | | | 1 | 378.6, 379.3' - Fractures (2), horizontal, rough, undulating, poorly fit 3/16-9/16" open | | | |
| | | | 2 | | | | |
| 380 | | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: AD-04 | SHEET 10 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: 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 | 379.6, 380.0, 380.1, 380.2, 380.7' - Bedding plane (5), horizontal, tightly fill 1/16-3/16" relief | | **Limestone** 378.0-379.5' - very light gray, (N8), very fine grained, moderate HCl reaction, weak (R2), >50% voids <1/32" wide and bioturbated | |
| | | | >10 | 380.9-382.7' - Fracture zone | | 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 distributed but <5% | |
| | | | >10 | | | 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 | R37: 16 minutes |
| | | | NR | | | **No Recovery 382.9-384.0'** | |
| | 384.0 | | | | | | |
| | R38-HQ 5 ft 100% | 55 | >10 | 384.0-384.3' - Fracture zone, fragments to 4"x2" | | **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 -342.4 | | | 3 | 384.3, 384.5, 384.8, 385.3, 387.85' - Bedding plane (5), 0-5 deg, smooth, undulating, tight to 1/2" open | | | |
| | | | 1 | 385.5' - Fracture, rough, undulating, 4-3/16" void<br>385.65' - Mechanical break, <5 deg, rough, undulating, tight | | 385.7-388.5' - Same as 384.0-385.7' | |
| | | | 2 | 387.5' - Mechanical break, 20 deg, rough, undulating, tight | | | |
| | | | >10 | 388.4-388.8' - Fracture zone, fragments to 2"x2" | | | R38: 10 minutes |
| | 389.0 | | | | | | |
| | R39-HQ 5 ft 100% | 0 | 2 | 389.4' - Fracture, 80 deg, rough, undulating, open, missing face | | 388.5-390.0' - light gray, (N7), fine to medium grained, moderate HCl reaction, weak to medium strong (R2 to R3), hard, abundant voids <1/32-1/8" throughout, primarily foraminiferous | |
| 390 -347.4 | | | 0 | 389.6' - Mechanical break, <5 deg, rough, undulating, tight | | **Clay (CL)** 390.0-390.3' - soft, calcareous with dark brown orange silt | |
| | | | >10 | 389.8' - Bedding plane, horizontal, smooth, planar to undulating | | **Limestone** 390.3-394.0' - yellowish gray, (5Y 7/2), moderate HCl reaction, very weak to weak (R1 to R2), friable, organic staining within many fractures <1/32-3/16" voids | |
| | | | >10 | 389.9-394.0' - Fracture zone, some brown organic staining on fractures, various fragments of all orientation within limestone; mechanical | | | |
| | | | >10 | | | | R39: 10 minutes |
| | | | >10 | | | | |
| | 394.0 | | | | | | |
| | R40-HQ 5 ft 90% | 53 | 3 | 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 HCl reaction, very weak to weak (R1 to R2), voids <1/32-3/16" (molds and casts) 394.0-395.0' bioturbated | |
| 395 -352.4 | | | >10 | 395.3-395.8' - Fracture zone, 3/4 to 1-1/2" blocky fragments | | | |
| | | | 2 | 396.4, 396.9' - Mechanical break (2), horizontal, rough, undulating, 1-3/16" relief | | | |
| | | | 0 | | | | |
| | | | 0 | | | | R40: 9 minutes |
| | 399.0 | | NR | | | **No Recovery 398.5-399.0'** | |
| 400 | | | 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -357.4 | | | 2 | 400.1-400.3' - Fracture zone | | **Limestone**<br>399.0-404.0' - yellowish gray, (5Y 8/1), very fine to fine grained, strong HCl reaction, very weak to weak (R1 to R2), mold and casts over 20% of rock, foraminifera. gastropods, pelycypods, bioturbated 400.0-401.0' | |
| | R41-HQ<br>5 ft<br>96% | 53 | 2 | 401.1' - Fracture, 30 deg, rough, 3/16-9/16" relief, mechanical<br>401.7, 402.1, 402.4, 402.6, 403.2' - Fractures (5), 0-20 deg, planar, tight | | | |
| | | | 2 | | | | |
| | | | 3 | | | | R41: 9 minutes<br>Finished at 15:15 on 9/20/07 |
| | 404.0 | | NR | | | **No Recovery 403.8-404.0'** | |
| | | | 5 | 404.1, 404.3, 404.5, 404.6, 404.8, 405.3, 405.7' - Mechanical break (7), horizontal and 30 deg, rough, planar to undulating, poorly fit, >9/16" open | | **Limestone**<br>404.0-409.0' - Same as 399.0-404.0' except molds and casts 1/16-3/16" between 405.0-407.0' | Started at 07:30 on 9/21/07 |
| 405<br>-362.4 | | | 3 | | | | |
| | R42-HQ<br>5 ft<br>99% | 40 | 2 | 406.0, 406.5, 406.8' - Mechanical break (3), 0-20 deg, rough, undulating, tightly fit to 3/8" open | | | |
| | | | 1 | 407.5, 408.2' - Mechanical break (2), 30 deg, very rough, planar, tightly fit | | | |
| | | | 3 | 408.5-408.8' - Mechanical break, vertical | | | R42: 11 minutes |
| | 409.0 | | NR | 408.9' - Mechanical break, horizontal, planar to undulating | | **No Recovery 408.95-409.0'** | |
| 410<br>-367.4 | | | 2 | 409.1, 409.2' - Mechanical break (2), horizontal, smooth, undulating, poorly fit | | 409.0-411.3' - light yellowish gray, (5Y 9/1), fine grained, moderate HCl reaction, very weak (R1), voids to 1/4", fine black needle form mineral throughout 5% (possibly phosphate or organic) | |
| | | | 2 | 410.3' - Mechanical break, horizontal, very rough, stepped, tightly fit, 3/4" relief | | | |
| | R43-HQ<br>5 ft<br>80% | 27 | 0 | 410.7' - Fracture, 30 deg, smooth, planar, 1/16" open | | **Clay (CL)**<br>411.3-411.7' - light gray calcareous silty clay | |
| | | | 3 | 411.1, 411.3' - Mechanical break (2), horizontal, very poorly fill, 1-3/16" open<br>411.6-411.9' - Fracture zone, through consolidated limestone | | **Limestone**<br>411.7-413.0' - Same as 409.0-411.3' except medium strong (R3) | R43: 14 minutes |
| | | | NR | 412.2' - Mechanical break, 30 deg, break through unconsolidated limestone | | **No Recovery 413.0-414.0'** | |
| | 414.0 | | | 412.7, 412.8' - Mechanical break (2), horizontal | | | |
| | | | 5 | 414.25, 414.4' - Mechanical break (2), planar to undulating, poorly fit | | **Limestone**<br>414.0-416.5' - yellowish gray, (5Y 8/1), moderate HCl reaction, medium strong (R3), finely crystalline; 415.0-416.5' medium strong (R3); 414.0-415.0' very weak; 414.7-414.9' very weak (R1), dark brown organics | |
| 415<br>-372.4 | | | 1 | 414.6' - Fracture, horizontal, undulating, poorly fit with (Mt) oxide staining evident<br>415.0' - Fracture, 40 deg, discontinuity between hard fossiliferous limestone and dark organic silt clay | | | |
| | R44-HQ<br>5 ft<br>96% | 50 | 1 | 415.7, 416.5, 417.2, 417.7, 418.0, 418.3' - Mechanical break (6), horizontal, planar | | 416.5-418.7' - yellowish gray, (5Y 8/1), fine grained, very weak to weak (R1 to R2), >5% fossiliferous casts and molds (foraminifera, echinoderma, pelycypods, gastropods), occasional black mineral growth in voids, very soft, voids <1/32-3/16" | |
| | | | 3 | | | | |
| | | | 2 | | | | R44: 13 minutes |
| | 419.0 | | NR | 418.7' - Fracture, horizontal, rough, planar, contact: hard fossiliferous limestone over dark brown silty clay. mt oxide staining on limestone surface | | **Clayey Silt (ML)**<br>418.7-418.8' - greenish black | |
| | | | 0 | | | | |
| 420 | | | 2 | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -377.4 | R45-HQ 5 ft 100% | 61 | 0 | 419.3' - Bedding plane, 10 deg, contact: black orange clayey silt over limestone, unbroken | | **No Recovery 418.8-419.0'** **Clayey Silt (ML)** 419.0-419.2' - greenish black, organic | |
| | | | 3 | 419.9' - Mechanical break, horizontal, rough, planar, 3/8" relief, 1/16" open, tight | | **Limestone** 419.2-421.5' - yellowish gray, (5Y 8/1), weak (R2), >5% casts and molds (foraminiferons, tortella, pelycypods), voids of various size throughout | |
| | | | 4 | 421.5' - Bedding plane, horizontal, undulating, horizontal undulating break along bedding, <1/16" infill (organic) 421.8-422.3' - Mechanical break, vertical | | | |
| | | | 1 | 422.8' - Bedding plane, smooth, undulating, break along bedding, tight fit, organic staining | | 421.5-423.0' - pale yellowish brown, (10YR 6/2), very fine grained, strong HCl reaction, weak (R2) | R45: No Time Recorded |
| 424.0 | | | | | | | |
| | R46-HQ 5 ft 58% | 12 | 1 | | | 423.0-424.5' - pale yellowish brown, (10YR 6/2), very dense, mild to moderate HCl reaction, very strong (R5), crystalline, <1/32" voids throughout | Bit drops at 424.5' |
| 425 -382.4 | | | NA | | | | |
| | | | >10 | | | **Clay (CL)** 424.5-425.2' - brownish gray, soft, carbonate | |
| | | | >10 | | | **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 |
| | | | NR | | | **No Recovery 427.0-429.0'** | |
| 429.0 | | | | | | | |
| | R47-HQ 5 ft 78% | 27 | 4 | 429.2, 429.5, 429.8, 429.9, 430.0' - Fractures (5), 10-30 deg, planar, tight, 1/16-1/16" relief, thin organic silty infill <1/32" | | **Limestone** 429.0-433.0' - light yellowish gray, (5Y 9/1), dense, strong HCl reaction, medium strong (R3), microcrystalline, no visible voids, medium strong (can be carved with a knife) organic, silty bedding planes, last 4" very soft and clayey | |
| 430 -387.4 | | | 1 | 430.0-432.5' - Mechanical break, horizontal, smooth, planar, tight to 1/8" open | | | |
| | | | 1 | | | | |
| | | | 3 | | | | |
| | | | NR | 432.7' - Fracture, rough, undulating break, disconformity, limestone over friable organic silt | | **No Recovery 433.0-434.0'** | R47: 15 minutes |
| 434.0 | | | | | | | |
| | R48-HQ 4 ft 100% | 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) |
| 435 -392.4 | | | 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, extremely weak to very weak (R0 to R1), >50% organic material | |
| | | | >10 | | | | |
| | | | >10 | | | **Limestone** 435.9-438.0' - grayish orange, (10YR 7/4), fine grained, strong HCl reaction, very weak to weak (R1 to R2) | R48: 16 minutes |
| 438.0 | | | | | | | |
| | | | 1 | 438.5' - Mechanical break, horizontal, rough, undulating, 3/16" open | | | SC-9 Collected at 438.5-439.4' |
| | | | >10 | | | | |
| 440 | | | | | | | |

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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -397.4 | R49-HQ 6 ft 43% | 14 | >10 | 439.4-440.6' - Fracture zone, through soft material | | 438.0-439.4' - yellowish gray, (5Y 7/2), very fine grained, moderate HCl reaction, medium strong (R3), abundant voids to 1/8" with some voids filled with organic silt, <5% fossils, primarily molds | |
| | | | NR | | | 439.4-440.6' - dusky yellow, (5Y 6/4), strong HCl reaction, very weak (R1), friable silt<br>**No Recovery 440.6-444.0'** | R49: 18 minutes |
| | 444.0 | | | | | | |
| 445<br>-402.4 | R50-HQ 5 ft 56% | 20 | 2 | 444.5' - Fracture, 15 deg, very rough | | **Limestone**<br>444.0-446.0' - moderate yellowish brown, (10YR 5/4), fine to very fine grained, mild HCl reaction, very weak to weak (R1 to R2), dolomite, crystalline friables, >5% voids up to 1/16" | |
| | | | 1 | 445.0' - Fracture, possible void<br>445.6' - Mechanical break, notched medium fit 1/16" open | | | |
| | | | NR | 446.0' - Fracture, bit dropped, assumed void location | | 446.0-447.8' - missing | Driller's Remark: Bit drop 2.0 ft into run, interpreted as void |
| | | | 1 | 447.6' - Fracture, 60 deg, break across void | | 447.8-448.6' - dusky yellowish brown to pale yellow brown, (10YR 2/2 to 10YR 4/2), fine grained, strong HCl reaction, crystalline, calcite, large voids to 1-1/4" with calcite rhombic crystals and clean hexagonal quartz crystals other voids filled with silty friable dolomite | R50: 9 minutes |
| | 449.0 | | NR | | | | |
| 450<br>-407.4 | R51-HQ 5 ft 32% | 0 | NR | 449.0' - Fracture, void | | **No Recovery 448.6-449.0'**<br>**No Recovery 449.0-451.0'** | Driller's Remark: Void at top of run, 1.0' of drilling in middle of void near bottom, (based on bit drop) |
| | | | >10 | 451.0-452.0' - Fracture zone, limestone (dolomite) | | **Limestone**<br>451.0-452.0' - pale yellowish brown, (10YR 6/2), medium strong to strong (R3 to R4), crystalline >5%, of voids (molds) voids up to 1/8", dolomite | |
| | | | NR | 452.0' - Fracture, void | | **No Recovery 452.0-454.0'** | R51: No Time Recorded |
| | 454.0 | | | | | | |
| 455<br>-412.4 | R52-HQ 5 ft 76% | 7 | >10 | 454.0-456.0' - Mechanical break, large angular fractures at all angles | | **Limestone**<br>454.0-455.9' - pale yellowish brown, (10YR 6/2), fine grained, <5% voids to 3/16", poorly fossiliferous | |
| | | | >10 | | | | |
| | | | 4 | 456.2, 456.3, 456.6, 456.7' - Fractures (4), horizontal, smooth, planar to undulating, tight | | 455.9-457.0' - light olive gray to pale olive, (5Y 5/2 to 10Y 6/2), fine grained, mild HCl reaction, very weak to weak (R1 to R2), friable, silty | |
| | | | 5 | 457.3-457.7' - shattered dolomite, large angular fragment | | 457.0-457.8' - Same as 454.0-455.9' except first 3" are amber brown, dolomite | |
| | | | NR | | | **No Recovery 457.8-459.0'** | R52: No Time Recorded |
| | 459.0 | | | | | | Finished drilling on 9/21/07 at 459.0' |
| 460 | | | >10 | 459.0-459.5' - Fracture zone, 1"-3" rock fragments of hard dolomite | | | Start drilling on 9/22/07 |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: AD-04 | SHEET 14 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -417.4 | R53-HQ 5 ft 100% | 25 | 3 | 460.0, 462.7' - Fracture (2), 75 deg, planar, fracture through hard dolomite, 3/16" relief | | **Limestone** 459.0-460.2' - moderate brown to grayish brown, (5YR 3/4 to 5YR 3/2), dense, fine to medium grained, mild HCl reaction, medium strong to strong (R3 to R4), crystalline, dolomite; <1/32" voids over 70% of surface | |
| | | | >10 | 460.4' - Fracture or mechanical break, 30 deg, rough, planar<br>460.6, 460.8, 461.2, 461.3' - Bedding plane or mechanical break (4), horizontal, planar, 3/16" relief | | | |
| | | | 5 | 461.7-462.3' - Fracture zone, horizontal, undulating, dolomite, poorly fit | | 460.2-462.2' - fine to medium grained, mild HCl reaction, very weak (R1), friable breaks on bedding planes | R53: 13 minutes |
| | | | >10 | 463.4-463.8' - Fracture zone | | | |
| | 464.0 | | | | | | |
| | R54-HQ 5 ft 60% | 0 | >10 | 464.0-466.3' - Fracture zone, large fragments of blocky to angular dolomite | | 462.2-464.0' - Same as 459.0-460.2' except moderate brown to grayish brown, (5YR 3/4 to 5YR 3/2), dolomite | |
| 465<br>-422.4 | | | >10 | | | **Limestone** 464.0-466.5' - Same as 462.2-464.0' | |
| | | | >10 | 466.5' - Fracture or mechanical break, 45 deg, across hard dolomite over friable dolomite below, tightly fit | | 466.5-467.0' - yellowish brown, (10YR 5/4), moderate HCl reaction, friable, silty, streaks of organic staining on bedding | |
| | | | NR | 466.7' - Fracture, horizontal, planar, 3/16-3/8" relief, contact between hard dolomite and friable dolomite below | | **No Recovery 467.0-469.0'** | R54: 12 minutes |
| | 469.0 | | | | | | |
| | R55-HQ 5 ft 60% | 13 | >10 | 469.0-470.2, 471.0-471.4' - Fracture zone (2), hard, dolomite | | **Limestone** 469.0-472.0' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, very weak to weak (R1 to R2), finely crystalline, dolomite, voids throughout variable 1/16-3/4" | |
| 470<br>-427.4 | | | 1 | 470.6' - Fracture, horizontal, rough, planar, break tensely fit, 9/16" relief | | | |
| | | | >10 | 471.8-472.0' - Fracture zone | | | |
| | | | NR | | | **No Recovery 472.0-474.0'** | R55: 12 minutes |
| | 474.0 | | | | | | |
| | R56-HQ 5 ft 80% | 27 | >10 | 474.0-475.1' - Fracture zone | | **Limestone** 474.0-478.0' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, very weak to weak (R1 to R2), extensive voids throughout 1/16-3/4", finely crystalline dolomite, few of the voids with clean hexagonal quartz crystals (1/8") | |
| 475<br>-432.4 | | | 1 | 475.5' - Fracture or mechanical break, 50 deg, very rough, undulating, tight | | | |
| | | | 3 | 476.5' - Mechanical break, 45 deg, tightly fit<br>476.7' - Mechanical break, 10 deg, planar, tight | | | |
| | | | >10 | 477.3' - Mechanical break, horizontal, undulating, tight | | | |
| | | | NR | | | **No Recovery 478.0-479.0'** | R56: 14 minutes |
| | 479.0 | | | | | | |
| 480 | | | 2 | 479.0-479.3' - Fracture zone, hard dolomite<br>479.3' - Fracture, 45 deg, rough, irregular break across voids | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -437.4 | R57-HQ 5 ft 88% | 48 | 2 | 480.0-480.3' - Fracture zone, through dolomite | | **Limestone** 479.0-481.7' - yellowish orange, (10YR 7/4), very weak to weak (R1 to R2), finely crystalline, dolomite, voids throughout to 3/4" | |
| | | | 6 | 480.8' - Fracture, horizontal, rough, undulating, horizontal break through voids 481.0-481.4' - Fracture zone, through friable dolomite | | 481.7-483.4' - grayish orange, (10YR 7/4), dolomite with calcareous infill voids; 482.6': portion of gray infilled limestone 3" thick | SC-10 Collected at 481.7-483.3' |
| | | | 0 | 481.4-481.7' - Fracture, 60 deg, through hard dolomite | | | |
| | | | 0 | 481.7' - Fracture, horizontal, very rough, undulating, Mt oxide staining | | | R57: 14 minutes |
| | 484.0 | | NR | | | **No Recovery 483.4-484.0'** | |
| 485 -442.4 | R58-HQ 5 ft 90% | 38 | 4 | 484.2-484.5' - Mechanical break, 45 deg and horizontal, undulating, poorly fit | | **Limestone** 484.0-487.0' - yellowish gray, (5Y 7/2), moderate HCl reaction, weak to medium strong (R2 to R3), finely crystalline dolomite, voids to <1/16-3/16"; many filled with amber calcite | |
| | | | 1 | 485.7' - Mechanical break, horizontal, undulating, across void, tightly fit | | | |
| | | | 2 | 486.4' - Fracture zone, irregular | | | |
| | | | >10 | 487.0, 487.3' - Mechanical break (2), horizontal, planar, very poorly fit across friable dolomite | | 487.0-488.5' - dusky yellow, (5Y 6/4), very weak (R1), very friable, finely crystalline dolomite | |
| | | | >10 | 487.3-488.5' - Fracture zone, friable to unconsolidated dolomite | | | R58: 12 minutes |
| | 489.0 | | NR | | | **No Recovery 488.5-489.0'** | |
| 490 -447.4 | R59-HQ 5 ft 92% | 50 | >10 | 489.0-489.8' - Fracture zone, large angular block, limestone fragments | | **Limestone** 489.0-489.3' - yellowish gray, (5Y 8/1), very fine grained, very strong HCl reaction, weak to medium strong (R2 to R3), <1/32" void over 10%, 1" thick layer of soft calcareous clay | |
| | | | 6 | 490.0-490.1' - Fracture, horizontal, smooth, undulating, discontinuity with 1" white clay infill | | | |
| | | | 2 | 490.1, 490.3' - Mechanical break (2), horizontal, planar, poorly fit 490.6' - Mechanical break, 15 deg, rough, planar, tightly fit | | 489.3-493.6' - pale grayish orange to dusky yellow, (10YR 7/4 to 5Y 6/4), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), >8% voids throughout <1/32-1/16", many voids with amber calcite fill, finely crystalline | |
| | | | 2 | 490.8-491.0' - Mechanical break, 85 deg, fracture between 2 horizontal bedding plane breaks | | | |
| | | | 0 | 491.7' - Mechanical break, undulating, 1/16-3/16" open | | | R59: 14 minutes |
| | 494.0 | | NR | | | **No Recovery 493.6-494.0'** | |
| 495 -452.4 | R60-HQ 6 ft 95% | 47 | 4 | 492.4-492.5' - Mechanical break (2), planar, 3/16-5/16" open 494.4, 494.7, 494.9, 495.0' - Mechanical break (4), 0-15 deg, rough, poorly fit | | **Limestone** 494.0-499.7' - grayish orange, (10YR 7/4), moderate HCl reaction, medium strong (R3), dolomite, weak to medium strong (R1-R2) through areas of bedding plane discontinuities; voids <1/32-1/8", uniformly distributed, some voids filled with amber calcite, numerous open voids to 1.5" with amber, calcite crystal growth, finely crystalline 496.0-496.9' - moderate yellowish brown to grayish brown, (10YR 5/4 to 10YR 7/4), mild HCl reaction, finely crystalline dolomite, well-distributed 1/32-1/16" voids, some filled with crystals, black organics, white calcareous clay | |
| | | | 3 | | | | |
| | | | >10 | 495.8' - Fractures (2), horizontal, light brown clay infill (1"), poorly fit 495.9' - Fracture (2), horizontal, light brown clay infill (1"), poorly fit | | | SC-11 Collected at 496.0-496.9' |
| | | | 2 | | | | |
| | | | 4 | 497.7-498.3' - Mechanical break or bedding plane (4), horizontal, planar, through friable dolomite | | | |
| | | | 3 | 498.8, 498.9, 499.0, 499.3, 499.5, 499.6' - Bedding plane (6), horizontal, poorly fit, friable dolomite | | | R60: 14 minutes |
| 500 | 500.0 | | NR | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
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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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES | | | SYMBOLIC LOG | LITHOLOGY | COMMENTS |
|---|---|---|---|---|---|---|---|
| | | 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. |
| | | | | | | **No Recovery 499.7-500.0'** | |
| | | | | | | Bottom of Boring at 500.0 ft bgs on 9/27/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING LOG

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

DRILLING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, auto hammer, NWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 5/23/07 START : 5/23/2007 END : 5/30/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 40.8 | 0.0 – 1.5 | 0.9 | SS-1 | 1-3-5 (8) | **Topsoil** 0.0-0.3' - brownish black, (5YR 2/1), moist, 15% roots 85% organic fines<br>**Poorly Graded Sand (SP)** 0.3-0.85' - very pale orange to grayish orange, (10YR 8/2 to 10YR 7/4), moist, loose, very fine to fine grained, trace roots, trace nonplastic fines, silica sand | | Additional equipment note: 3-7/8" tricone bit, split spoon Start drilling 5/23/07 at 08:15; water level = 1' ft below ground surface |
| 5 | 5.0 | | | | | | |
| 35.8 | 5.0 – 6.5 | 1.1 | SS-2 | 1-4-6 (10) | **Poorly Graded Sand With Silt (SP-SM)** 5.0-6.1' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), moist to wet, loose, very fine to fine grained, no HCl reaction, 12% nonplastic fines, trace roots, silica sand | | |
| 10 | 10.0 | | | | | | |
| 30.8 | 10.0 – 11.5 | 1.1 | SS-3 | 4-9-10 (19) | **Poorly Graded Sand (SP)** 10.0-11.1' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), moist to wet, medium dense to dense, fine to medium grained, no HCl reaction, trace black minerals, silica sand | | |
| 15 | 15.0 | | | | | | |
| 25.8 | 15.0 – 16.5 | 0.8 | SS-4 | 6-9-9 (18) | **Poorly Graded Sand With Silt (SP-SM)** 15.0-15.8' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), wet, medium dense, no HCl reaction, 5% nonplastic fines, silica sand | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING LOG

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

DRILLING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, auto hammer, NWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 5/23/07 START : 5/23/2007 END : 5/30/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 20.8 | 20.0 – 21.5 | 1.5 | SS-5 | 2-2-2 (4) | **Silty Sand (SM)** 20.0-21.5' - pale yellowish brown, (10YR 6/2), wet, very loose, no HCl reaction, 35% nonplastic fines, silica sand | | |
| 25 | 25.0 | | | | | | |
| 15.8 | 25.0 – 26.5 | 1.5 | SS-6 | 1-1-1 (2) | **Silty Sand (SM)** 25.0-26.5' - Same as above except 35-40% nonplastic fines | | |
| 30 | 30.0 | | | | | | |
| 10.8 | 30.0 – 31.5 | 1.5 | SS-7 | 0-1-1 (2) | **Silty Sand (SM)** 30.0-31.5' - Same as above except 35-40% non to low plastic fines | | |
| 35 | 35.0 | | | | | | |
| 5.8 | 35.0 – 36.5 | 0.5 | SS-8 | 1-2-4 (6) | **Silt (ML)** 35.0-35.5' - pale yellowish brown, (10YR 6/2), moist to wet, low plasticity, rapid dilatancy, mild to moderate HCl reaction, very thinly bedded, 5-10% fine to medium grained silica sand, lens of coarse sand-sized material from 35.4-35.5', all carbonate materials, trace organics throughout, one 1/4" thick organic lense | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-01 SHEET 3 OF 9 |

# SOIL BORING LOG

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

DRILLING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, auto hammer, NWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 5/23/07 START : 5/23/2007 END : 5/30/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 0.8 | 40.0 – 41.5 | 1.5 | SS-9 | 2-2-2 (4) | **Clayey Sand With Organics (SC)** 40.0-41.5' - olive gray, (5Y 4/1), moist to wet, very loose, very fine to fine grained, no HCl reaction, organic lenses, 16% medium plastic fines, fines appear to be organic, silica sand | | |
| 45 -4.2 | 45.0 – 45.4 | 0.4 | SS-10 | 50/5 (50/5") | **Organic Soil (OL)** 45.0-45.2' - greenish black, (5GY 2/1), moist to wet, hard, very fine to fine grained, medium plasticity, slow dilatancy, no HCl reaction, 5-10% silica sand<br>**Clayey Sand (SC)** 45.2-45.4' - light olive gray, (5Y 6/1), moist to wet, 35% medium to plastic fines, silica sand | | HW casing down to 45.0' |
| 50 -9.2 | 50.0 – 50.9 | 0.9 | SS-11 | 27-50/5 (77/11") | **Silty Sand (SM)** 50.0-50.85' - moderate yellowish brown to pale yellowish brown, (10YR 5/4 to 10YR 6/2), moist to wet, very dense, very fine to medium grained, strong HCl reaction, 45-50% nonplastic fines, all carbonate material | | |
| 55 -14.2 | 55.0 – 55.3 | 0.3 | SS-12 | 50/4 (50/4") | **Sandy Silt (ML)** 55.0-55.3' - light olive gray, (5Y 5/2), wet, nonplastic to low plasticity, rapid dilatancy, moderate to strong HCl reaction, 30% very fine to medium sand, 10% coarse sand, all carbonate materials | | |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-01 SHEET 4 OF 9 |

# SOIL BORING LOG

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

DRILLING METHOD AND EQUIPMENT : CME 55 S/N 299205, mud rotary, auto hammer, NWJ rods, 3-7/8" tri-cone bit ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 5/23/07 START : 5/23/2007 END : 5/30/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -19.2 | 60.0 | 1.5 | SS-13 | 32-15-10 (25) | **Sandy Silt (ML)** 60.0-60.8' - light olive gray, (5Y 5/2), wet, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 30-40% fine to coarse sand, all carbonate | | There is no distinct boundary between the subunits; boundary is gradational |
| | 61.5 | | | | **Silty Sand (SM)** 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 | | |
| 65 -24.2 | 65.0 65.1 | 0.0 | SS-14 | 50/0.25 (50/0.25") | **Limestone Fragments** 65.0-65.1' - light olive gray, (5Y 5/2), mild to moderate HCl reaction, fine gravel-size fragments | | Driller's Remark: Hit rock at 65.0' |
| 70 -29.2 | 70.0 70.1 | 0.0 | SS-15 | 50/1 (50/1") | **No Recovery 70.0-70.1'** Begin Rock Coring at 70.0 ft bgs See the next sheet for the rock core log | | 10:00 Began rock coring; water level at 2.3' below ground surface |
| 75 -34.2 | | | | | | | |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-01 SHEET 5 OF 9 |

# ROCK CORE LOG

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 START : 5/23/2007 END : 5/30/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -29.2 | 70.0 | | | | | | |
| | R1-NQ 5 ft 39% | 17 | >10 | 70.3' - Fracture, 65 deg, rough, undulating, tight, open <1/8" | | **Limestone** 70.0-71.95' - moderate olive brown, (5Y 4/4), fine grained, moderate to strong HCl reaction, weak (R2), voids (1/16") over 25% of surface, trace fossil molds, largest 1/4"x1/2", trace secondary recrystallization in voids | |
| | | | 1 | 70.35-70.6' - Fracture zone, very fine to coarse gravel sized fragments<br>70.65-70.85' - Bedding plane, <10 deg, smooth, undulating, tight to 1/4" open | | | SC-1 collected at 71.15-71.95' |
| | | | NR | 71.1' - Fracture or mechanical break, rough, undulating, tight | | **No Recovery 71.95-75.0'** | Driller's Remark: Soft from 72.0-74.0'<br>R1: 3 minutes |
| 75 | 75.0 | | | | | | |
| -34.2 | R2-NQ 5 ft 64% | 10 | >10 | 75.0-75.2' - Fracture zone<br>75.5-75.9' - Fracture zone | | **Limestone** 75.0-75.9' - moderate olive brown to light olive gray, (5Y 4/4 to 5Y 2/2), fine grained, moderate HCl reaction, weak (R2), voids (<1/16") over 15-20% of surface, secondary recrystallization in voids trace casts | |
| | | | 6 | 76.4, 76.55, 76.7, 76.9, 76.95' - Bedding plane (3), <10 deg, rough, undulating to stepped, open <1/2" | | | Driller's Remark: Soft from 76.5-77.0' |
| | | | 4 | 76.8-76.9' - Fracture zone | | 75.9-78.2' - moderate olive brown to light olive gray, (5Y 4/4 to 5Y 2/2), fine to coarse grained, strong HCl reaction, weak (R2), voids (<1/16") over 40% of surface, trace secondary recrystallization, trace fossil casts up to 1/2" diameter | |
| | | | 1 | 77.25, 77.1, 77.6, 77.9' - Bedding plane or mechanical break (4), <10 deg, rough, undulating to stepped, open <1/2" | | | |
| | | | NR | 78.1-78.2' - Fracture zone | | **No Recovery 78.2-80.0'** | R2: 5 minutes |
| 80 | 80.0 | | | | | | |
| -39.2 | R3-NQ 5 ft 84% | 38 | 5 | 80.15, 80.3, 80.4, 80.55, 80.75, 81.05, 81.35' - Bedding plane or mechanical break (7), <10 deg, smooth, undulating, open <1/2" | | **Limestone** 80.0-84.2' - moderate olive brown, (5Y 4/4), fine to medium grained, strong HCl reaction, very weak (R1), except from 82.5-82.8' where secondary calcite crystals in voids (<1/16") exists, medium strong (R3), voids (<1/16") over 50% of surface, many cavities, highly fossiliferous (fossils/molds) | Driller's Remark: No circulation at 80' |
| | | | 2 | 81.05' - Bedding plane or mechanical break, 30 deg, smooth, undulating, open <1/8" | | | SC-2 collected at 81.35-82.35' |
| | | | 2 | 82.35-82.4' - Mechanical break<br>82.4' - Bedding plane or mechanical break, 10 deg, rough, undulating, tight | | | |
| | | | >10 | 82.4-82.7' - Mechanical break<br>82.7-84.2' - Fracture zone | | | |
| | | | >10 | | | | R3: 6 minutes |
| | | | NR | | | **No Recovery 84.2-85.0'** | |
| 85 | 85.0 | | | | | | |
| -44.2 | R4-NQ 5 ft 44% | 18 | 3 | 85.1' - Bedding plane or mechanical break, 10 deg, rough, fine gravel with clayey silt infill, open (large) | | **Limestone** 85.0-87.2' - moderate olive brown, (5Y 4/4), except two zones: 85.0-85.1' and 86.1-86.3' of clayey silt, pale greenish yellow, (10Y 8/2), moist, strong HCl reaction, extremely weak (R0) | |
| | | | >10 | 85.35, 86.0, 86.85, 86.95' - Bedding plane or mechanical break (4), <10 deg, rough, undulating, no infill, open <1/2" | | | Driller's Remark: 86-87' silty clay |
| | | | 1 | 85.9' - Bedding plane or mechanical break, 50 deg, smooth, undulating, tight | | | Driller's Remark: Still no circulation |
| | | | NR | 86.0-86.4' - Fracture zone, clayey silt infill<br>87.1' - Bedding plane or mechanical break, 50 deg, smooth, undulating, open <1/8" | | **No Recovery 87.2-90.0'** | R4: 4 minutes |
| 90 | 90.0 | | | | | | |

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

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 START : 5/23/2007 END : 5/30/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -49.2 | R5-NQ 5 ft 46% | 29 | >10<br>1<br>0<br>NR | 90.2' - Bedding plane or mechanical break, <10 deg, smooth, undulating, open <1/2"<br>90.4-90.8, 91.3-91.45' - Fracture zone (2), fine to coarse gravel sized fragments | | **Limestone**<br>90.0-90.4' - yellowish gray, (5Y 8/1), moderate HCl reaction, weak (R2), voids (<1/16") over 5% of surface, trace fossil molds/cavities<br>**Limestone**<br>90.4-92.3' - moderate olive brown, (5Y 4/4), strong HCl reaction, weak (R2), voids (1/16") over 40% of surface, fossil molds<br>**No Recovery 92.3-95.0'** | Driller's Remark: 92.0-93.0' silty clay<br>Driller's Remark: 94-94.5' possible voids<br>R5: 5 minutes |
| 95 | 95.0 | | | | | | |
| -54.2 | R6-NQ 5 ft 38% | 0 | >10<br>5<br>NR | 95.0-95.1, 95.4-95.7' - Fracture zone (2), fine to coarse gravel sized fragments<br>95.7-96.0' - Fracture, vertical, smooth, undulating, fragmented rock on one side of fracture<br>96.0, 96.1, 96.4, 96.55' - Bedding plane or mechanical break (4), <10 deg, smooth, planar to undulating, open <1/2" | | **Limestone**<br>95.0-96.5' - yellowish gray, (5Y 7/2), strong HCl reaction, extremely weak (R0), voids (1/16") over 40% of surface from 95.0-96.1' and 25% of surface from 96.1-96.5', few cavities, few small (<1/4") fossils<br>**Silt (ML)**<br>96.5-96.9' - carbonate material<br>**No Recovery 96.9-100.0'** | Driller's Remark: 96.0-99.0' very soft clay<br>R6: 3 minutes |
| 100 | 100.0 | | | | | | |
| -59.2 | R7-NQ 5 ft 87% | 32 | 2<br>5<br>6<br>5<br>1<br>NR | 100.6, 100.7, 100.8' - Mechanical break (3), <10- 50 deg, smooth, undulating, tight<br>101.3, 101.4,101.5, 101.55, 101.6' - Mechanical break (5), <10 deg, smooth, planar to undulating, tight to open <1/8"<br>102.2-102.3' - Fracture zone, very fine to fine gravel sized fragments<br>102.5, 102.75, 103.0, 103.1, 103.35, 103.55, 103.6, 103.85' - Mechanical break (8), <10 deg, smooth, planar to undulating, tight to open <1/8"<br>104.1-104.35' - Fracture zone, coarse gravel | | **Limestone**<br>100.0-104.35' - grayish yellow to yellowish gray, (5Y 8/4 to 5Y 7/2), fine to medium grained, strong HCl reaction, very weak (R1), trace coarse grained material, voids (< 1/16") over 40% of surface, abundant cavities/fossil molds, few fossils, trace black organics material<br>**No Recovery 104.35-105.0'** | R7: 5 minutes |
| 105 | 105.0 | | | | | | |
| -64.2 | R8-NQ 5 ft 51% | 20 | 3<br>>10<br>0<br>NR | 105.15-106.8' - Bedding plane or mechanical break, <10 deg, rough, undulating, open <1/2"<br>106.6' - Fracture zone, fine to coarse gravel | | **Limestone**<br>105.0-106.5' - light olive gray, (5Y 6/1), fine to medium grained, strong HCl reaction, very weak (R1), trace coarse-sized material, voids (< 1/16") over 40% of surface, abundant cavities/fossil molds, few fossils, trace black organics material<br>106.5-107.55' - Same as 105.0-106.5' except grayish yellow, (5Y 8/4)<br>**No Recovery 107.55-110.0'** | Driller's Remark: 106.0-107.5' soft, probably sand<br>R8: 4 minutes |
| 110 | 110.0 | | | | | | |

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

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 START : 5/23/2007 END : 5/30/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -69.2 | R9-NQ 5 ft 84% | 20 | >10 | 110.5' - Mechanical break, 60 deg, smooth, undulating, tight | | **Limestone** 110.0-114.2' - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, very weak (R1), voids (<1/16") over 40% of surface, few cavities, fossil molds | |
| | | | 7 | 110.7, 110.9-111.1, 111.3, 111.35, 111.55' - Bedding plane or mechanical break (5), <10 deg, smooth, planar to undulating, open <1/8" | | | |
| | | | 5 | 111.1-111.35' - Fracture (2), 80 deg, smooth, undulating, tight | | | |
| | | | 6 | 112.4, 112.45' - Mechanical break (2), <15 deg, undulating, smooth to rough, open <1/2" 112.75-112.85' - Fracture zone | | | |
| | | | 1 | 113.3, 113.45, 113.7, 113.8' - Bedding plane or mechanical break (4), <15 deg, undulating, smooth to rough, open <1/2", gray/black staining on rock core and fracture surface from 112.8-113.6', | | **No Recovery 114.2-115.0'** | R9: 4 minutes |
| | | | NR | | | | |
| 115 | 115.0 | | | | | | |
| -74.2 | R10-NQ 5 ft 56% | 13 | 2 | 113.8-114.2' - Fracture zone 115.2-115.4' - Fracture zone, sand- to gravel-size fragments | | **Limestone** 115.0-117.8' - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, very weak (R1), gray/black staining from 117.5-117.9' | |
| | | | 3 | 115.75, 116.3, 117.0' - Bedding plane or mechanical break (3), <10 deg, rough, undulating to stepped, tight to open <1/2" | | | |
| | | | >10 | 116.0-116.1, 117.2-117.8' - Fracture zone (2), fine to coarse gravel-sized fragments | | | |
| | | | NR | | | **No Recovery 117.8-120.0'** | R10: 3 minutes |
| 120 | 120.0 | | | | | | |
| -79.2 | R11-NQ 5 ft 97% | 16 | 3 | 120.15' - Fracture, 30- 50 deg, rough, undulating, open <1/4" | | **Limestone** 120.0-124.85' - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, extremely weak (R0), trace secondary recrystallization voids | |
| | | | >10 | 120.55' - Fractures, 10 - 50 deg, undulating, smooth to rough, open <1/2" 121.0, 121.1, 121.25, 121.4, 121.6, 121.65, 121.8, 122.05, 122.1, 122.2, 122.75, 122.8, | | | |
| | | | >10 | 122.95' - Bedding plane (13), <10 deg, smooth, undulating, open <1/4" | | | |
| | | | 6 | 123.2, 123.4, 123.45, 123.75, 124.2, 124.35' - Fractures (6), 10 - 50 deg, undulating, smooth to rough, <1/2" open | | | |
| | | | 3 | | | | R11: 3 minutes |
| 125 | 125.0 | | | | | | |
| -84.2 | R12-NQ 5 ft 89% | 38 | NR | 124.7' - Bedding plane, <10 deg, smooth, undulating, open <1/4" | | **No Recovery 124.85-125.0'** | |
| | | | 3 | 125.2, 125.4, 125.9' - Bedding plane (3), <10 deg, smooth, undulating, open <1/2" | | **Limestone** 125.0-129.45' - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, extremely weak (R0) | |
| | | | 3 | 125.9' - Fractures, 30 deg, smooth, undulating, tight to open <1/4" 126.1, 126.2, 126.3,' - Bedding plane (3), <10 deg, smooth, undulating, open <1/2" | | | 16:00 Stopped drilling and left core barrel in overnight due to possibility of hole caving |
| | | | 5 | 127.1' - Fractures, 30 deg, smooth, undulating, tight to open <1/4" | | | |
| | | | 3 | 127.8, 127.9, 128.2, 128.5, 128.7, 128.85' - Bedding plane (6), <10 deg, smooth, undulating, open <1/2" | | | |
| | | | 2 | | | | R12: 5 minutes |
| | | | NR | 129.25' - Fractures, 30 deg, smooth, undulating, tight to open <1/4" | | **No Recovery 129.45-130.0'** | |
| 130 | 130.0 | | | | | | |

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|---|---|---|

# ROCK CORE LOG

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 START : 5/23/2007 END : 5/30/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -89.2 | R13-NQ 5 ft 98% | 73 | >10 | 130.2, 130.4, 130.7, 131.0, 131.1, 131.2, 131.25' - Bedding plane or mechanical break (7), <10 deg, undulating, smooth to rough, open <1/2" | | **Limestone** 130.0-134.9' - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, extremely weak (R0), very fine grained from 130.7-131.3' | |
| | | | 5 | 131.3' - Fractures, 15 -20 deg, smooth, undulating, open <1/2" | | | |
| | | | 7 | 132.0, 132.25, 132.5, 132.6, 132.75, 132.95, 133.9' - Bedding plane or mechanical break (7), <10 deg, undulating, smooth to rough, open <1/2" | | | |
| | | | 0 | | | | SC-3 collected at 133.1-134.1' |
| | | | 3 | 133.95' - Fractures, 15- 20 deg, smooth, undulating, open <1/2" | | | R13: 5 minutes |
| 135 | 135.0 | | NR | 134.65, 134.75, 134.8' - Bedding plane or mechanical break (3), <10 deg, undulating, smooth to rough | | **No Recovery 134.9-135.0'** | |
| -94.2 | R14-NQ 5 ft 78% | 7 | 5 | 135.1, 135.25, 135.3, 135.4, 135.6, 135.75, 136.1, 136.2, 136.3' - Bedding plane or mechanical break (9), <10 deg, smooth, planar to undulating, open <1/4" | | **Limestone** 135.0-138.9' - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, extremely weak (R0), except 135.1-135.3' and 136.7-137.1', very fine grained material with lineations (1/8" thick) of yellowish gray (5Y 8/1) and light olive gray (5Y 5/2), gray material in few voids | |
| | | | 9 | | | | |
| | | | 6 | 136.4' - Fracture or mechanical break, 15 deg, rough, undulating, tight | | | |
| | | | 3 | 136.5, 136.6, 136.7, 136.75, 136.95, 137.05, 137.3, 137.55, 137.7, 137.8, 138.05, 138.2, 138.3' - Bedding plane or mechanical break (13), <10 deg, smooth, planar to undulating, open <1/4" | | | |
| | | | NR | | | **No Recovery 138.9-140.0'** | R14: 5 minutes |
| 140 | 140.0 | | | | | | |
| -99.2 | R15-NQ 5 ft 80% | 12 | >10 | 140.2, 140.3' - Bedding plane or mechanical break (2), <10 deg, smooth, undulating, tight to open <1/2" | | **Limestone** 140.0-140.8' - yellowish gray, (5Y 8/1), very fine grained, moderate to strong HCl reaction, strong (R4), voids (<1/16") over 15% of surface, few cavities of fossil molds (1/4"x1/2") | |
| | | | 3 | 140.5' - Fracture, vertical, rough, undulating, open <1/4" | | | |
| | | | 4 | 140.7-140.9' - Fracture zone 141.1, 141.7, 141.95, 142.2, 142.25, 142.35, 142.88, 143.16, 143.42, 143.55' - Bedding plane or mechanical break (10), <10 deg, rough, undulating, tight to open <1/2" | | 140.8-144.0' - yellowish gray, (5Y 8/1), fine grained, strong HCl reaction, very weak (R1), trace localized medium to coarse grained material, voids (<1/16") over 40% of surface, few cavities, abundant fossil casts | Driller's Remark: 142-143' void |
| | | | >10 | 143.65-143.85' - Fracture zone | | | Driller's Remark: 143.5-144' soft |
| | | | NR | | | **No Recovery 144.0-145.0'** | R15: 5 minutes |
| 145 | 145.0 | | | | | | |
| -104.2 | R16-NQ 5 ft 90% | 36 | >10 | 145.05' - Bedding plane or mechanical break, 10 deg, smooth to rough, planar to undulating 145.5-145.6' - Fracture zone | | **Limestone** 145.0-146.7' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, strong (R4), voids (1/16") over 15% of surface , few cavities (1/8"x3/4"-elongated) | |
| | | | >10 | 145.7, 145.75, 146.0' - Bedding plane or mechanical break (3), <10 deg, smooth to rough, planar to undulating | | | |
| | | | 3 | 146.0-146.35' - Fracture zone 146.65' - Mechanical break | | 146.7-149.5' - yellowish gray, (5Y 7/2), fine to medium grained, strong HCl reaction, very weak (R1), trace coarse grained material, voids (<1/16") over 40-50% of surface, abundant fossil casts and molds | |
| | | | 3 | 146.83, 146.86' - Bedding plane or mechanical break (2), <10 deg, smooth to rough, planar to undulating | | | |
| | | | 2 | 147.3' - Bedding plane 147.47' - Bedding plane | | | R16: 6 minutes |
| 150 | 150.0 | | NR | | | **No Recovery 149.5-150.0'** | |
| | | | | | | Bottom of Boring at 150.0 ft bgs on 5/30/2007 | |

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|---|---|
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# ROCK CORE LOG

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 START : 5/23/2007 END : 5/30/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES | | | SYMBOLIC LOG | LITHOLOGY | COMMENTS |
|---|---|---|---|---|---|---|---|
| | | R Q D (%) | FRACTURES PER FOOT | DESCRIPTION<br>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. |
| | | | | 147.65' - Bedding plane or mechanical break, <10 deg, smooth to rough, planar to undulating<br>148.35' - Mechanical break, smooth, undulating, open <1/8"<br>148.55, 148.75, 148.9, 149.0, 149.15' - Bedding plane (5), <10 deg, undulating, smooth to rough, tight | | | Total depth = 150.0' |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-02 SHEET 1 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 ORIENTATION : Vertical

WATER LEVELS : 4.0 ft bgs on 4/18/07 START : 4/18/2007 END : 4/19/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 41.8 | 0.0 – 1.5 | 1.0 | SS-1 | 2-2-2 (4) | **Poorly Graded Sand With Silt (SP-SM)** 0.0-1.0' - mottled dark gray, yellowish gray and pale yellowish brown, (N3, 5Y 8/1 and 10YR 6/2), moist, very loose, very fine to fine grained silica sand, 5-10% nonplastic fines, 10% rootlets <1/16" up to 2-1/2" long, trace dark yellowish orange (10YR 6/6) mottling near top | | NW-Rod (5.0' sections)<br>QuikGel brand bentonite (50 lb bags)<br>24" split spoon (SS)<br>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<br>Add 1/2 bag bentonite to mud vat<br>Water level assumed at 4.0' below ground surface due to moisture content of SS-1 and SS-2 |
| 5 | 5.0 – 6.5 | 0.5 | SS-2 | 2-3-2 (5) | **Clayey Sand (SC)** 5.0-5.5' - moderate yellowish brown and pale green, (10Y 5/4 and 10G 6/2), mottled, moist to wet, loose, 30-35% medium plastic, fine grained silica sand, cohesive, trace rounded concretions up 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' |
| 10 | 10.0 – 11.5 | 1.2 | SS-3 | 1-5-42 (47) | **Silt With Sand (ML)** 10.0-11.2' - grayish yellow to moderate yellow, (5Y 8/4 to 5Y 7/6), wet, hard, nonplastic, very rapid dilatancy, mild to moderate HCl reaction, 5-10% fine to medium grained silica sand, 20% medium to coarse grained in pockets, all carbonate | | 10:17 Driller's Remark: switched to 4-3/4" tricone roller bit to straighten out the hole, will add 10' of 4" HW casing to ensure a 90° borehole through confirmed drilling<br>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°.<br>Add 1/4 bag bentonite<br>11:26 Driller's Remark: 12.5-14.5' soft drilling, hard slow drilling at 14.5', 2' adaptor and 1-3/8" tricone roller drill |
| 15 | 15.0 – 15.2 | 0.1 | SS-4 | 50/2 (50/2") | **Limestone Fragments** 15.0-15.1' - grayish yellow to moderate yellow, (5Y 8/4 to 5Y 7/6), moderate to strong HCl reaction, poorly fossiliferous | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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 ORIENTATION : Vertical

WATER LEVELS : 4.0 ft bgs on 4/18/07 START : 4/18/2007 END : 4/19/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 21.8 | 20.0 – 21.5 | 1.1 | SS-5 | 10-10-24 (34) | **Silty Sand (SM)** 20.0-21.1' - grayish yellow, (5Y 8/4), wet, dense, fine to medium grained, moderate to strong HCl reaction, 30-40% nonplastic fines, 5-10% fine gravel, trace fine grained silica sand moderate gray (5G 5/6) particles, trace fine grained silica sand white particles, all carbonate | | Driller's Remark: softened drilling at 16.5-20.0' |
| | | | | | | | 13:27 Driller's Remark: 21.5' hard drilling, soft again at 23.0' |
| 25 / 16.8 | 25.0 – 25.8 | 0.8 | SS-6 | 47-50/4 (100") | **Silt (ML)** 25.0-25.8' - grayish yellow, (5Y 8/4), wet, nonplastic, very rapid dilatancy, moderate to strong HCl reaction, 10-15% very fine to fine grained, 5-10% fine grained silica sand white particles, homogeneous, all carbonate | | |
| | | | | | | | 13:50 Driller's Remark: 26.5' hard drilling |
| | | | | | | | 13:55 Driller's Remark: 28.5-29.5' soft drilling |
| 30 / 11.8 | 30.0 – 31.5 | 1.3 | SS-7 | 48-39-37 (76) | **Silt With Sand (ML)** 30.0-31.3' - Same as 25.0-25.8' except yellowish gray to moderate yellow, (5Y 8/4 to 5Y 7/6), wet, nonplastic, very rapid dilatancy, 20-25% very fine to medium grained silica sand | | |
| | | | | | | | 14:08 Driller's Remark: hardened drilling at 34.0' |
| 35 / 6.8 | 35.0 – 35.3 | 0.3 | SS-8 | 50/3 (50/3") | **Silty Gravel With Sands (GM)** 35.0-35.3' - moderate yellowish brown, (10YR 5/4), wet, dense, mild to moderate HCl reaction, fine gravel-sized angular to subangular limestone fragments, 30% fine to coarse grained silica sand-sized, 25% low plastic fines | | |
| | | | | | | | 14:23 Remove silt/sand cuttings from mud vat, add 1/4 bag bentonite before continuing down hole to 40' |
| | | | | | | | 14:34 Driller's Remark: Observe light to moderate drill chatter and bouncing |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-02 SHEET 3 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 ORIENTATION : Vertical

WATER LEVELS : 4.0 ft bgs on 4/18/07 START : 4/18/2007 END : 4/19/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 1.8 | 40.0 – 41.5 | 1.5 | SS-9 | 50-46-37 (83) | **Silt With Limestone Fragments (ML)** 40.0-41.5' - moderate olive brown, (5Y 4/4), wet, hard, nonplastic to low plasticity, rapid dilatancy, mild to moderate HCl reaction, 5-10% very fine grained silica sand, 15-25% very fine to fine grained silica sand, medium dark gray (N4) fragments, 40.0-40.4' lens of 1/8"-1/4" thick limestone disks, all carbonate | | |
| 45 -3.2 | 45.0 – 46.3 | 1.1 | SS-10 | 16-34-50/3 (84/9") | **Silty Sand (SM)** 45.0-46.1' - moderate olive brown to light olive gray, (5Y 4/4 to 5Y 5/2), wet, very dense, fine to coarse grained, mild to moderate HCl reaction, 10% fine gravel-sized, 36% nonplastic fines, trace very fine black fragments, one 1/2"x1/4" brittle black fragment, gray staining near black fragment, all carbonate | | 15:24 45-50' with very light chatter intermittently<br>Driller's Remark: 48.5' to bottom was soft drilling (very soft) |
| 50 -8.2 | 50.0 – 50.5 | 0.5 | SS-11 | 40-50/0.5 (90/6.5") | **Silty Sand And Limestone Fragments (SM)** 50.0-50.5' - dusky yellow to moderate olive brown, (5Y 6/4 to 5Y 4/4), wet, very dense, fine to coarse grained, mild to moderate HCl reaction, 25% nonplastic fines, 60% of sample is limestone fragments 1/4"-3/8" thick disks, 1/2" to 1" fragments, trace brownish black (5YR 2/1) organic staining on limestone, all carbonate | | 15:45 Driller's Remark: 50% circulation loss<br>15:54 Driller's Remark: 52.0-53.0' soft drilling<br>16:22 Driller's Remark: last SS/SPT for B-2R, will switch to NQ coring assembly, will install 55' of 3" NW |
| 55 -13.2 | 55.0 – 55.3 | 0.3 | SS-12 | 50/4 (50/4") | **Limestone Fragments** 55.0-55.3' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), wet, mild to moderate HCl reaction<br>Begin Rock Coring at 55.5 ft bgs<br>See the next sheet for the rock core log | | 8:07 Water level on 4/19/07 is 1.2' |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-02 SHEET 4 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

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

WATER LEVELS : 4.0 ft bgs on 4/18/07 START : 4/18/2007 END : 4/19/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (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<br>8:57 Total depth tape measured at 55.5' below ground surface<br>9:12 Added 1/8 bag to mud vat<br>SC-1 collected at 57.0-58.15' |
| | R1-NQ 5 ft 76% | 62 | 3 | 56.75, 56.85' - Fractures (2), rough, undulating, open <1/8"-1/4" | | **Limestone**<br>56.7-57.0' - dusky yellow, (5Y 6/4), mild to moderate HCl reaction, extremely weak to very weak (R0 to R1), friable, 30-35% spheroidal voids <1/16" | |
| | | | 1 | 57.0' - Fracture, horizontal, rough, undulating, open <1/2"-1/16"<br>58.1' - Fracture, 60 deg, rough, undulating, tight | | 57.0-60.5' - olive gray with yellow gray mottling, (5Y 3/2 with 5Y 7/2), moderate HCl reaction, highly laminated in black discontinuous ribbons (<1/16" thick), voids <1/16" up to 20% of surface, 60.0-60.5' is yellowish gray (5Y 7/2) with 10-15% fine to medium grained organic black fragments horizontally aligned, laminations are horizontal then grade to wavy downward | |
| | | | 0 | | | | |
| 60<br>-18.2 | | | 2 | | | | R1: 13 minutes |
| | 60.5 | | | | | | |
| | R2-NQ 5 ft 90% | 75 | 0 | 60.55' - Mechanical break, rough, undulating, tight, fragments in rock matrix to 1/4" | | 60.5-61.5' - light olive gray, (5Y 5/2), moderate HCl reaction, medium strong (R3), voids <1/16" over 20-25% of surface, poorly fossiliferous (casts up to 3/8"), 10% short black discontinuous laminae <1/16" thick | |
| | | | 0 | 61.5' - Mechanical break, horizontal | | | |
| | | | 0 | 62.15' - Mechanical break, horizontal, rough, undulating, tight<br>62.4, 62.9' - Mechanical break (2), horizontal, rough, undulating, tight | | | |
| | | | 1 | 63.0' - Mechanical break, 3-7 deg, rough, undulating, tight | | | |
| 65<br>-23.2 | | | 1 | 64.5' - Mechanical break or bedding plane, horizontal, rough, undulating, open 1/4"-1" | | 61.5-65.0' - dusky yellow, (5Y 6/4), mild HCl reaction, very weak (R1), 35-40% voids up to 1/16", trace 3/16" elongated cavities, poorly fossiliferous (casts 3/16"), trace voids infilled with medium gray mineralization, medium gray staining over interval | R2: 3 minutes |
| | 65.5 | | NR | 64.8' - Fracture or mechanical break, 75-85 deg, rough, undulating, tight | | | |
| | R3-NQ 5 ft 100% | 98 | 1 | 65.6' - Mechanical break or bedding plane, horizontal, rough, planar, open 1/4" | | | |
| | | | 0 | 66.15' - Mechanical break, horizontal to 5 deg | | | |
| | | | 0 | 67.3, 67.5' - Mechanical break (2) | | **No Recovery 65.0-65.5'**<br>**Limestone**<br>65.5-70.5' - dusky yellow, (5Y 6/4), very fine grained, mild to moderate HCl reaction, very weak to medium strong (R1 to R3), voids up to 1/16" over 25-35% of surface, medium gray staining over 20% of surface, powdery feel in sections of core run | |
| | | | 2 | 68.55' - Fracture or bedding plane, rough, undulating, tight | | | |
| 70<br>-28.2 | | | 1 | 69.4' - Fracture or mechanical break, horizontal, rough, undulating, open up to 5/8"<br>69.8' - Fracture or mechanical break, horizontal, rough, undulating, tight to open 1/4", vertical stress joints from 69.8-70.35' | | | R3: 8 minutes |
| | 70.5 | | | | | | |
| | R4-NQ 5 ft 91% | 77 | 0 | | | 70.5-73.55' - moderate brown to grayish brown, (5Y 4/4 to 5Y 3/2), moderate HCl reaction, medium strong to strong (R3 to R4), voids up to 3/16" spheroidal over 30-40% of surface, trace 1/4"x3/16" elongated cavities, poorly fossiliferous (casts up to 1/4") 1" thick extremely weak (R0) rock layer at 72.1' | |
| | | | 1 | 72.1' - Bedding plane, horizontal, rough, undulating, carbonate fine infill up to 1/4" thick | | | 11:10 Additional 0.35' recovered during R5-NQ core run which belongs in the R4-NQ data.<br>Driller's Remark: Able to identify redrill marks on core pieces |
| | | | 0 | 72.8, 72.95, 73.1' - Mechanical break (3) | | | |
| | | | 1 | 73.55' - Bedding plane, 20-30 deg, rough, undulating, contact with extremely weak rock (R0) below and medium strong to strong (R3 to R4) rock above | | | |
| 75<br>-33.2 | | | 2 | | | | R4: 10 minutes |
| | 75.5 | | NR | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: B-02 | SHEET 5 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

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

WATER LEVELS : 4.0 ft bgs on 4/18/07 START : 4/18/2007 END : 4/19/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R5-NQ 5 ft 98% | 80 | 3 | 74.65' - Bedding plane or mechanical break, horizontal, rough, undulating, tight to open 1/8" | | **Limestone** 73.55-75.05' - pale greenish yellow to yellowish gray, (10Y 8/2 to 5Y 7/2), very fine grained, strong HCl reaction, very weak (R1), voids /16" over 10-15% of surface, poorly fossiliferous (casts up to 3/8"x1/8", powdery feel, trace black staining in casts) | |
| | | | 3 | 74.75' - Bedding plane or mechanical break, horizontal, smooth, planar, tight | | | |
| | | | 0 | 75.6' - Fracture, 40 deg, smooth, planar, tight, through very weak rock (R1) 75.75' - Fracture, 30 deg, smooth, planar, tight, through very weak rock (R1) | | | |
| | | | 0 | 75.8' - Fracture, 20 deg, smooth, planar, tight, through very weak rock (R1) | | **No Recovery 75.05-75.5'** | |
| | | | 0 | 76.5' - Fracture or bedding plane, horizontal, rough, undulating, open 5/8" | | **Limestone** 75.5-76.5' - yellowish gray, (5Y 7/2), very fine to medium grained, strong HCl reaction, extremely weak to very weak (R0 to R1), 35-40% of this interval is medium gray (N5), medium grained, granular appearance | |
| 80 -38.2 | 80.5 | | 0 | 76.8' - Fracture, 20-30 deg, rough, planar, open 1/8" | | | R5: 11 minutes |
| | R6-NQ 5 ft 88% | 82 | NR | 77.05' - Fracture or mechanical break, horizontal-5 deg, rough, undulating, tight | | 76.5-78.75' - light olive gray to moderate brown, (5Y 5/2 to 5Y 4/4), medium strong (R3), voids to 1/16" over 40% of surface, dark gray (N3) infill, trace casts up to 3/8", trace of 1/2" organic fragments | |
| | | | 1 | 77.95' - Mechanical break, horizontal, rough, undulating, tight | | | |
| | | | 1 | 80.9' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | | |
| | | | 0 | 81.95' - Fracture, 30 deg, rough, undulating, open 1/8"-5/8" | | | Driller's Remark: 5-10% circulation loss during run |
| | | | 0 | | | 78.75-80.4' - yellowish gray, (5Y 7/2), very fine grained, strong HCl reaction, medium strong to strong (R3 to R4), trace 1"-1-1/2" cavities infilled with secondary mineralization | |
| 85 -43.2 | 85.5 | | 1 | 84.61' - Fracture or mechanical break, horizontal, rough, undulating, open 1/8"-1/2" | | | R6: 3 minutes |
| | | | NR | | | **No Recovery 80.4-80.5'** | |
| | R7-NQ 5 ft 100% | 100 | 0 | | | **Limestone** 80.5-84.9' - dusky yellow to moderate olive brown, (5Y 6/4 to 5Y 4/4), moderate to strong HCl reaction, medium strong (R3), voids up to 1/16" over 20-25% of surface, moderately fossiliferous (casts up to 5/8"), trace medium grain black organic fragments throughout, laminations of 3/16" thick over upper most 0.2' | |
| | | | 0 | | | | |
| | | | 0 | 87.6, 88.0, 89.7' - Mechanical break (3), horizontal, rough, undulating, tight | | | |
| | | | 0 | | | | |
| 90 -48.2 | 90.5 | | 0 | | | **No Recovery 84.9-85.5'** | |
| | | | | | | **Limestone** 85.5-90.5' - light olive brown mottled olive gray, (5Y 5/6 mottled 5Y 3/2), fine to medium grained, strong HCl reaction, very weak to weak (R1 to R2), highly fossiliferous (casts, molds, microforams), yellowish gray (5Y 8/1) material as replacement infill of echinoderms, 5-10% olive gray (5Y 4/1) wavy laminations throughout interval, up to 20% bioturbated zones filled with both yellowish gray (5Y 8/1) infill around edges and medium dark gray (N4) infill inside/center, very light gray (N7) carbonate silt mottling (hard) over the last 1.0' of run, 5-10% organics (black medium grain sized fragments) as short laminations | R7: 7 minutes |
| | R8-NQ 5 ft 100% | 98 | 0 | | | | |
| | | | 2 | 91.9-92.0' - Fracture, horizontal, slickensided, undulating, clay infill, dry, soft clay 0.1' thick | | | |
| | | | 0 | 92.4, 93.0' - Mechanical break (2), horizontal, rough, undulating, tight | | | SC-2 collected at 93.0-94.1' |
| | | | 1 | 94.0' - Fracture, 40-50 deg, rough, undulating, tight to open 1/8" (fossil mold 1-1/4" x 1/2" on fracture surface), fossils are whole spiral shaped casts | | | |
| 95 -53.2 | 95.5 | | 0 | | | | R8: 10 minutes |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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

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

WATER LEVELS : 4.0 ft bgs on 4/18/07 START : 4/18/2007 END : 4/19/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | 0 | 96.2' - Mechanical break, horizontal-5 deg, rough, undulating, tight | | **Limestone**<br>90.5-95.5' - white to yellowish gray, (N9 to 5Y 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)<br>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, "powdery" chalk-like feel over entire run<br>**No Recovery 100.3-100.5'**<br>**Limestone**<br>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 <1/16" over 20-25% of surface, 130.5-131.2 is without olive mottling<br>105.5-110.5' - yellowish gray, (5Y 7/2), strong HCl 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 feel, very fossiliferous (casts from 1/8" to greater than 2"), spiral shaped casts and shell patterns<br>110.5-115.45' - no visible coral shaped casts, casts of echinoderms/ ostracods 1/4"x1/16" with white calcite mineral replacement | |
| | R9-NQ<br>5 ft<br>96% | 93 | 0 | | | | |
| | | | 1 | 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<br>98.0, 99.0, 99.2' - Mechanical break (3) | | | |
| | | | 0 | | | | |
| 100<br>-58.2 | | | 0 | | | | R9: 4 minutes |
| | 100.5 | | NR | | | | |
| | | | 1 | 100.7' - Fracture or mechanical break, horizontal, rough, undulating, open 1/16" | | | |
| | | | 0 | | | | |
| | R10-NQ<br>5 ft<br>100% | 97 | 0 | 103.0' - Mechanical break | | | |
| | | | 0 | | | | |
| 105<br>-63.2 | | | 0 | | | | R10: 5 minutes |
| | 105.5 | | | | | | |
| | | | 0 | | | | |
| | | | 2 | 106.3-109.0' - Fracture, vertical, large >2" sized fossil molds and casts along surface<br>106.65' - Fracture or mechanical break, horizontal, rough, undulating, tight | | | |
| | R11-NQ<br>5 ft<br>100% | 83 | 1 | 106.95' - Fracture or mechanical break, horizontal, rough, undulating, tight | | | |
| | | | 2 | 107.65' - Fracture, vertical, rough, undulating, >2" size fossil casts or molds along surface<br>108.5' - Fracture or mechanical break, horizontal, rough, undulating, tight | | | |
| 110<br>-68.2 | | | 0 | 108.7' - Fracture or mechanical break, horizontal, rough, undulating, tight | | | R11: 7 minutes |
| | 110.5 | | | | | | |
| | | | 1 | | | | |
| | | | 0 | 111.45' - Fracture or mechanical break, horizontal, rough, undulating, tight | | | |
| | R12-NQ<br>5 ft<br>99% | 99 | 0 | 113.0' - Mechanical break | | | |
| | | | 0 | | | | |
| 115<br>-73.2 | | | 0 | 114.3' - Fracture, 20 deg, rough, undulating, open 1/8"-1/4" | | | R12: 5 minutes |
| | 115.5 | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: B-02 | SHEET 7 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

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

WATER LEVELS : 4.0 ft bgs on 4/18/07 START : 4/18/2007 END : 4/19/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R13-NQ 5 ft 100% | 97 | 1 | 115.7' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1/8", surfaces of fracture have molds or voids filled with secondary mineralization | | **No Recovery 115.45-115.5'** **Limestone** 115.5-120.5' - yellowish gray, (5Y 7/2), strong HCl reaction, very weak (R1), very fossiliferous, microforams, casts of echinoderms/ ostracods with yellowish gray (5Y 7/2) replacement mineralization, olive gray (5Y 3/2) thin beds and laminations at 116.0', medium light gray staining from 118.0-119.0', rock sample contains 25-35% medium grain, medium dark gray (N4) fragments in rock matrix, overall the sample has a "gritty" feel | SC-3 collected at 114.5-115.5' |
| | | | 0 | 116.9' - Mechanical break, 50-60 deg, rough, undulating, tight | | | |
| | | | 0 | | | | |
| | | | 1 | | | | |
| 120 -78.2 | | | 0 | | | | R13: 8 minutes |
| | 120.5 | | | | | | |
| | R14-NQ 5 ft 98% | 80 | 1 | | | 120.5-125.4' - yellowish gray, (5Y 7/2), strong HCl reaction, weak (R2), voids <1/16" over 30-40% of surface, olive gray (5Y 3/2) staining over 20% of rock (122.0-122.7' and 124.0-124.45'), extremely weak (R0) rock at 124.35', very fine grained limestone bed from 121.35-121.75', medium strong, highly fossiliferous (microforams, casts), trace molds with white mineral replacement | |
| | | | 3 | 121.35, 121.5, 121.75, 122.05' - Fracture or mechanical break (4), horizontal, rough, undulating, open 1/16"-1/8" | | | |
| | | | 2 | 122.7' - Mechanical break, horizontal, rough, undulating, tight | | | |
| | | | 2 | 123.0' - Mechanical break 123.35, 124.45' - Bedding plane (2), horizontal, rough, undulating, open 1/16" | | | |
| 125 -83.2 | | | 0 | 123.5' - Bedding plane or mechanical break, rough, undulating, open up to 1/2" 123.75' - Mechanical break, horizontal, rough, undulating, tight | | | R14: 7 minutes |
| | 125.5 | | | | | | |
| | R15-NQ 5 ft 100% | 97 | 0 | | | **No Recovery 125.4-125.5'** **Limestone** 125.5-130.5' - yellowish gray and olive gray, (5Y 7/2 and 5Y 5/2), wavy bedded, strong HCl reaction, very weak (R1), voids <1/16" over 5-10% of surface, trace molds with white calcite mineral replacement at sizes of 5/8"x1/8" and 3/16"x1/16", medium dark gray (N4), medium grain particles over 30-40% of rock matrix | |
| | | | 0 | | | | |
| | | | 0 | 127.5, 127.65, 128.0' - Mechanical break (3), horizontal, rough, undulating | | | |
| | | | 1 | 129.0, 129.5' - Bedding plane (2), horizontal, rough, planar, tight | | | |
| 130 -88.2 | | | 2 | 129.75' - Fracture or mechanical break, horizontal, rough, undulating, open 1/4" | | | R15: 8 minutes |
| | 130.5 | | | | | | |
| | R16-NQ 5 ft 96% | 78 | 0 | | | 130.5-135.3' - Same as 125.5-130.5' except no molds with replacement mineralization, casts up to 5/8" (spiral shapes without infilling), more thinly bedded than 125.5-130.5' | |
| | | | 1 | 132.15' - Fracture, 20 deg, rough, planar, tight | | | |
| | | | 3 | 132.75' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | | |
| | | | 4 | 132.95, 133.1' - Bedding plane or mechanical break (2), horizontal, smooth, planar, tight 133.7' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1/2" | | | |
| 135 -93.2 | | | 0 | 133.95, 134.0' - Bedding plane or fracture, horizontal, smooth, undulating, tight | | | SC-4 collected at 134.35-135.3' R16: 10 minutes |
| | 135.5 | | | | | | |

| 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

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

WATER LEVELS : 4.0 ft bgs on 4/18/07 START : 4/18/2007 END : 4/19/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | NR | 134.35' - Bedding plane, horizontal, smooth, planar, tight | | **No Recovery 135.3-135.5'** | |
| | | | 0 | | | **Limestone** | |
| | | | | | | 135.5-136.8' - Same as 125.5-130.5' | |
| | | | 1 | 136.65' - Bedding plane, horizontal, rough, undulating, tight | | 136.8' - intact discontinuity | |
| | R17-NQ 5 ft 100% | 100 | 0 | | | 136.8-138.6' - yellowish gray, (5Y 7/2), medium to coarse grained, strong HCl reaction, very weak (R1), chalk-like feel, medium dark gray (N4) particles over 25-30% of matrix, 5-7% medium dark gray (N4) subrounded cavities up to 5/8" | |
| | | | 1 | 138.55' - Bedding plane or mechanical break, rough, undulating, open 5/8", exposed filled cavities on surfaces | | | |
| 140 -98.2 | | | 0 | | | 138.6-142.8' - variegated yellowish gray to grayish yellow, (5Y 7/2 to 5Y 8/4), very fine grained, strong HCl reaction, weak to medium strong (R2 to R3), voids increasing with depth (1/16") ranging from 1-2% to 15-20%, fossil molds/casts common with cavities 1-3/16"- 1-9/16" x 3/4"- 1-3/16" penetrating deep into core, few cavities filled with very weak (R0) limestone with voids more than 40-50% decreasing with depth | R17: 9 minutes |
| | 140.5 | | | | | | |
| | | | 2 | 140.35' - Mechanical break, horizontal, rough, undulating, tight<br>140.85' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | | |
| | | | 2 | 141.55' - Fracture or mechanical break, horizontal, rough, undulating, open up to 3/4" | | | |
| | R18-NQ 5 ft 98% | 82 | 1 | 141.7' - Bedding plane, horizontal, rough, undulating, <1/32" brownish black organic material infill over 100% surface, tight | | | |
| | | | 2 | 142.8' - Bedding plane, horizontal, rough, undulating, tight, horizontal mottling surface | | 142.8-145.4' - variegated yellowish gray to dusky yellow to light olive gray, (5Y 7/2 to 5Y 6/4 to 5Y 5/2), strong HCl reaction, medium strong (R3), voids over less than 1-2% of surface becoming more common with depth, thin black organic laminae from subhorizontal to vertical throughout interval, thin subvertical to vertical fractures (tight), unbroken, permeate nearly full length of interval, trace fossil casts/molds predominantly in last 0.3' of interval | |
| | | | | 144.2' - Fracture, 30 deg, rough, undulating | | | Driller's Remark: 144.0-144.5' 50-75% loss of circulation in a void (space approximately 80%) |
| 145 -103.2 | | | 0 | 144.4' - Fracture or mechanical break, horizontal, rough, undulating, open 1/2" | | | R18: 9 minutes |
| | 145.5 | | | | | | SC-5 collected at 144.4-145.4' |
| | | | 1 | 145.7' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1/2" | | | |
| | | | 0 | | | | |
| | R19-NQ 5 ft 100% | 92 | 0 | 147.7, 147.9' - Mechanical break (2), horizontal, rough, undulating, tight | | **No Recovery 145.4-145.5'** | |
| | | | | | | **Limestone** | |
| | | | 2 | 148.55, 148.6' - Bedding plane (2), horizontal, rough, undulating, crumbled rock fragment between surfaces | | 145.5-148.7' - yellowish gray mottled with light gray, (5Y 7/2 mottled with N7), fine to medium grained, strong HCl reaction, very weak (R1), sharp contact at 146.4' with rocks above containing abundant lithoclasts up to 1/2" (well rounded to rounded nodules), possibly bioclastic, lithoclasts less apparent below contact, appears to be very thinly laminated, voids and trace cavities >3/8"x1/16" over 1-3% of surface | |
| 150 -108.2 | | | 0 | | | | R19: 5 minutes |
| | 150.5 | | | | | | |
| | | | | | | 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") | Total depth is 150.5' on 4/19/07 |
| | | | | | | Bottom of Boring at 150.5 ft bgs on 4/19/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-03 SHEET 1 OF 8 |

# SOIL BORING 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

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, AWJ rods, 4-3/4" tri-cone bit ORIENTATION : Vertical

WATER LEVELS : 3.0 ft bgs on 3/26/07 START : 3/26/2007 END : 3/26/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 43.9 | 0.0 – 1.5 | 0.5 | SS-1 | 1-1-1 (2) | **Poorly Graded Sand With Organics (SP)** 0.0-0.5' - medium gray to dusky brown, (N5 to 5YR 2/2), moist, very loose, very fine to fine silica sand, organics are fines and roots | | 24" split spoon, 5' AWJ rod |
| | | | | | | | Driller switch to N-rod, 4.75" tricone roller drill bit add 12.5lb quick gel bentonite |
| | | | | | | | Water level reached at ~3.0' below ground surface based upon SS-1 and SS-2 on 3/26/07 at 12:00 |
| 5 | 5.0 | | | | | | |
| 38.9 | 6.5 | 0.9 | SS-2 | 6-7-9 (16) | **Poorly Graded Sand With Silt (SP-SM)** 5.0-5.9' - very pale orange to grayish orange, (10YR 8/2 to 10YR 7/4), wet, medium dense, very fine to fine rounded silica sand, 5% nonplastic fines as black particles and pale yellowish orange (10YR 8/6) particles, trace fine gravel-sized concretions with moderate yellowish brown (10YR 5/4) centers and grayish brown (5YR 3/2) rims, trace roots up to 3" | | |
| 10 | 10.0 | | | | | | |
| 33.9 | 11.5 | 0.8 | SS-3 | 5-6-7 (13) | **Poorly Graded Sand (SP)** 10.0-10.8' - very light gray to light gray, (N8 to N7), wet, medium dense, no HCl reaction, very fine to fine rounded silica sand, trace nonplastic fines that are predominantly black particles | | |
| | | | | | | | Driller's Remark: Hitting hard rock at 13' drilling slow |
| 15 | 15.0 | | | | | | |
| 28.9 | 16.5 | 1.1 | SS-4 | 6-4-5 (9) | **Fat Clay With Sand (CH)** 15.0-15.4' - medium light gray, (N6), wet, stiff, medium to high plasticity, no to low dilatancy, mottled with greenish gray (5G 6/1) and light olive brown (5Y 6/6), 20-25% very fine to fine rounded silica sand, trace very fine sand-sized black particles<br>**Fat Clay (CH)** 15.4-16.1' - bluish white, (5B 9/1), moist, stiff, medium to high plasticity, no to low dilatancy, no HCl reaction, mottled with grayish blue (5PB 5/2) streaks, 10% fine to medium sand-sized white particles | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-03 SHEET 2 OF 8 |

# SOIL BORING 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

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, AWJ rods, 4-3/4" tri-cone bit ORIENTATION : Vertical

WATER LEVELS : 3.0 ft bgs on 3/26/07 START : 3/26/2007 END : 3/26/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 23.9 | 20.0 – 21.5 | 1.2 | SS-5 | 6-5-5 (10) | **Lean Clay With Sand (CL)** 20.0-21.2' - light gray, (N7), wet, stiff, 30% very fine to fine grained, low plasticity, slow to no dilatancy, no HCl reaction, pale green (10GB 8/2) mottling, mottled at bottom (21.2'), trace of black particles, 50% very fine to fine silica sand, trace fine gravel-sized grains | | |
| 25 | 25.0 – 26.5 | 1.3 | SS-6 | 2-1-2 (3) | **Silty Sand (SM)** 25.0-26.25' - yellowish gray, (5Y 7/2), wet, very loose, medium grained, no HCl reaction, very fine to fine rounded silica sand, 20-30% nonplastic fines, trace of very fine sand-sized black particles | | |
| 18.9 | | | | | | | |
| 30 | 30.0 – 31.5 | 1.2 | SS-7 | 2-2-3 (5) | **Clayey Sand (SC)** 30.0-31.2' - light olive gray mottled with greenish gray and purple streaks, (5Y 6/1 with 5GY 6/1), wet, loose, no HCl reaction, very fine to fine rounded silica sand, 20% medium plastic fines, trace very fine sand-sized black particles | | |
| 13.9 | | | | | | | |
| 35 | 35.0 – 36.5 | 1.0 | SS-8 | 14-28-7 (35) | **Silt (ML)** 35.0-36.0' - light olive gray with olive black and dark yellowish brown, (5Y 5/2 with 5Y 2/1 and 10YR 4/2), wet, hard, low plasticity, rapid dilatancy, 5-10% fine sand-sized black particles, mild HCl reaction from 35.5-40.0', carbonate material, organic seam at 35.0', 0.35' thick black and brown mottling , strong organic odor | | |
| 8.9 | | | | | | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-03 SHEET 3 OF 8 |

# SOIL BORING 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

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, AWJ rods, 4-3/4" tri-cone bit ORIENTATION : Vertical

WATER LEVELS : 3.0 ft bgs on 3/26/07 START : 3/26/2007 END : 3/26/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 3.9 | 40.0 – 41.5 | 1.3 | SS-9 | 30-41-46 (87) | **Silt (ML)** 40.0-41.3' - light olive gray, (5Y 5/2), wet, very dense, fine to medium grained, mild to moderate HCl reaction, 50% nonplastic fines, trace fine gravel-sized, all carbonate, many sand-sized particles can be broken into silt sized by hand | | |
| 45 -1.1 | 45.0 – 46.5 | 1.4 | SS-10 | 29-40-46 (86) | **Silty Sand (SM)** 45.0-46.4' - light olive gray, (5Y 5/2), wet, very dense, fine to medium grained, mild to moderate HCl reaction, sand, 10% coarse sand-sized, 35-40% nonplastic fines, all carbonate | | |
| 50 -6.1 | 50.0 – 50.5 | 0.5 | SS-11 | 50/6 (50/6") | **Sandy Silt With Limestone Fragments (ML)** 50.0-50.5' - yellowish gray, (5Y 7/2), wet, hard, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 40% fine to coarse sand-sized, 1/4"-1/2" limestone lenses at top and bottom of sample, all carbonate | | Start of sampling on 3/27/07<br>Driller's Remark: Soft drilling |
| 55 -11.1 | 55.0 – 55.4 | 0.3 | SS-12 | 50/4.5 (50/4.5") | **Silt With Sand (ML)** 55.0-55.3' - yellowish gray, (5Y 7/2), wet, hard, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 20% fine to medium sand-sized, all carbonate | | Light to moderate bit chatter over 1st foot (drilling from 51.5-55.0')<br>Driller's Remark: Hard at 57', soft at 57.5', hard again at 58.3' |
| 60 | 60.0 – 60.2 | 0.2 | SS-13 | 50/2.5 (50/2.5") | **Limestone Fragments** 60.0-60.2' - light olive gray to olive gray, (5Y 5/2 to 5Y 3/2), moderate to strong HCl reaction, fossiliferous (molds), trace medium grain sized black fragments, very fine (1/32") spheroidal particles are the matrix | | |
| | | | | | Begin Rock Coring at 60.0 ft bgs<br>See the next sheet for the rock core log | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-03 SHEET 4 OF 8 |

# 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 on 3/26/07 START : 3/26/2007 END : 3/26/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -16.1 | 60.0 R1-NQ 1 ft 85% 61.0 | 85 | 0 | 60.65' - Mechanical break | | **Limestone** 60.16-61.0' - dusky yellow, (5Y 6/4), fine grained, mild to moderate HCl reaction, very weak to weak (R1 to R2), voids up to 1/16" on 15-20% of surface, no fossils | R1: 1 minute |
| | | | 2 | | | | Start at drilling 3/28/07, water level at surface (mud) at 7:55 =3/28/07 |
| | | | 2 | | | 61.0-65.9' - dusky yellow, (5Y 6/4), mild to moderate HCl reaction, weak to medium strong (R2 to R3), voids up to 3/16"x3/16" (some infilled with very fine to medium grain mineralization) voids up to 25% of surface, extremely weak carbonate silt interval from 64.3-64.6' mottled gray from 63.5-64.5', very poorly fossiliferous (trace molds) | |
| | R2-NQ 5 ft 98% | 65 | 0 | 63.05', 63.4' - Mechanical break | | | |
| | | | 3 | | | | |
| 65 -21.1 | | | 1 | | | | R2: 12 minutes |
| | 66.0 | | NR | | | **No Recovery 65.9-66.0'** | |
| | | | 0 | | | **Limestone** 66.0-71.0' - Same as 61.0-65.9' except very weak rock (peels with knife over first foot) grades to medium strong over last 3.0' of run, 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 voids (<1/16") in lower half infilled with gray mineral moderately fossiliferous (casts, molds), up to 3/8" fragment molds | |
| | | | 0 | | | | |
| | R3-NQ 5 ft 100% | 78 | 2 | 68.5', 68.6' - Fractures, 50-60 deg, rough, undulating, tight, black particles on surface | | | |
| | | | 3 | 68.95' - Bedding plane, <10 deg, top of extremely weak rock | | | |
| 70 -26.1 | | | 1 | 69.15' - Bedding plane, 40 deg, base of extremely weak rock | | | R3: 13 minutes Driller's Remark: Maintaining circulation |
| | 71.0 | | | 69.5' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | | |
| | | | >10 | 70.0' - Fracture, 60-70 deg, rough, undulating, medium black particles | | 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), 71.0-72.75' and 74.7-75.7' very weak rock (R1) peels with knife, 72.75-74.7' medium strong rock (R3) cannot be scraped with knife 72.5-75.7' - Same as 71.0-71.5' except moderate to strong HCl reaction | |
| | | | 2 | 71.15'-71.7' - Fracture zone, fractured rock core black stains on fractures | | | |
| | | | | 72.15' - Bedding plane, 0-5 deg, rough, undulating, open 5/8" | | | |
| | R4-NQ 5 ft 94% | 72 | 2 | 72.75' - Bedding plane or mechanical break, horizontal, rough, planar | | | |
| | | | 1 | 73.35'-74.35' - Fracture, rough, planar, no stains, curved fracture | | | |
| 75 -31.1 | | | 0 | 73.95' - Fracture, 40 deg, rough, planar, tight, (bisecting curved fracture) | | | R4: 23 minutes |
| | 76.0 | | NR | 74.7' - Bedding plane or mechanical break, horizontal, rough, undulating, open up to 1/2" discontinuity between rock | | **No Recovery 75.7-76.0'** | |
| | | | 2 | | | | |
| | | | 1 | 76.7' - Fracture, 80-90 deg, rough, undulating, tight | | | |
| | R5-NQ 5 ft 98% | 90 | 1 | 76.95' - Fracture, horizontal, rough, undulating, open up to 1" | | | |
| | | | 1 | 77.25' - Fracture or mechanical break, horizontal, rough, undulating, open 1/4" | | | |
| 80 | | | 1 | 78.35' - Bedding plane or mechanical break, 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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| 338884.FL | B-03 SHEET 5 OF 8 |

# 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 on 3/26/07 START : 3/26/2007 END : 3/26/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -36.1 | | | 2 | 80.5' - Fracture, 30-40 deg, rough, undulating, tight | | **Limestone**<br>76.0-80.9' - dusky yellow to moderate olive brown, (5Y 6/4 to 5Y 4/4), moderate to strong HCl reaction, spherical voids up to 1/16"x1/16" covering up to 30% of core surface, 5-10% irregularly shaped cavities up to 1-1/4", no infill, predominantly weak rock (R2), gray mottling of stains at 80.5', zone of brown lamination (very weak rock R1 at 78.35'), moderate olive brown interval from 76.0-76.6' | R5: 7 minutes |
| 81.0 | | | NR | | | | |
| | R6-NQ 5 ft 96% | 90 | 2 | 80.6' - Fracture, 10-15 deg, rough, undulating, tight<br>81.0'-81.2' - Fracture zone | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | SC-1 collected at 84.2-85.15' |
| 85<br>-41.1 | | | 0 | 85.15' - Mechanical break | | **No Recovery 80.9-81.0'**<br>**Limestone**<br>81.0-85.8' - dusky yellow, (5Y 6/4), mottled, mottled, irregular shaped cavities infilled with medium gray (N5) mineral 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 to 2"x1/2" over bottom 2.5' of run, entire run moderately fossiliferous (molds and casts), yellowish gray (5Y 8/1) clay seam at 83.2' | Driller's Remark: 100% loss of circulation at 84.5'<br>R6: 8 minutes |
| 86.0 | | | NR | | | | |
| | R7-NQ 5 ft 100% | 88 | 2 | 86.1' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1/4"<br>86.3' - Mechanical break or bedding plane, horizontal, rough, undulating, open 1/8"-1/4" | | | |
| | | | 0 | | | | |
| | | | 2 | 88.05' - Fracture, 15-20 deg, rough, undulating, tight<br>88.35' - Mechanical break, 5-10 deg, rough, planar, black stain, tight | | | |
| | | | 3 | 88.5' - Mechanical break<br>88.95' - Fracture, 70-80 deg, rough, undulating, black staining | | **No Recovery 85.8-86.0'**<br>**Limestone**<br>86.0-88.0' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), strong HCl reaction, very fine wavy very thinly bedded (1/16" thick) containing dark brown and white fossil, voids covering 40-50% of surface, 1"x1/2" cavity infilled with soft gray clay, trace medium grain black particles, medium to highly fossiliferous (casts, molds, mostly whole fossil), weak rock (R2) | |
| 90<br>-46.1 | | | 0 | 89.5', 89.6' - Bedding plane or mechanical break, 5-10 deg, rough, planar, black stains, tight | | | R7: 12 minutes |
| 91.0 | | | | | | | |
| | | | 1 | 90.65' - Mechanical break<br>91.6' - Fracture, 60-70 deg, rough, undulating, tight | | | |
| | | | 0 | | | | |
| | R8-NQ 5 ft 100% | 100 | 0 | | | 88.0-91.0' - Same as 86.0-88.0' except dusky yellow, (5Y 6/4), very fine grained, weak (R2), poorly fossiliferous (molds, casts, whole fossil), 5-10% black particles, organic bedding/lamination at 89.5-98.0' | |
| | | | 0 | | | | |
| 95<br>-51.1 | | | 0 | | | 91.0-96.0' - Same as 88.0-91.0' except discontinuous wavy black lamination at 92.0', highly fossiliferous | R8: 6 minutes |
| 96.0 | | | | | | | |
| | | | 2 | 96.3', 96.85', 96.55' - Fractures (3), horizontal, rough, undulating, tight | | 96.0-100.9' - Same as 88.0-91.0' except highly fossiliferous at 98.5-99.7' | |
| | | | 0 | | | | SC-2 collected at 96.85-97.8' |
| | R9-NQ 5 ft 98% | 88 | 1 | | | | |
| | | | 1 | 98.95' - Fracture, horizontal, rough, undulating, 1/8" relief | | | |
| 100 | | | | | | | |

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|---|---|
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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 on 3/26/07 START : 3/26/2007 END : 3/26/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -56.1 | | | 2 | 99.7' - Fracture, 10 deg, rough, undulating, open | | | R9: 8 minutes |
| 101.0 | | | NR | 100.65', 100.75' - Bedding plane, rough, planar, 1/16" relief (bedding plane fracture) | | **No Recovery 100.9-101.0'** | |
| | | | 1 | 101.2' - Mechanical break<br>101.25' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1/4" | | **Limestone**<br>101.0-106.0' - Same as 88.0-91.0' except highly fossiliferous at 101.3-102.1' and 103.5-104.2' | |
| | | | 0 | | | | |
| | R10-NQ 5 ft 100% | 96 | 0 | 103.5', 104.2' - Mechanical break (2) | | | |
| | | | 0 | 104.25', 104.7', 105.25', 105.65' - Mechanical break (4), horizontal, rough, undulating, tight | | | |
| 105 -61.1 | | | 0 | | | | R10: 8 minutes |
| 106.0 | | | | | | | |
| | | | 0 | | | 106.0-109.0' - yellowish gray, (5Y 7/2), strong HCl reaction, very weak to weak (R1 to R2), gray mottling, staining over 106.0-109.0', 10-15% spherical voids (<1/16"), poorly fossiliferous (molds mostly casts up to 1/8" in size), 25-30% very fine grain white and dark gray particles | |
| | | | 0 | | | | |
| | R11-NQ 5 ft 100% | 92 | 1 | 108.6' - Fracture, 60-70 deg, rough, undulating, tight | | | |
| | | | 2 | 109.0' - Bedding plane or mechanical break, horizontal, smooth, planar | | 109.0-111.0' - Same as 106.0-109.0' except yellowish gray, (5Y 8/1) | |
| 110 -66.1 | | | 2 | 109.8' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1/4"<br>110.2' - Bedding plane or mechanical break, horizontal, smooth, planar, open 1/8" | | | R11: 7 minutes |
| 111.0 | | | | | | | |
| | | | 1 | 110.35' - Bedding plane or mechanical break, horizontal, rough, undulating, open up to 5/8" | | 111.0-113.0' - yellowish gray, (5Y 8/1), strong HCl reaction, very weak to weak (R1 to R2), up to 10% elongated cavities up to 1/4"x1/2" rimmed with secondary mineralization, trace fossil casts up to 1/2" | |
| | | | 2 | 111.3' - Bedding plane or mechanical break, horizontal, rough, undulating, 1/8" open<br>111.6' - Mechanical break, <10 deg, rough, undulating, tight | | | |
| | R12-NQ 5 ft 100% | 80 | 2 | 112.0' - Mechanical break, <10 deg, rough, undulating, tight | | 113.0-116.0' - white, (N9), strong HCl reaction, very weak to weak (R1 to R2), mottled with soft white clay, poorly fossiliferous (casts and molds up to 1/4") more larger voids, voids are spheroidal and up to 1/16", no infill | |
| | | | 1 | 112.9' - Mechanical break or bedding plane, <10 deg, rough, undulating, tight | | | |
| 115 -71.1 | | | 1 | 113.7-113.95' - Fracture zone, rough, undulating, gray stains, also brown stains<br>114.4' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | | R12: 5 minutes |
| 116.0 | | | | | | | |
| | | | 1 | 115.35' - Bedding plane or mechanical break, rough, undulating, tight to 1/8" gap | | 116.0-119.5' - yellowish gray, (5Y 7/2), strong HCl reaction, very weak to weak (R1 to R2), grades from moderate to highly fossiliferous from 116.0-119.0' (casts, molds) up to 1/2"x1/2" micro fossils, gray staining predominantly over 117.0-119.0' | SC-3 collected at 115.1-116.0' |
| | | | 5 | 116.45' - Bedding plane or mechanical break, horizontal, rough, undulating, open up to 1/4"<br>117.2' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | | |
| | R13-NQ 5 ft 100% | 72 | 1 | 117.4' - Fracture, 60-70 deg, rough, undulating, open 1/8" | | | |
| | | | 2 | 117.55' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1/8"<br>117.65' - Mechanical break, horizontal, smooth, planar, open 1/8" | | | |
| 120 | | | | | | | |

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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 on 3/26/07 START : 3/26/2007 END : 3/26/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -76.1 | | | 1 | 117.9' - Mechanical break or bedding plane, rough, undulating, tight | | **Limestone** | R13: 7 minutes |
| | 121.0 | | | 118.25' - Mechanical break or bedding plane, <10 deg, rough, undulating, tight | | 119.5-120.5' - Same as 116.0'-119.5' except grayish yellow, (5Y 8/4), up to 25% spheroidal voids (<1/16") | |
| | | | 2 | 119.45' - Mechanical break or bedding plane, <10 deg, rough, undulating, dark gray stains, open up to 1/2" | | 120.5-121.0' - Same as 116.0'-119.5' except yellowish gray, (5Y 8/1), very fine grained, trace voids, 15% elongated cavities up to 1/8"x1/2", poorly fossiliferous | Chalk like or powder like rock, this run contains rock with vertical fractures- possible stress related to over burden |
| | | | 0 | 119.65' - Bedding plane, horizontal | | | |
| | R14-NQ 5 ft 80% | 75 | 2 | 120.3' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1/8" gap | | 121.0-125.0' - yellowish gray, (5Y 8/1), strong HCl reaction, very weak to weak (R1 to R2), 10% voids up to 1/16", wavy bedded discontinuity 1/2" thick at 122.0', gray staining over entire interval, poorly fossiliferous (casts), trace dark gray very fine particles, upper most 1' is the same as the bottom of R13 | |
| | | | 1 | 121.75' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | | |
| 125 -81.1 | | | NR | 121.85' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | | SC-4 collected at 124.5-125.0' |
| | 126.0 | | | 123.05' - Bedding plane or mechanical break, horizontal, rough, planar, tight | | | R14: 5 minutes |
| | | | | 123.35, 123.55' - Mechanical break | | | Driller's Remark: Soft drilling at 124.5-125.0' |
| | | | | 123.9' - Mechanical break, rough, planar, tight | | **No Recovery 125.0-126.0'** | |
| | | | 1 | 124.05' - Mechanical break or bedding plane, smooth, planar, tight | | **Limestone** | |
| | | | 2 | 126.5' - Mechanical break or bedding plane, horizontal, rough, planar, open 1/16" | | 126.0-129.6' - yellowish gray with moderate gray staining, (5Y 8/1), strong HCl reaction, 126-128.5' is very fine chalk-like feel, poorly fossiliferous (trace casts), 25% spheroidal voids (mostly 1/16"x1/16"), trace cavities up to 1/2"x1/4" | |
| | R15-NQ 5 ft 72% | 52 | 2 | 127.0' - Mechanical break, horizontal, rough, undulating, tight | | | |
| | | | 2 | 127.3-127.45' - Fracture zone | | | |
| | | | | 128.3' - Mechanical break or bedding plane, horizontal, rough, undulating, open 1/16" | | | |
| 130 -86.1 | | | NR | 128.8' - Mechanical break, horizontal, rough, undulating, tight | | 128.5-129.6' highly fossiliferous (casts, molds, micro fossil), 20-25% cavities partially filled (rimmed with calcite) | |
| | 131.0 | | | 129.02-129.05' - Fracture zone | | | R15: 7 minutes |
| | | | | 129.4' - Bedding plane or mechanical break, horizontal, rough, undulating, tight, assume core loss from bottom of run | | **No Recovery 129.6-131.0'** | Driller's Remark: Soft lense from 127.0-128.0' |
| | | | >10 | | | **Limestone** | Appears similar to 90-115', a vertical fracture in this interval is over 1.5' long |
| | | | >10 | 132.0' - Mechanical break, horizontal, rough, planar, for horizontals, vertical stained set of fractures at 132', 80-100% surface covered. | | 131.0-135.0' - Same as 126.0-128.5' except bottom most 0.5' returns to "clean" un-stained yellowish gray (5Y 8/1) | |
| | R16-NQ 5 ft 80% | 10 | >10 | | | | |
| | | | 2 | | | | |
| 135 -91.1 | | | NR | | | **No Recovery 135.0-136.0'** | R16: 7 minutes |
| | 136.0 | | | | | | |
| | | | 0 | | | **Limestone** | |
| | | | >10 | 137.45' - Bedding plane, 15-20 deg, brownish black stains, tight | | 136.0-137.45' - light olive gray, (5Y 6/1), strong HCl reaction, strong (R4), wavy black mineralization laminae, trace cavities up to 1-1/2" long | |
| | R17-NQ 5 ft 96% | 64 | >10 | 137.8-138.15' - Fracture zone, up to 2" subrounded pieces | | | |
| | | | 2 | 138.35' - Fracture or mechanical break, 70-80 deg | | | |
| 140 | | | | | | | |

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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 on 3/26/07 START : 3/26/2007 END : 3/26/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -96.1 | | | 1 | 138.5-138.75' - Fracture zone, brownish black stains | | **Limestone** | R17: 8 minutes |
| | 141.0 | | NR | 139.35' - Bedding plane or mechanical break, horizontal, rough, undulating, open up to 1/2" | | 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 secondary mineral, poorly to moderately fossiliferous (casts, molds), fossils up to 3/4" | Stopped drilling at 141.0' on 3/28/07 Starts drilling from 141.0' on 3/29/07, 08:01 water level to 3'10" below ground surface in NQ barrel |
| | | | 1 | 139.55' - Fracture or mechanical break, 40-50 deg, rough, undulating, open up to 1/2" | | | |
| | | | 0 | 140.25' - Mechanical break or bedding plane, horizontal, rough, undulating | | | |
| | R18-NQ 5 ft 100% | 88 | 1 | 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 | | **No Recovery 140.8-141.0'** **Limestone** 141.0-146.0' - light olive gray, strong HCl 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 medium strong (R3) limestone | |
| | | | 0 | 143.4', 143.5', 143.85', 144.15', 144.55' - Mechanical break (5), horizontal, rough, undulating, tight | | | |
| 145 -101.1 | | | 2 | 144.55' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | | R18: 9 minutes |
| | 146.0 | | | 145.8' - Bedding plane or mechanical break, horizontal, rough, undulating, 1/8" gap between weaker rock above and stronger rock below | | | |
| | | | 0 | | | 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 20-30% of surface, trace cavities elongated horizontally 1"x1/4" in size, trace fossil (casts/molds) | |
| | | | 1 | 147.55' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | | |
| | R19-NQ 5.2 ft 100% | 100 | 2 | 148.05', 148.5', 149.4' - Bedding plane or mechanical break (3), horizontal, rough, planar, 148.5' has organic black infill <1/16" thick | | | SC-5 collected at 148.5-149.45' |
| | | | 1 | | | 148.5-149.45' - very weak (R1), stratified section of yellowish gray and brownish black lamination, rock has powdery feel to touch | |
| 150 -106.1 | | | 0 | | | 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 | 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 |
| | 151.2 | | | | | Bottom of Boring at 151.2 ft bgs on 4/3/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
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# SOIL BORING LOG

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

WATER LEVELS : 3.0 ft bgs on 4/10/07 START : 4/10/2007 END : 4/17/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.8 | 0.0 – 1.5 | 1.1 | SS-1 | 1-2-2 (4) | **Topsoil** 0.0-0.15' - brownish black, (5YR 2/1), moist, 30-35% roots<br>**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 | | Samples taken using 5' sections of N-rod, 3-7/8" tricone drag bit, 50 lb bags of quick gel brand bentonite<br>08:40 Water level at 3.0' below ground surface based on SS-1 moist, SS-2 wet |
| 5 | 5.0 | | | | | | |
| 37.8 | 5.0 – 6.5 | 1.0 | SS-2 | 2-2-2 (4) | **Poorly Graded Sand (SP)** 5.0-6.0' - grayish orange to pale yellowish brown mottled with trace dusky brown, (10YR 7/4 to 10YR 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 | | |
| 10 | 10.0 | | | | | | |
| 32.8 | 10.0 – 11.5 | 0.9 | SS-3 | 4-6-7 (13) | **Poorly Graded Sand To Clayey Sand (SP-SC)** 10.0-10.9' - yellowish gray, (5Y 7/2), wet, very fine to fine grained, grading from sand (SP) to clayey silt (SC) with depth, trace nonplastic fines in SP, 25-30% low to medium plastic fines in SC, trace of angular shaped black particles | | |
| 15 | 15.0 | | | | | | |
| 27.8 | 15.0 – 16.5 | 1.2 | SS-4 | 7-10-12 (22) | **Silty Sand (SM)** 15.0-16.2' - yellowish gray, (5Y 7/2), wet, medium dense, very fine to fine grained, 25-30% nonplastic 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 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
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# SOIL BORING LOG

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

WATER LEVELS : 3.0 ft bgs on 4/10/07 START : 4/10/2007 END : 4/17/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.8 | 20.0 – 21.5 | 1.2 | SS-5 | 9-10-9 (19) | **Silty Sand (SM)** 20.0-21.2' - yellowish gray, (5Y 7/2), wet, very fine to fine grained, 14% nonplastic fines, trace very fine angular black particles, silica sand | | |
| 25 | 25.0 – 26.5 | 1.3 | SS-6 | 5-6-5 (11) | **Clayey Sand (SC)** 25.0-25.1' - dark yellowish orange, (10YR 6/6), moist, very fine to fine grained, 30-35% medium plastic fines, silica sand<br>**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<br>**Fat Clay (CH)** 25.4-25.7' - grayish black, (N2), moist, high plasticity, no dilatancy | | |
| 30 | 30.0 – 31.5 | 1.4 | SS-7 | 7-11-41 (52) | **Silty Sand (SM)** 25.7-26.0' - light brown, (5YR 5/6), wet, fine to medium grained, strong HCl reaction, 25-30% low plastic fines carbonate derived<br>**Silty Sand (SM)** 26.0-26.3' - grayish yellow, (5Y 8/4), wet, fine to medium grained, strong HCl reaction, 25% nonplastic fines, pockets of yellowish gray (5Y 8/1) material<br>**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 | | 09:36 Driller's Remark: Will change to 3-7/8" tricone roller bit |
| 35 | 35.0 – 36.5 | 1.5 | SS-8 | 3-4-14 (18) | **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% very fine to fine grained sand, 1" angular limestone fragments at bottom of sample | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-04 SHEET 3 OF 8 |

# SOIL BORING LOG

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

WATER LEVELS : 3.0 ft bgs on 4/10/07 START : 4/10/2007 END : 4/17/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.8 | 40.0 – 41.5 | 1.4 | SS-9 | 5-5-9 (14) | **Silt With Sand (ML)** 40.0-41.4' - light gray mottled with yellowish gray, (N7 mottled with 5Y 7/2), wet, nonplastic, rapid dilatancy, very strong HCl reaction, 20% very fine to fine sand, all carbonate | | |
| 45 -2.2 | 45.0 – 46.5 | 1.5 | SS-10 | 6-10-14 (24) | **Elastic Silt With Sand And Limestone Fragments (MH)** 45.0-46.5' - medium light gray, (N7), wet, low to medium plasticity, rapid dilatancy, very strong HCl reaction, 25% fine to medium grained sand, 10-15% fine to coarse grained gravel limestone fragments, all carbonate | | |
| 50 -7.2 | 50.0 – 51.5 | 1.0 | SS-11 | 17-17-18 (35) | **Silty Sand (SM)** 50.0-51.0' - medium gray, (N5), wet, dense, fine to coarse grained, very strong HCl reaction, predominantly fossils including shell fragments, 20% low plastic fines | | |
| 55 -12.2 | 55.0 – 56.5 | 1.5 | SS-12 | 15-24-33 (57) | **Sandy Silt (ML)** 55.0-56.5' - very light gray, (N8), wet, low plasticity, rapid dilatancy, very strong HCl reaction, 30% fine to coarse grained sand, fossils and fossil fragments ranging from yellowish gray to medium dark gray (5Y 5/1 to 5Y 8/1) | | |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-04 SHEET 4 OF 8 |

# SOIL BORING LOG

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

WATER LEVELS : 3.0 ft bgs on 4/10/07 START : 4/10/2007 END : 4/17/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -17.2 | 60.0 – 61.5 | 1.5 | SS-13 | 28-27-24 (51) | **Silty Sand With Gravel (SM)** 60.0-61.5' - medium light gray, (N6), wet, very dense, fine to coarse grained, very strong HCl reaction, predominantly fossil fragments, 25-30% low to medium plastic fines, 15% fine gravel-sized fragments composed of shale fragments | | 10:58 Driller's Remark: Change mud vat, add 1/4 bag (50 lb), quick gel bentonite |
| 65 | 65.0 | | | | | | |
| -22.2 | 65.8 | 0.8 | SS-14 | 37-50/4.0 (87/10") | **Silty Sand (SM)** 65.0-65.8' - very light gray to light gray mottled with 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 | | |
| 70 | 70.0 | | | | | | |
| -27.2 | 71.5 | 1.5 | SS-15 | 24-26-30 (56) | **Silty Sand (SM)** 70.0-71.5' - Same as 65.0-65.9' | | |
| 75 | 75.0 | | | | | | |
| -32.2 | 76.5 | 1.5 | SS-16 | 11-12-15 (27) | **Clay With Sand (CL)** 75.0-75.8' - grayish green mottled with grayish green and brownish black, (10GY 5/2 mottled with 10G 4/2 and 5Y 2/1), moist, very stiff, high plasticity, no dilatancy, mild HCl reaction, 25% very fine to fine silica sand; irregular shaped, laminated bedding; brownish black material may be organics<br>**Elastic Silt With Sand (MH)** 75.8-76.5' - yellowish gray, (5Y 8/1), moist to wet, low 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 75.7-75.8' | | Transitional boundary between CH/MH subunits |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-04 SHEET 5 OF 8 |

# SOIL BORING LOG

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

WATER LEVELS : 3.0 ft bgs on 4/10/07 START : 4/10/2007 END : 4/17/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -37.2 | 80.0<br>80.9 | 0.9 | SS-17 | 18-50/4.5<br>(68/10.5") | **Clayey Sand (SC)**<br>80.0-80.9' - light olive gray mottled with dusky yellow 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<br>CH- dusky blue green, (5BG 3/2), with very shiny appearance, no HCl reaction<br>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 | | 14:29 Driller's Remark: Observed hard drilling light rig bouncing |
| 85 | 85.0 | | | | | | |
| -42.2 | 85.2 | 0.1 | SS-18 | 50/2<br>(50/2") | **Limestone Fragments**<br>85.0-85.1' - light olive gray, (5Y 5/2), moderate to strong HCl reaction, organic fragments | | 14:49 Driller's Remark: Light rig bouncing over entire 5-foot run to 90' |
| 90 | 90.0 | | | | | | |
| -47.2 | 90.3 | 0.3 | SS-19 | 50/4<br>(50/4") | **Silt (ML)**<br>90.0-90.3' - yellowish gray mottled with medium dark gray, (5Y 7/2 mottled with N4), moist, low plasticity, rapid dilatancy, strong HCl reaction, brownish black irregular laminations, organics at bottom of sample, carbonate derived | | |
| 95 | 95.0 | | | | | | |
| -52.2 | 95.9 | 0.7 | SS-20 | 40-50/4.5<br>(90/10.5") | **Sandy Silt (ML)**<br>95.0-95.7' - yellowish gray, (5Y 8/1), wet, low plasticity, rapid dilatancy, strong HCl reaction, 25-30% fine to medium grained sand, 5% coarse grained sand, all carbonate derived | | |
| 100 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-04 SHEET 6 OF 8 |

# SOIL BORING LOG

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

WATER LEVELS : 3.0 ft bgs on 4/10/07 START : 4/10/2007 END : 4/17/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -57.2 | 100.0 | 0.3 | SS-21 | 50/4 (50/4") | **Sandy Silt (ML)** 100.0-100.3' - Same as 95.0-95.7' except limestone lens 0.1' thick at bottom of sample | | 16:10 Driller's Remark: Last sample of 4/10/07, end of drilling 08:15 Water level at 2.5' below ground surface on 4/11/07 4/11/07 Adding 5' sections of AWJ to reach depth |
| 105 | 105.0 | | | | | | |
| -62.2 | 106.0 | 0.8 | SS-22 | 41-50/5.5 (91/11.5") | **Silt With Sand (ML)** 105.0-105.8' - yellowish gray mottled with gray, (5Y 8/1 mottled with N5), moist, low plasticity, rapid dilatancy, strong HCl reaction, 20% fine to medium grained sand, trace wafer shaped limestone lenses <1/8" thick, one 1/2" dark yellowish orange coarse fragment, all carbonate | | 09:44 Starting drilling to 105' added 1/2 bag bentonite |
| 110 | 110.0 | | | | | | |
| -67.2 | 110.9 | 0.8 | SS-23 | 33-50/5 (83/11") | **Silty Sand (SM)** 110.0-110.8' - yellowish gray, (5Y 8/1), wet, fine to coarse grained, strong HCl reaction, 10-15% fine gravel-sized, 25-30% low to medium plastic fines, all carbonate | | 10:36 Driller's Remark: 33-50/5" (83/11") Add 1/2 bag bentonite to mud vat |
| 115 | 115.0 | | | | | | |
| -72.2 | 116.5 | 1.5 | SS-24 | 1-1-3 (4) | **Sandy Clay With Silt (CL-ML)** 115.0-116.5' - olive gray mottled with greenish black, (5Y 4/1 mottled with 5GY 2/1), low plasticity, slow dilatancy, moderate to strong HCl reaction, 15-20% of clay is fine to coarse grained sand; fossils and fossil fragments; the clay is irregularly interbedded with 30% light olive gray (5Y 6/1) fine grained, poorly graded silica sand (SP) | | |
| 120 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-04 SHEET 7 OF 8 |

# SOIL BORING LOG

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

WATER LEVELS : 3.0 ft bgs on 4/10/07 START : 4/10/2007 END : 4/17/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: 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 (ML)** 120.0-120.3' - yellowish gray, (5Y 8/1), moist, strong HCl reaction, 50% limestone fragments, 20% fine to medium sand-sized material, all carbonate | | |
| 125 | 125.0 | | | | | | |
| -82.2 | 125.3 | 0.2 | SS-26 | 50/3 (50/3") | **Silt (ML)** 125.0-125.2' - yellowish gray, (5Y 8/1), moist, low plasticity, rapid dilatancy, strong HCl reaction, 5-10% fine to medium sand-sized, all carbonate | | |
| 130 | 130.0 | | | | | | |
| -87.2 | 130.3 | 0.3 | SS-27 | 50/3 (50/3") | **Silt With Sand (ML)** 130.0-130.3' - Same as 125.0-125.2' except 20-25% fine to coarse sand-sized material | | 14:20 Driller's Remark: Light rig chatter at 133.5', 131.5' |
| 135 | 135.0 | | | | | | |
| -92.2 | 135.1 | 0.1 | SS-28 | 50/1 (50/1") | **Limestone Fragment** 135.0-135.1' - yellowish gray, (5Y 7/2), moderate to strong HCl reaction, trace olive gray (5Y 3/2) staining, fossil casts, fragment is a 1" disc shaped<br>Begin Rock Coring at 136.0 ft bgs<br>See the next sheet for the rock core log | | 15:02 Driller's Remark: Will switch to NQ coring, last soil sample for B-4 boring |
| 140 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-04 SHEET 8 OF 8 |

# ROCK CORE LOG

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

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

WATER LEVELS : 3.0 ft bgs on 4/10/07 START : 4/10/2007 END : 4/17/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 136.0 | | | | | **Limestone** | 4/12/07 Start coring at 09:40:15 from 136-141' |
| | | | 2 | 136.5, 136.9' - Fractures (2), horizontal, rough, undulating | | 136.0-137.35' - light olive gray, (5Y 5/2), fine to medium grained, strong HCl reaction, medium strong (R3), voids (<1/16") on 20% of surface, cavities (3/16" - 1-3/4"), secondary crystallization in 35-40% of surface, fossiliferous | The interval from 135.0-136.0' was drilled down to set a 5' stroke; no data for 135.0-136.0' is available |
| | | | 2 | 137.3' - Fracture or bedding plane, horizontal, smooth | | | 07:45 Water level at 7' 10" |
| | R1-NQ 5 ft 92% | 74 | 1 | 137.35' - Fracture, horizontal, smooth<br>137.8, 138.5' - Fractures (2), horizontal, rough, undulating | | 137.35-137.39' - light olive gray, (5Y 5/2), very fine grained, moderate to mild HCl reaction, extremely weak (R0), fine wavy laminations | |
| 140 -97.2 | | | 2 | 139.8' - Fracture, <10 deg, rough, undulating | | 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), weaker with depth, voids (<1/16") on <5% of surface, irregular laminations, powder feel increases with depth, shell fragments, fossiliferous (casts, molds) | R1: 25 minutes |
| | 141.0 | | NR | 140.4' - Fracture, 20-30 deg, rough, undulating | | | |
| | | | >10 | 141.6-142.6' - Fracture zone, 70-80 deg, rough, <20 deg at 142.6' and 146.6', rough, undulating | | | R2-NQ is the first run on 4/17/07<br>08:45 Water level at 6.5' below ground surface |
| | | | >10 | | | | |
| | R2-NQ 5 ft 98% | 78 | 0 | 143.1, 143.5' - Mechanical break (2) | | **No Recovery 140.6-141.0'**<br>**Limestone**<br>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 HCl 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 gray stains at 144.5' | |
| | | | 1 | 144.0' - Mechanical break or bedding plane, horizontal, open 3/8", clay infill, very soft | | | |
| 145 -102.2 | | | 2 | 145.45' - Fracture or mechanical break, 50-60 deg, rough, undulating, black staining on 70% surface | | | R2: 8 minutes |
| | 146.0 | | NR | | | | |
| | | | >10 | 145.75' - Bedding plane or fracture, vertical, rough, undulating, black stains on 60-70% of surface, tight | | **No Recovery 145.9-146.0'**<br>**Limestone**<br>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'<br>SC-1 collected at 147.35-148.4' |
| | | | 2 | 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") | | | |
| | R3-NQ 5 ft 72% | 19 | 5 | 147.05' - Fracture or bedding plane, horizontal, rough, undulating, open 1/8", black stains over 25% of surface | | | |
| | | | 4 | | | | |
| 150 -107.2 | | | NR | 147.4' - Fracture, 20-30 deg, rough, undulating, black staining over 100% of surface, open 1/32" | | **No Recovery 149.6-151.0'** | R3: 4 minutes<br>End of B-4 boring at 151.0' below ground surface on 4/17/07 |
| | 151.0 | | | 148.5' - Fracture, 40 deg, rough, undulating, 100% black staining, tight<br>148.55' - Fracture or mechanical break, rough, undulating, black staining over 100% of surface, tight<br>148.7, 148.8, 149.0' - Mechanical break or bedding plane (3), rough, undulating, tight to open 1/16"<br>149.15' - Fracture or mechanical break, horizontal, black stains on 80% surface, open 1/4"-1/2"<br>149.45' - Fracture or mechanical break, 40-50 deg, rough, undulating, tight<br>149.55' - Mechanical break or bedding plane, horizontal, rough, undulating, open 1/2"- 5/8" | | Bottom of Boring at 151.0 ft bgs on 4/14/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-04A SHEET 1 OF 9 |

# SOIL BORING 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

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

WATER LEVELS : 25.0 ft bgs on 6/14/07 START : 6/12/2007 END : 6/13/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.0 | 0.0 – 1.5 | 1.3 | SS-1 | 1-2-3 (5) | **Poorly Graded Sand Grading To Poorly Graded Sand With Silt (SP)** 0.0-1.3' - light gray grading to dark yellowish orange, (N7 to 10YR 6/6), moist, no HCl reaction, trace to 10-15% nonplastic fines, very fine to fine silica sand, trace roots | | "Water level is based on Ground Water Monitoring at LNP site (FSAR Table 2.4.12.08)" |
| 5 | 5.0 | | | | | | |
| 37.0 | 5.0 – 6.5 | 0.9 | SS-2 | 3-6-7 (13) | **Silty Sand (SM)** 5.0-5.3' - black with orange staining, matrix is dark yellowish orange, (10YR 6/6), wet, loose, no HCl reaction, predominantly coarse sand to 3/16", 20% nonplastic fines, angular to rounded sand | | Sand in 5.0-5.3' may be pyrite |
| | | | | | **Clayey Sand (SC)** 5.3-5.6' - dusky yellow green, (5GY 5/2), moist, no HCl 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 | 10.0 | | | | | | |
| 32.0 | 10.0 – 11.5 | 0.4 | SS-3 | 9-8-7 (15) | **Silt With Sand (ml) To Silty Sand (SM)** 10.0-10.4' - grayish orange, (10YR 7/4), wet, medium dense, very fine to fine grained, mild to moderate HCl reaction, nonplastic fines, carbonate material, sample is 50% ML and 50% SM, trace black sand | | |
| 15 | 15.0 | | | | | | |
| 27.0 | 15.0 – 16.5 | 1.0 | SS-4 | 2-3-11 (14) | **Silty Sand (SM)** 15.0-16.0' - yellowish gray, (5Y 8/1), with mottling and streaking, wet, nonplastic, mild to moderate HCl reaction, 51% fine sand, trace fine gravel-sized (limestone) fragments, carbonate material | | Driller's Remark: 10-15% circulation loss at 16.5' |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

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

WATER LEVELS : 25.0 ft bgs on 6/14/07 START : 6/12/2007 END : 6/13/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.0 | 20.0 – 21.5 | 0.7 | SS-5 | 22-22-12 (34) | **Silty Sand (SM)** 20.0-20.7' - pale yellowish gray, (5Y 8/1), wet, dense, medium to coarse grained, mild HCl reaction, 45% nonplastic fines, carbonate material | | Blind drill to 20.0' after moving drill rig due to split spoon shoe lost in previous hole Begin SPTs at 20.0'. Each of the following samples belong to the redrilled hole B-04A. |
| 25 / 17.0 | 25.0 – 25.5 | 0.4 | SS-6 | 50/5.5 (50/5.5") | **Silt (ML)** 25.0-25.4' - grayish orange, (10YR 7/4), wet, nonplastic, mild to moderate HCl reaction, trace to 10% fine to medium sand-sized material, streaks of white in matrix and trace fine sand-sized green material, carbonate material | | |
| 30 / 12.0 | 30.0 – 31.5 | 0.6 | SS-7 | 13-8-3 (11) | **Silt With Sand (ML)** 30.0-30.6' - grayish orange, (10YR 7/4), wet, nonplastic, mild HCl reaction, up to 25% fine to coarse sand-sized material decreasing with depth, carbonate material | | |
| 35 / 7.0 | 35.0 – 35.1 | 0.0 | SS-8 | 50/1.5 (50/1.5") | **No Recovery 35.0-35.1'** | | Driller's Remark: some chatter at 35.0-36.0' |
| 40 | | | | | | | Driller's Remark: smooth at 38.0' |

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

# SOIL BORING 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

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

WATER LEVELS : 25.0 ft bgs on 6/14/07 START : 6/12/2007 END : 6/13/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.0 | 40.0 40.4 | 0.4 | SS-9 | 50/5 (50/5") | **Silt With Sand (ML)** 40.0-40.4' - olive gray, (5Y 4/1), wet, nonplastic to low plasticity, mild to moderate HCl reaction, 20-25% very fine sand, carbonate material | | Driller's Remark: 35.0-40.0' fairly hard |
| 45 -3.0 | 45.0 45.2 | 0.1 | SS-10 | 50/2.5 (50/2.5") | **Limestone Fragments** 45.0-45.1' - olive gray, (5Y 4/1), mild HCl reaction, a few limestone fragments and silt as in 40.0-40.4' | | |
| 50 -8.0 | 50.0 51.1 | 1.0 | SS-11 | 48-50-50/1 (100/7") | **Silty Sand (SM)** 50.0-51.0' - olive gray mottled with light gray, (5Y 4/1 mottled with 5Y 6/1), wet, very dense, fine to coarse grained, moderate HCl reaction, 30-40% low plastic fines, carbonate material | | Driller's Remark: drilling remains fairly hard |
| 55 -13.0 | 55.0 55.1 | 0.1 | SS-12 | 50/1 (50/1") | **Limestone Fragments** 55.0-55.1' - olive gray, (5Y 4/1), mild to moderate HCl reaction, limestone fragments | | A few limestone fragments and silt |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
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# SOIL BORING 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

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

WATER LEVELS : 25.0 ft bgs on 6/14/07 START : 6/12/2007 END : 6/13/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -18.0 | 60.0 | 0.1 | SS-13 | 50/1 (50/1") | **Limestone Fragments** 60.0-60.1' - olive gray, (5Y 4/1), moderate HCl reaction, limestone fragments | | Driller's Remark: 60.0-65.0' drilling slows and becomes much harder |
| | | | | | | | Driller's Remark: very hard at 63.0' |
| 65 -23.0 | 65.0 65.1 | 0.1 | SS-14 | 50/1 (50/1") | **Limestone Fragments** 65.0-65.1' - Same as 60.0-60.1' Begin Rock Coring at 65.0 ft bgs See the next sheet for the rock core log | | switch to rock coring, see rock core log |
| 70 -28.0 | | | | | | | |
| 75 -33.0 | | | | | | | |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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 ORIENTATION : Vertical

WATER LEVELS : 25.0 ft bgs on 6/14/07 START : 6/12/2007 END : 6/13/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -23.0 | 65.0 | | | | | | |
| | R1-NQ 5 ft 38% | 19 | 2 | 65.7, 65.85, 66.2' - Fractures (3), <10 deg, rough, undulating, open 3/16" | | **Limestone** 65.0-65.4' - pale yellowish brown, (10YR 6/2), medium grained, moderate HCl reaction, very weak (R1), voids (up to 1/8") over 30% of surface, trace casts/cavities (up to 3/8"x1/4"), poorly fossiliferous | Installed HW casing to 65.0' Driller's Remark: 65.5-67.0' very soft (silt lense) |
| | | | 3 | 66.25-66.7' - Fracture, vertical, rough, undulating, changing to 30 deg over last 1" from 66.6-66.7', open 1/8" | | 65.4-66.9' - light olive gray, (5Y 5/2), fine to medium grained, moderate HCl reaction, very weak to weak (R1 to R2), voids (up to 3/16") over 30% of surface, trace linear casts (1/16"x1/16"), poorly fossiliferous | |
| | | | NR | 66.9' - Fracture zone | | **No Recovery 66.9-70.0'** | Driller's Remark: 68.0-68.5' very soft (silt lense) R1: 10 minutes |
| 70 | 70.0 | | | | | | |
| -28.0 | R2-NQ 5 ft 12% | 0 | >10 | 70.0-70.6' - Fracture zone | | **Limestone** 70.0-70.6' - light olive gray, (5Y 5/2), strong HCl reaction, medium strong (R3), voids (1/16") over 5% of surface, trace spherical casts/cavities (3/8"), partial infill with material similar to 65.4-66.9', trace thread-like black (organic) inclusions at 70.5' | Driller's Remark: Approximately 3.0' of R2-NQ lodged in core barrel, driller removing string of NQ rod to retrieve sample (14:38) Driller's Remark: unable to retrieve sample from core barrel |
| | | | NR | | | **No Recovery 70.6-75.0'** | R2: 6 minutes |
| 75 | 75.0 | | | | | | |
| -33.0 | R3-NQ 5 ft 84% | 51 | >10 | 75.0-75.4' - Fracture zone | | **Limestone** 75.0-79.2' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, very weak to weak (R1 to R2), 77.95-78.05' is extremely weak to very weak (R0 to R1), voids (up to 1/8") over 20% of surface, trace cavities, large cavity (1-9/16"x1-3/16") partially infilled with soft (R0) carbonate at 77.2' | |
| | | | >10 | 75.8-76.0, 76.0-76.2' - Fractures (2), 60 deg, smooth, undulating, tight | | | Driller's Remark: medium to hard |
| | | | >10 | 76.6-76.7' - Fracture, 45 deg, smooth, undulating, tight | | | 17:00 stop due to lightning |
| | | | 2 | 77.5' - Mechanical break 77.7' - Fracture, horizontal, rough, undulating, open | | | 17:30 shut down for day |
| | | | 0 | 77.85-78.05' - Fracture zone 78.05-78.8' - Fracture, vertical, smooth, undulating, open 1/8" | | | 6/14/07 water level at 25.0' |
| | | | NR | 78.8' - Fracture, <5 deg, rough, undulating, open 3/8" | | **No Recovery 79.2-80.0'** | R3: 6 minutes |
| 80 | 80.0 | | | | | | |
| -38.0 | R4-NQ 5 ft 94% | 67 | 1 | 80.1' - Fracture, no discerning orientation | | **Limestone** 80.0-84.7' - Same as 75.0-79.2' except moderate HCl reaction, extremely weak to weak (R0 to R1) at 82.9-83.5', trace casts/cavities (up to 3/4"x9/16") | Driller's Remark: "stiff" run except soft at last 2.0' |
| | | | 2 | 81.25' - Fracture, 30 deg, rough, undulating, open | | | |
| | | | 1 | 81.5' - Mechanical break 81.5-82.4' - Fracture or mechanical break, vertical and terminating at 60 deg, rough, undulating, tight | | | |
| | | | >10 | 82.5' - Mechanical break 82.9-83.1' - Fracture zone | | | |
| | | | 0 | 83.35-83.5' - Fracture zone 83.8-84.0' - Fracture zone | | | R4: 5 minutes |
| 85 | 85.0 | | NR | | | **No Recovery 84.7-85.0** | |

| PROJECT NUMBER: | BORING 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

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

WATER LEVELS : 25.0 ft bgs on 6/14/07 START : 6/12/2007 END : 6/13/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -43.0 | R5-NQ 5 ft 78% | 41 | >10 | 85.0-85.5' - Fracture zone<br>85.7' - Fracture, horizontal, rough, undulating, open | | **Limestone**<br>85.0-86.35' - Same as 75.0-79.2' except cavities (1-3/16"x3/8") at 86.3' over 50% of surface | |
| | | | 1 | 86.2-86.3' - Fracture, 30 deg, rough, undulating, open | | 86.35-87.65' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, medium strong (R3), trace voids (up to 1/16"), trace cavities (5/16"x1/16") | SC-1 collected at 86.35-87.4'<br>Driller's Remark: 87.0-87.5' soft |
| | | | 2 | 87.35-87.55' - Fracture, 60 deg, smooth, stepped, tight | | **Fat Clay (CH)**<br>87.65-87.8' | |
| | | | 3 | 88.25-88.35' - Fracture, 30 deg, rough, undulating, open | | **Limestone**<br>87.8-88.9' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, very weak to weak (R1 to R2), trace voids (up to 1/16"), <2% casts (up to 1/4"x1/4") | |
| | | | NR | 88.35-88.9' - Fracture, vertical, smooth, undulating, tight<br>88.7' - Fracture, horizontal, rough, undulating, tight | | | R5: 6 minutes |
| 90 | 90.0 | | | | | | |
| -48.0 | R6-NQ 5 ft 38% | 25 | >10 | 90.0-90.2' - Fracture zone<br>90.5-90.95' - Fracture zone | | | Driller's Remark: 89.0-90.0' soft |
| | | | 1 | 91.8' - Fracture, horizontal, rough, undulating, open | | **No Recovery 88.9-90.0'**<br>90.0-91.9' - yellowish gray, (5Y 7/2), fine to medium grained, very strong HCl reaction, very weak (R1), voids (up to 3/16") over 15-20% of surface, trace spherical casts and cavities (up to 3/8") | SC-2 collected at 90.9-91.8' |
| | | | NR | | | **No Recovery 91.9-95.0'** | R6: 3 minutes |
| 95 | 95.0 | | | | | | |
| -53.0 | R7-NQ 5 ft 100% | 61 | 3 | 95.4' - Bedding plane, horizontal, smooth, planar, tight | | **Limestone**<br>95.0-100.0' - very pale orange to yellowish brown, (10YR 8/2 to 10YR 6/2), fine to medium grained, strong HCl reaction, very weak to weak (R1 to R2), voids (up to 3/16") over 15-20% of surface, no visible cavities except 98.0-98.6' 10% casts/cavities (up to 1"x3/8"), poorly fossiliferous, black (organic) laminae at 97.9' | |
| | | | 4 | 95.65-95.8' - Fracture, 30 deg, smooth, undulating, open<br>96.05' - Fractures (2), <30 deg, smooth, undulating, open | | | |
| | | | >10 | 96.4' - Fracture, 25 deg, smooth, stepped, tight | | | |
| | | | 1 | 96.6-96.7' - Fractures (2), horizontal, smooth, undulating, open<br>97.0-97.7' - Fracture zone (8), 0-30 deg, rough, undulating, open | | | |
| | | | 1 | 98.35, 98.45' - Fractures (2), <10 deg, rough, undulating, tight | | | R7: 5 minutes |
| 100 | 100.0 | | | | | | |
| -58.0 | R8-NQ 5 ft 68% | 26 | >10 | 99.55' - Bedding plane, horizontal, rough, undulating, tight<br>100.2, 100.4' - Fractures (2), horizontal, smooth, undulating, open | | 100.0-100.55' - Same as 95.0-100.0' | |
| | | | 2 | 100.55, 100.9'<br>101.4, 101.85, 102.35, 102.55, 102.7, 102.9' - Fractures (6), horizontal, smooth, undulating, open | | 100.55-103.4' - very pale orange, (10YR 8/2), fine to medium grained, strong HCl reaction, very weak to weak (R1 to R2), trace voids (up to 1/16"), no visible casts/cavities | |
| | | | 5 | | | | |
| | | | 2 | 102.95-103.15' - Fracture zone, black staining over 75% of surface | | **No Recovery 103.4-105.0'** | |
| | | | NR | | | | R8: 4 minutes |
| 105 | 105.0 | | | | | | |

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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

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

WATER LEVELS : 25.0 ft bgs on 6/14/07 START : 6/12/2007 END : 6/13/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, 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**<br>105.0-107.5' - very pale orange, (10YR 8/2), fine to medium grained, strong HCl reaction, very weak to weak (R1 to R2), trace voids (up to 1/16"), no visible casts/cavities | |
| | | | >10 | 106.15-106.4' - Fracture zone<br>106.5, 106.7, 106.95, 107.0, 107.05, 107.3, 107.4' - Bedding plane (7), horizontal, smooth, planar to undulating, open | | | |
| | R9-NQ<br>5 ft<br>50% | 0 | 5 | | | **No Recovery 107.5-110.0'** | |
| | | | NR | | | | R9: 3 minutes |
| 110 | 110.0 | | | | | | |
| -68.0 | | | NA | | | **Carbonate Silts And Sands (SP-SM)**<br>110.0-111.4' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), very strong HCl reaction, grades from 60% silt-sized particles to 40% sand-sized particles to 80% medium sand-sized particles and 20% silt-sized | Unclear if material is cuttings or very poorly indurated rock that was destroyed by drilling action |
| | | | NA | 111.65, 111.95' - Fractures (2), <10 deg, rough, undulating, open (small rock fragments associated with fracture)<br>112.5' - Mechanical break<br>112.8-113.3' - Fracture zone, possibly due to casts/cavities | | **Limestone**<br>111.4-113.7' - very pale orange, (10YR 8/2), fine to medium grained, extremely weak to weak (R0 to R2), 111.4-112.0' no visible voids or cavities, at 112.0-113.7' voids (up to 3/16") over 15-20% of surface, 10% casts/cavities (up to 9/16"x3/4")<br>**No Recovery 113.7-115.0'** | |
| | R10-NQ<br>5 ft<br>74% | 12 | >10 | | | | |
| | | | >10 | | | | |
| | | | NR | | | | R10: 3 minutes |
| 115 | 115.0 | | | | | | |
| -73.0 | | | >10 | 115.0-115.2' - Fracture zone<br>115.2-115.4' - Bedding plane (3), horizontal, smooth, planar, open<br>115.55, 115.75, 115.95' - Fractures (3), horizontal, rough, undulating, open<br>116.55' - Fracture, <10 deg, rough, undulating, open | | **Limestone**<br>115.0-116.8' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), 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 (up to 3/8"x5-7/8"), highly fossiliferous<br>**No Recovery 116.8-120.0'** | |
| | | | 1 | | | | Driller's Remark: 116.5-120.0' very soft |
| | R11-NQ<br>5 ft<br>36% | 11 | | | | | |
| | | | NR | | | | R11: 3 minutes |
| 120 | 120.0 | | | | | | |
| -78.0 | | | | | | **No Recovery 120.0-125.0'** | Driller's Remark: no recovery 6/14/07 |
| | R12-NQ<br>5 ft<br>0% | 0 | NR | | | | R12: 2 minutes |
| 125 | 125.0 | | | | | | |

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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

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

WATER LEVELS : 25.0 ft bgs on 6/14/07 START : 6/12/2007 END : 6/13/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -83.0 | R13-NQ 5 ft 18% | 0 | >10 | 125.0-125.9' - Fracture zone | | **Limestone**<br>125.0-125.35' - Same as 115.0-116.8'<br>125.35-125.6' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, very weak (R1), trace voids (up to 1/16"), no visible cavities<br>125.6-125.9' - Same as 115.0-116.8'<br>**No Recovery 125.9-130.0'** | Driller's Remark: very soft to 128.5'<br>R13: 4 minutes |
| 130 | 130.0 | | | | | | |
| -88.0 | R14-NQ 5 ft 56% | 0 | NA<br>NA<br>>10<br>NR | 131.85-132.25' - Mechanical break<br>132.0-132.9' - Fracture, vertical, rough, undulating, open<br>132.25-132.5' - Fracture zone<br>133.2, 133.3, 133.4' - Fractures (3), <10 deg, rough, undulating, healed | | **Carbonate Silts And Sands (SM)**<br>130.0-131.6' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), loose, strong HCl reaction, fine to medium grained sands<br>**Limestone**<br>131.6-132.8' - yellowish gray, (5Y 7/2), strong HCl reaction, extremely weak to weak (R0 to R2), voids (up to 1/16") over 5-10% of surface and increasing with depth, no visible casts except 133.55-133.8' 20-30% casts (up to 1-3/4"x1")<br>**No Recovery 132.8-135.0'** | possible alluvial/fluvial deposit<br>R14: 5 minutes |
| 135 | 135.0 | | | | | | |
| -93.0 | R15-NQ 5 ft 52% | 10 | NA<br>>10<br>1<br>NR | 136.35-136.7' - Fracture zone<br>136.95' - Fracture or mechanical break, horizontal, smooth, planar<br>137.05' - Fracture, horizontal, rough, undulating | | **Carbonate Silts And Sands (SM)**<br>135.0-136.35' - Same as 130.0-131.6'<br>**Limestone**<br>136.35-137.6' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, medium strong (R3), no visible voids or cavities except 10% voids at 137.4' and 137.6'<br>**No Recovery 137.6-140.0'** | Possible cuttings or infill<br>R15: 26 minutes |
| 140 | 140.0 | | | | | | |
| -98.0 | R16-NQ 5 ft 58% | 0 | NA<br>NA<br>>10<br>>10<br>NR | 141.5-141.9' - Fracture zone<br>141.9-142.6' - Fracture, vertical, rough, undulating, open<br>142.35' - Fracture, horizontal, rough, undulating, open<br>142.45' - Fracture, horizontal, rough, undulating, open<br>142.6-142.9' - Fracture zone | | **Carbonate Silts And Sands (SM)**<br>140.0-141.5' - Same as 130.0-131.6' except grades from 60% fines to fine sand at top to 80% medium sand and 20% fines at bottom<br>**Limestone**<br>141.5-142.9' - yellowish gray, (5Y 7/2), fine to medium grained, strong HCl reaction, very weak (R1), trace voids (up to 1/16"), no visible cavities<br>**No Recovery 142.9-145.0'** | Possible cuttings or infill<br>R16: 4 minutes |
| 145 | 145.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.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

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

WATER LEVELS : 25.0 ft bgs on 6/14/07 START : 6/12/2007 END : 6/13/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (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% | 51 | 0 | | | 145.0-146.5' - pale yellowish brown, (10YR 6/2), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), trace voids (up to 1/16"), trace casts and cavities (up to 1/8"x3/16") | SC-3 collected at 145.0-145.95' |
| | | | 2 | 145.95' - Mechanical break<br>146.5, 146.75, 147.2, 147.85, 147.95' - Fractures (5), horizontal, rough, undulating, open | | 146.5-147.2' - Same as 145.0-146.5' except voids (1/16") over 10-15% of surface | |
| | | | 3 | 147.6-147.8' - Mechanical break, extremely weak section | | 147.2-150.15' - pale yellowish brown to very pale orange, (10YR 6/2 to 10YR 8/2), fine grained, strong HCl 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") | |
| | | | 3 | 147.85-148.15' - Fracture, vertical, rough, undulating, open | | | R17: 4 minutes |
| | | | 3 | 148.15, 148.5' - Fractures (2), horizontal, rough, undulating, open<br>149.05' - Bedding plane, smooth, planar to undulating, open<br>149.45' - Bedding plane, smooth, planar to undulating, open<br>149.8' - Bedding plane, smooth, planar to undulating, open | | | |
| 150<br>-108.0 | 150.2 | | | | | Bottom of Boring at 150.2 ft bgs on 6/13/2007 | Total depth of boring 150.15' below ground surface at 14:10<br>First batch grout: 32 gallons water, 6 47-lb bags of Portland cement up to approximately 100.0' below ground surface<br>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<br>Third batch of grout: 32 gallons water, 5 47-lb bags of Portland cement up to ground surface<br>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 |

# 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

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 : 4.0 ft bgs on 5/8/07 START : 5/7/2007 END : 5/9/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.9 | 0.0 – 1.5 | 1.5 | SS-1 | 1-2-1 (3) | **Poorly Graded Sand (SP)** 0.0-1.0' - light gray, (N7), dry to moist, very loose, very fine silica sand, trace nonplastic fines, trace very fine grained black particles, roots | | |
| | 1.5 – 5.0 | | | | **Silty Sand With Organics (SM)** 1.0-1.5' - dusky yellowish 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 / 37.9 | 5.0 – 6.5 | 1.1 | SS-2 | 5-6-4 (10) | **Poorly Graded Sand With Silt (SP-SM)** 5.0-6.1' - white with dark yellowish orange and pale yellowish brown staining, (N9, with 10YR 6/6 and 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 | | |
| 10 / 32.9 | 10.0 – 11.5 | 1.3 | SS-3 | 3-3-3 (6) | **Silty Sand (SM)** 10.0-11.3' - pale yellowish brown, (10YR 6/2), wet, loose, very fine to fine grained, silica sand, 30% nonplastic fines, trace very fine sand-sized black particles | | |
| 15 / 27.9 | 15.0 – 16.5 | 1.1 | SS-4 | 3-2-2 (4) | **Silty Sand (SM)** 15.0-16.1' - Same as 10.0-11.3' except very loose | | |
| 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

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 : 4.0 ft bgs on 5/8/07 START : 5/7/2007 END : 5/9/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.9 | 20.0 – 21.5 | 1.4 | SS-5 | 2-3-4 (7) | **Sandy Fat Clay (CH)** 20.0-21.4' - light greenish gray, (5GY 8/1), wet, stiff, high plasticity, no dilatancy, no HCl reaction, heavily mottled with dark yellowish orange (10YR 6/6), 30% white very fine silica sand, 5-10% very fine sand-sized black particles, scattered pockets of medium sand-sized white particles throughout, up to 1/8" in size | | |
| 25 | 25.0 | | | | | | |
| 17.9 | 26.5 | 0.7 | SS-6 | 5-6-5 (11) | **Silty Sand (SM)** 25.0-25.7' - yellowish gray, (5Y 7/2), wet, loose, very fine to fine grained, silica sand, 15-20% nonplastic fines, trace very fine sand-sized black particles | | |
| 30 | 30.0 | | | | | | |
| 12.9 | 31.5 | 1.0 | SS-7 | 1-3-3 (6) | **Silty Gravel With Sand (GM)** 30.0-30.95' - yellowish gray, (5Y 8/1), wet, stiff, low to medium plasticity, rapid dilatancy, no HCl reaction, gray staining and laminated appearance, 50% of sample is fine to coarse gravel-sized material, trace organics, limestone appearance, also has appearance of fine grained conglomerate | | |
| 35 | 35.0 | | | | | | |
| 7.9 | 36.5 | 1.2 | SS-8 | 4-6-5 (11) | **Sand With Silt (SP-SM)** 35.0-36.15' - yellowish gray, (5Y 7/2), wet, medium dense, very fine to fine grained, no HCl reaction, silica sand, with trace medium dark gray (N4) mottling, 10% nonplastic fines | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-05 SHEET 3 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

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 : 4.0 ft bgs on 5/8/07 START : 5/7/2007 END : 5/9/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.9 | 40.0 – 41.5 | 1.5 | SS-9 | 1-2-2 (4) | **Elastic Silt And Fat Clay (CH)** 40.0-41.5' - grayish olive green, (5GY 3/2), wet, soft, high plasticity, no dilatancy, materials are layered in an irregular way giving a mottled appearance, predominantly clay, mottled with another clay and silt, clay is olive gray (5Y 3/2), high plastic, no dilatancy, no HCl reaction, silt is yellowish gray (5Y 8/1), low to medium plastic, rapid dilatancy, very mild HCl reaction | | Driller's Remark: Loss of circulation after pulling up SPT sampler |
| 45 -2.1 | 45.0 – 46.5 | 1.3 | SS-10 | 3-5-5 (10) | **Poorly Graded Sand With Silt (SP-SM)** 45.0-46.3' - pale yellowish brown with medium dark gray staining, (10YR 6/2 with N4 staining), wet, loose, very fine to fine grained, no HCl reaction, silica sand, 10-15% nonplastic fines, 1/2" lens of grayish olive green (5G 3/2) fat clay (CH), trace very fine to coarse sand-sized pyrite fragments | | |
| 50 -7.1 | 50.0 – 51.5 | 1.5 | SS-11 | 1-2-3 (5) | **Sandy Lean Clay (CL)** 50.0-51.5' - greenish gray and grayish olive green, (5GY 6/1 and 5GY 3/2), wet, stiff, high plasticity, no dilatancy, no HCl reaction, 40% very fine to fine silica sand, seams and pockets of other materials scattered throughout less than 10% of sample, yellowish gray (5Y 7/2) sandy seam, pocket of medium sand-sized white particles, pockets of silty material | | |
| 55 -12.1 | 55.0 – 56.5 | 1.5 | SS-12 | 1-1-2 (3) | **Poorly Graded Sand With Clay (SP-SC)** 55.0-56.5' - greenish gray and grayish olive green, (5GY 6/1 and 5GY 3/2), wet, stiff, no to mild HCl reaction, no white particles, lenses of grayish green (5G 5/2) fat clay (CH) similar to 40.0-41.5' materials, possible organic lens, lenses of other materials are 10% of sample, sample has mottled appearance | | |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-05 SHEET 4 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

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 : 4.0 ft bgs on 5/8/07 START : 5/7/2007 END : 5/9/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -17.1 | 60.0 – 61.5 | 1.5 | SS-13 | 0-1-2 (3) | **Silty Sand (SM)** 60.0-61.5' - yellowish gray, (5Y 7/2), wet, very loose, no HCl reaction, silica sands, 30% nonplastic fines, trace very fine sand-sized black particles | | |
| 65 | 65.0 | | | | | | |
| -22.1 | 66.5 | 1.5 | SS-14 | 2-1-3 (4) | **Clayey Sand (SC)** 65.0-66.5' - yellowish gray, (5Y 7/2), wet, very loose, no HCl reaction, with trace gray staining, very fine to fine silica sands, 35% medium plastic fines | | |
| 70 | 70.0 | | | | | | |
| -27.1 | 70.1 | 0.0 | SS-15 | 50/1 (50/1") | **No Recovery 70.0-70.1'** | | 18:42 Water level 5.0' below ground surface, last SPT on 5/7/07<br>Driller's Remark: 70-71.5' hard material, maybe rock layer, soft easy Driller's Remark: Drilling with intermittent light chatter, switch to newer tricone roller Driller's Remark: Drill bit 2-7/8" in diameter |
| 75 | 75.0 | | | | | | |
| -32.1 | 75.3 | 0.3 | SS-16 | 50/3.25 (50/3.25") | **Limestone Fragments** 75.0-75.3' - yellowish gray, light olive gray, and moderate gray, (5Y 7/2, 5Y 8/8, and N5), mild HCl reaction, angular and subangular 1/4" to 3/4" sized fragments | | 5/8/07, 07:45 Water level 4.0' below ground surface, 4" HW casing installed to 70' below ground surface<br>Driller's Remark: rock fragments are caving into bottom of borehole, advanced 4" HW casing to 75' below ground surface |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-05 SHEET 5 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

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 : 4.0 ft bgs on 5/8/07 START : 5/7/2007 END : 5/9/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -37.1 | 80.0 | | SS-17 | 50/2 (50/2") | **Limestone Fragments** 80.0-80.1' - greenish gray, (5GY 6/1), moderate HCl reaction, 15% voids/casts on surface, very poor recovery<br>Begin Rock Coring at 81.0 ft bgs<br>See the next sheet for the rock core log | | Driller's Remark: Advanced 4" HW casing to 78.6' below ground surface, switch to NQ wireline coring assembly |
| 85 -42.1 | | | | | | | |
| 90 -47.1 | | | | | | | |
| 95 -52.1 | | | | | | | |
| 100 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
| 338884.FL | B-05 | SHEET 6 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 ORIENTATION : Vertical

WATER LEVELS : 4.0 ft bgs on 5/8/07 START : 5/7/2007 END : 5/9/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 81.0 | | 1 | | | **Limestone**<br>81.0-85.3' - light olive gray, (5Y 5/2), moderate HCl reaction, weak to medium strong (R2 to R3), spheroidal voids up to 25% surface (<1/16") in size, moderately fossiliferous (casts, molds, up to 3/8"), trace irregularity shaped cavities 25% infilled with very fine grain yellowish gray (5Y 7/2) material, trace to 7% organics, brownish black (5YR 2/1) lamination at 81.7', 83.6' and 84.2' and short (1" long), discontinuous lamination<br>85.3-86.0' - Same as 81.0-85.3' except yellowish gray, (5Y 8/1), strong HCl reaction, medium strong to strong (R3 to R4), 5-10% voids (<1/16"), very fine grain interval<br>86.0-87.1' - yellowish gray, (5Y 8/1), very fine to fine grained, strong HCl reaction, medium strong (R3), trace voids (1/16"), organics rich carbonate silt bed (1/4" thick)<br>87.1-88.1' - Same as 86.0-87.1' except very weak (R1), moderately fossiliferous (casts, shells, molds), 10-15% fine to medium grained sized medium dark gray (N4) particles in rock matrix, 20-25% elongated and spherical shaped void/casts (<1/16), yellowish gray discoloration on 30-40% of material<br>**No Recovery 88.1-91.0'**<br>**Limestone**<br>91.0-95.9' - yellowish gray, (5Y 8/1), medium grained, strong HCl reaction, very weak to weak (R1 to R2), highly fossiliferous (casts , molds) fossils up to 1/2" in size, voids (<1/16") up to 25% surface, trace micro (<1/16" thick) lamination - brownish black in color - from 91.0-92.0' and 93.5-99.0' , trace spherical cavities up to 3/8" partially filled with black very soft fine material (organics), medium gray (N5) fine grain particles in rock matrix, powder/chalk like texture to rock<br>**No Recovery 95.9-96.0'**<br>**Limestone**<br>96.0-104.0' - Same as 91.0- 95.9' except large 1-1/4" cavity at 96.6', 80% filled with carbonate silt, light olive gray (5Y 6/1) from 96.2-96.8' and 97.3-98.7', organics also appears up to 1" long <1/32" thick laminations at 96.3' and 97.3' | First core run on 5/8/07 |
| | R1-NQ 5 ft 100% | 90 | 2 | 81.7' - Bedding plane, rough, undulating, organic material (brownish black ) covering 80% surface, open 5/8" | | | |
| | | | 1 | 82.3' - Bedding plane or mechanical break, horizontal, rough, undulating, open up to 1" | | | |
| | | | 3 | 82.6' - Fracture, 80 deg, rough, undulating, tight | | | |
| 85 -42.1 | | | 0 | 83.6' - Bedding plane, horizontal, rough, undulating, tight<br>84.3' - Fracture, 25 deg, rough, undulating, fossil casts/molds on fracture surface<br>84.8' - Bedding plane, horizontal, rough, undulating, 1" thick, tight | | | R1: 9 minutes |
| | 86.0 | | | | | | |
| | R2-NQ 5 ft 42% | 30 | 2 | 84.9' - Fracture, vertical, rough, undulating, grayish, staining 10% surface, tight<br>85.3' - Mechanical break | | | Driller's Remark: 86.5' <5% circulation loss, regained at 87' |
| | | | 2 | 86.1' - Mechanical break<br>86.3' - Fracture, 80-90 deg, rough, undulating, gray staining over 15-20% surface, tight | | | |
| | | | 0 | 86.85' - Bedding plane, horizontal, smooth, planar, 1/4" carbonate silt infill, tight | | | |
| 90 -47.1 | | | NR | 87.1' - Bedding plane, horizontal, rough, undulating, open 1"<br>87.75' - Fracture, 10-15 deg, rough, undulating, tight | | | R2: 8 minutes |
| | 91.0 | | | | | | |
| | R3-NQ 5 ft 98% | 98 | 0 | | | | |
| | | | 0 | | | | |
| | | | 1 | 93.1' - Fracture or mechanical break, 20 deg, rough, undulating, tight<br>93.5' - Mechanical break | | | |
| | | | 0 | | | | |
| 95 -52.1 | | | 0 | | | | R3: 4 minutes |
| | 96.0 | | NR | | | | |
| | R4-NQ 5 ft 100% | 90 | 0 | 96.2' - Mechanical break, horizontal, rough, undulating, open 1/2" | | | |
| | | | 2 | | | | |
| | | | 1 | 97.65' - Bedding plane or mechanical break, horizontal, rough, undulating, tight<br>97.8' - Bedding plane or mechanical break, horizontal, rough, undulating, brownish black (organic) covering <50-60% surface, open 1/16" | | | SC1-collected at 98.5-99.6' |
| | | | 1 | | | | |
| 100 -57.1 | | | 1 | 98.0' - Fracture or mechanical break, horizontal, rough, undulating, tight<br>98.5' - Mechanical break | | | R4: 6 minutes |
| | 101.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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 ORIENTATION : Vertical

WATER LEVELS : 4.0 ft bgs on 5/8/07 START : 5/7/2007 END : 5/9/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R5-NQ 5 ft 80% | 36 | 0 | 99.6' - Fracture, 10-15 deg, rough, undulating, tight | | **Limestone** 101.0-105.0' - yellowish gray, (5Y 8/1), strong HCl reaction, very weak to weak (R1 to R2), over all powder/chalk-like feel, 15-20% voids/casts, highly fossiliferous (forams and foram casts), 10% fine grain medium dark gray, (N4) particles (probably pyrite), yellowish gray (5Y 7/8) staining from 101.0-103.0', voids tend to be concentrated in a horizontal orientation | |
| | | | 2 | 101.2' - Mechanical break, horizontal, rough, planar, <1/16 gap<br>102.2' - Fracture, 45 deg, rough, undulating, tight | | | |
| | | | >10 | 102.6' - Mechanical break or bedding plane, rough, undulating, open up to 1/2"<br>103.05, 103.15, 103.25, 103.3, 103.35, 103.45, 103.5, 103.6, 103.7, 103.8, 104.0, 104.1, 104.2, 104.25, 104.35, 104.5, 104.6, | | | |
| | | | 8 | | | | |
| 105<br>-62.1 | | | NR | 104.7' - Bedding plane or mechanical break (18), smooth and planar to smooth and undulating, open 1/16" | | **No Recovery 105.0-106.0'** | R5: 8 minutes |
| | 106.0 | | | | | | |
| | R6-NQ 5 ft 90% | 56 | >10 | 106.1' - Mechanical break, horizontal, rough, undulating, open 1/8"<br>106.3-106.45' - Fracture zone, 1"-1-3/8" sized rock fragments | | **Limestone** 106.0-107.0' - yellowish gray, (5Y 8/1), very fine grained, strong HCl reaction, very weak to weak (R1 to R2), stained light gray (N7) over 40% of entire sample, highly fossiliferous (forams and foram casts, echinoderms), 20-25% fine grained pyrite in rock matrix, gradational with 107.0-110.5'<br>107.0-110.5' - Same as 106.0-107.0' except fine grained, molds and casts up to 1/32"-3/8" | |
| | | | 2 | 106.5' - Fracture, 80 deg, smooth, planar, <1/22" organics on surface, tight | | | |
| | | | 2 | 106.9' - Fracture, 50 deg, rough, undulating, tight | | | |
| | | | 2 | 107.4' - Fracture or mechanical break, horizontal, rough, undulating, tight<br>107.8' - Fracture, 50-60 deg, rough, undulating, tight | | | |
| 110<br>-67.1 | | | 1 | 108.3' - Fracture or bedding plane, 15-20 deg, rough, undulating, open 1/8" | | | R6: 5 minutes |
| | 111.0 | | NR | 108.65-108.8' - Fracture zone | | **No Recovery 110.5-111.0'** | |
| | R7-NQ 5 ft 88% | 79 | >10 | 109.1' - Fracture, 10-15 deg, rough, undulating, tight<br>109.4' - Fracture, 80-90 deg, rough, undulating, open 1/2" | | **Limestone** 111.0-115.4' - yellowish gray, (5Y 7/2), medium to coarse grained, strong HCl reaction, weak (R2), becoming mottled moderate yellow (5Y 7/6) with depth, voids rare to absent except from 115.0-115.4' where voids <1/16" cover 1-3% of rock surface, cavities rare (3/16" in diameter), rare echinoderms, fossil voids/casts rare to absent, thick bedded except from 115.3-115.4' which is laminated, fine grained (sharp contact with overlying massive bedded limestone | |
| | | | 1 | 110.1' - Fracture, 60-65 deg, rough, undulating, tight | | | SC-2 collected at 112.5-113.6' |
| | | | 1 | 110.0-111.25' - Fracture zone<br>111.35' - Mechanical break, 50 deg, rough, undulating, tight | | | |
| | | | 2 | 111.75' - Fracture, 50 deg, rough, undulating, tight | | | |
| 115<br>-72.1 | | | 0 | 112.5' - Fracture or mechanical break, 5-10 deg, rough, undulating, tight | | | R7: 4 minutes |
| | 116.0 | | NR | 113.6' - Fracture, 50 deg, rough, undulating, tight | | **No Recovery 115.4-116.0'** | |
| | R8-NQ 5 ft 90% | 76 | 3 | 114.4' - Fracture, 0-5 deg, rough, undulating, tight | | **Limestone** 116.0-120.5' - yellowish gray, (5Y 7/2), medium to coarse grained, very weak to weak (R1 to R2), except from 116.1-116.15' which is very fine grained and medium strong rock (R3), voids (<1/16") over 5% or less of rock surface, some cavities up to 3/16" over 1-2% of rock surface to 120.4', fossils (molds/casts) rare to absent, rare echinoderms, some lithoclast (1"-1-1/2" long) from 120.0-120.5', cavities common from 120.4-120.5' | |
| | | | 2 | 114.8, 114.9' - Mechanical break or fractures (2), horizontal, rough, planar<br>115.0' - Mechanical break, 30 deg, rough, undulating | | | |
| | | | 2 | 116.1' - Bedding plane, 0-5 deg, rough, undulating, open 1/8", fine infilling<br>116.25-116.35' - Fracture zone | | | |
| | | | 2 | 116.7' - Fracture or mechanical break, horizontal, rough, planar, 1/8" open<br>117.2' - Fracture, 20-25 deg, rough, undulating, open up to 1/8" | | | |
| 120<br>-77.1 | | | 0 | | | | R8: 7 minutes |
| | 121.0 | | NR | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
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# 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 ORIENTATION : Vertical

WATER LEVELS : 4.0 ft bgs on 5/8/07 START : 5/7/2007 END : 5/9/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R9-NQ 5 ft 100% | 77 | 3 | 117.5' - Fracture or mechanical break, horizontal, rough, undulating, tight to 1/2" open | | **No Recovery 120.5-121.0'** **Limestone** 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 5-10% of rock surface, cavities common (up to 3/8"-3/4"), fossiliferous (echinoderms) and casts/molds, some areas where rock is fine-grained and stronger (R2-R3), some rip-up clasts/intraclasts 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, voids (<1/16") over 1-3% of rock surface, some cavities up to 3/4" (especially at 124.7-124.9'), fossils (molds/casts) rare to absent 126.0-127.8' - Same as 123.4-126.0' except rare fossil echinoids 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 surface, cavities rare to absent (<3/16" in diameter), fossil molds/casts rare, some laminations 128.5-130.6' - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, voids (<1/16") over 3-5% of rock surface, some cavities up to 3/8"-3/4" in diameter (typically elongated), fossiliferous (molds/casts and rare echinoids), very rare (<1/16") dark gray argillaceous grains **No Recovery 130.6-131.0'** **Limestone** 131.0-132.6' - yellowish gray, (5Y 8/1), strong HCl reaction, very weak to weak (R1 to R2), powder/chalk-like feel, highly fossiliferous (forams), voids/casts (<1/16") over 10-15% of surface, 15-20% cavities infilled with medium light gray (N6) fine grained mineral with stong HCl reaction, cavities are irregularly shaped to spherical and range in size from 3/16"- 1-3/8", horizontal aligned fossil (casts/shells) and gray cavities, bedding/discontinuity at 131.65' | Water level 10.8' below ground surface in outer (4"HW) casing, 3.8' below ground surface in borehole (uncased) |
| | | | 1 | 118.65' - Fracture or mechanical break, horizontal, rough, undulating, tight | | | |
| | | | 4 | 118.85' - Fracture, 20-25 deg, rough, undulating, tight 119.45' - Fracture, 35-40 deg, rough, undulating, tight | | | |
| | | | 2 | 119.95' - Fracture, 20 deg, rough, undulating, tight 120.35' - Mechanical break | | | |
| 125 -82.1 | | | 0 | 121.1, 121.3, 121.5, 121.6' - Bedding plane or mechanical break (4), horizontal, rough, undulating, open 1/8" | | | R9: Runtime not recorded |
| | 126.0 | | | | | | |
| | R10-NQ 5 ft 92% | 52 | >10 | 122.5' - Fracture, 40 deg, rough, undulating, tight 123.4' - Fracture, 5-10 deg, rough, undulating, open <1/16" | | | |
| | | | 2 | 123.55, 123.75, 123.95' - Bedding plane or mechanical break (3), horizontal, rough, planar, tight | | | |
| | | | 1 | 124.3' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | | |
| | | | 2 | 124.95' - Bedding plane or mechanical break, horizontal, smooth, planar, tight 125.9' - Mechanical break, 50 deg, rough, undulating | | | |
| 130 -87.1 | | | 1 | 126.0-127.0' - Mechanical break, horizontal, smooth, planar, multiple breaks along bedding planes, tight | | | R10: Runtime not recorded |
| | 131.0 | | NR | | | | |
| | R11-NQ 5 ft 50% | 23 | 3 | 127.55' - Fracture or mechanical break, 0-5 deg, rough, planar, tight | | | First core run on 5/9/07, water level at 4.1' below ground surface Driller's Remark: NQ core barrel has snapped in two pieces SC-3 collected at 131.85-132.6' |
| | | | >10 | 128.5' - Bedding plane, horizontal, rough, undulating, tight 129.2' - Fracture or mechanical break, horizontal, open up to 1" | | | |
| | | | >10 | 129.7' - Bedding plane or mechanical break, horizontal, rough, planar, tight to 1/4" gap | | | |
| 135 -92.1 | | | NR | 130.15' - Fracture, 70-75 deg, rough, undulating, tight 131.15, 131.4' - Bedding plane or mechanical break (2), horizontal, smooth, planar, tight to open 1/16" | | | R11: 23 minutes |
| | 136.0 | | | | | | |
| | R12-NQ 5 ft 84% | 66 | 3 | 131.85' - Bedding plane, horizontal, rough, undulating, tight, 3/4" sized exposed medium light gray (N6) filled voids on surface 132.6' - Fracture zone, angular fragments of rock | | | |
| | | | 3 | 136.1, 136.05' - Bedding plane or mechanical break (2), horizontal, rough, undulating, 1/8" open | | | |
| | | | 0 | 136.3' - Fracture, 60 deg, rough, undulating, tight | | | |
| | | | 1 | 137.1' - Fracture, 45 deg, rough, undulating, centimeter spaced parallel fracture | | | |
| 140 -97.1 | | | 0 | 137.3' - Bedding plane, horizontal, rough, undulating, light olive gray hard mineralization over 38% surface, 1/32" thick, tight | | | R12: 15 minutes |
| | 141.0 | | NR | | | | |

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# 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 ORIENTATION : Vertical

WATER LEVELS : 4.0 ft bgs on 5/8/07 START : 5/7/2007 END : 5/9/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R13-NQ 5 ft 94% | 50 | 3 | 137.35' - Mechanical break, 40-50 deg, rough, planar, tight | | **Limestone** 132.6-133.5' - medium light gray to medium gray, (N6 to N5), very fine grained, strong HCl reaction, medium strong to strong (R3 to R4), trace voids/casts (<1/16"), poorly fossiliferous (1" molds), very fine grain pyrite grains in rock matrix (5-7%), 10-15% cavities from 1/8" to 1" in size, oval in shape unfilled to partially filled with a yellowish gray (5Y 7/2) very fine grained material that is 40-45% voids <1/16" | |
| | | | 1 | 137.65' - Bedding plane or mechanical break, horizontal, rough, undulating, exposed molds on surface, open 5/8" | | | |
| | | | 3 | 138.5' - Mechanical break | | | |
| | | | 3 | 139.25' - Fracture, 40 deg, rough, undulating, tight | | | |
| | | | 3 | 140.1' - Mechanical break, horizontal, rough, undulating, tight | | | |
| 145 -102.1 | | | 2 | 141.25' - Mechanical break or bedding plane, horizontal, rough, planar, tight | | | |
| | | | NR | 141.65' - Fracture, vertical, rough, undulating, brown staining over surface (100%), <1/32" infill over 98% surface | | **No Recovery 133.5-136.0'** | R13: 11 minutes |
| | 146.0 | | | | | **Limestone** 136.0-137.5' - yellowish gray and light olive gray, (5Y 7/2 and 5Y 5/2), strong HCl reaction, medium strong to strong (R3 to R4), thin bedded alternating with very fine grained rock with medium grain-sized particles in the laminated (<1/16") beds | |
| | R14-NQ 5 ft 96% | 60 | 3 | 141.75' - Fracture or mechanical break, horizontal, rough, undulating, tight | | | |
| | | | 4 | 142.5' - Fracture or mechanical break, horizontal, rough, undulating, tight | | | |
| | | | 1 | 143.3, 143.5' - Fractures or mechanical break (2), 5-10 deg, rough, undulating, tight | | | SC-4 collected at 147.8-148.7' |
| | | | 2 | 143.85' - Fracture or mechanical break, 0-5 deg, rough, undulating, tight | | 137.5-140.2' - yellowish gray, (5Y 7/2), fine to medium grained, strong HCl reaction, very weak (R1), 7-10% coarse grain-sized flat angular fossil fragments horizontally aligned, | |
| 150 -107.1 | | | 2 | 144.45' - Fracture or mechanical break, horizontal, rough, undulating, tight | | | |
| | | | NR | 144.6' - Bedding plane or mechanical break, horizontal, rough, undulating, 1/8" open | | | |
| | 151.0 | | | 144.8' - Bedding plane or mechanical break, horizontal, rough, undulating, 1/16" open | | 15-25% medium to coarse grain-sized medium dark gray (N4), subrounded particles also horizontally aligned, highly fossiliferous, trace voids (<3/16"), sharp discontinuity at 139.5' | R14: 8 minutes |
| | | | | 144.9, 144.95' - Mechanical break (2), rough, undulating, open <1/16" | | | |
| | | | | 145.1, 145.35' - Bedding plane (2), 0-5 deg, rough, undulating, wavy bed of organics, 100% surface coverage with brownish black organics | | **No Recovery 140.2-141.0'** | |
| | | | | 146.5' - Bedding plane, 15-20 deg, rough, undulating | | **Limestone** 141.0-142.6' - yellowish gray, (5Y 8/1), very fine to medium grained, strong HCl reaction, very weak (R1), texture coarsening with depth to sharp contact at 142.6', interval of moderate yellow brown and light brown (5Y 7/6 and 5Y 5/6) fine to medium grained rounded grains, powder to chalk-like texture | |
| | | | | 146.6' - Fracture, 50 deg, rough, undulating, tight | | | |
| | | | | 146.8' - Fracture, 70 deg, rough, undulating, black stains over 100% surface , tight | | | |
| | | | | 147.0' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | | |
| | | | | 147.3' - Bedding plane or mechanical break, 0-5 deg, rough, planar, tight | | 142.6-145.0' - Same as 141.0-142.6' except light olive gray, (5Y 5/2), moderate to strong HCl reaction, medium strong (R3), voids 10-15% (<1/16") spheroidal trace elongated cavities 3/16"x1/16" | |
| | | | | 147.5' - Fracture, 60 deg, rough, undulating, black staining 80-90% surface, tight | | | |
| | | | | 147.8' - Fracture, 15-20 deg, rough, undulating, tight | | | |
| | | | | 148.7' - Fracture or mechanical break, horizontal, rough, undulating, tight | | | |
| | | | | 149.25' - Fracture, 40 deg, rough, undulating, tight to 1/8" open | | 145.0-145.7' - Same as 141.0-142.6' except yellowish gray, (5Y 8/1), very weak to weak (R1 to R2), 25-30% olive black (5Y 2/1) laminations | |
| | | | | 149.45' - Fracture, 10-15 deg, rough, planar, tight | | **No Recovery 145.7-146.0'** | |
| | | | | 150.3' - Fracture or mechanical break, horizontal, rough, undulating, hard mineral infill covering 30-40% surface 1/16' thick, open 1/8" | | **Limestone** 146.0-146.5' - Same as 145.0-145.7' | |
| | | | | 150.6' - Fracture or mechanical break, horizontal, smooth, planar, open 1/16" | | | |

| PROJECT NUMBER: | BORING NUMBER: |
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# 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 ORIENTATION : Vertical

WATER LEVELS : 4.0 ft bgs on 5/8/07 START : 5/7/2007 END : 5/9/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES | | | SYMBOLIC LOG | LITHOLOGY | COMMENTS |
|---|---|---|---|---|---|---|---|
| | | R Q D (%) | FRACTURES PER FOOT | DESCRIPTION<br>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. |
| | | | | | | **Limestone**<br>146.5-150.8' - yellowish gray, (5Y 8/1), very fine to medium grained, strong HCl reaction, very weak (R1), highly fossiliferous (molds, forams, fragments), sharp contact between medium grained limestone above and fine grained limestone below at 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'<br>**No Recovery 150.8-151.0'**<br>Bottom of Boring at 151.0 ft bgs on 5/9/2007 | |

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# 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

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 : 4.4 ft bgs on 4/26/07 START : 4/24/2007 END : 4/26/2007 LOGGER : B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.5 | 0.0 – 1.5 | 1.0 | SS-1 | 0-1-2 (3) | **Topsoil** 0.0-0.2' **Poorly Graded Sand (SP)** 0.2-1.0' - light brownish gray, (5YR 6/1), moist, very loose, very fine to fine grained, silica sand with medium dark gray (N4) mottling, trace of nonplastic fines, roots and organics decreasing with depth | | 16:51 Begin drilling, sample SS-1 taken; first 6"=weight of hammer |
| 5 | 5.0 | | | | | | |
| 37.5 | 5.0 – 6.5 | 1.1 | SS-2 | 4-4-4 (8) | **Clayey Sand (SC)** 5.0-6.1' - greenish gray, (5G 6/1), moist to wet, loose, very fine to fine grained, no HCl reaction, silica sand, 20% low plasticity fines, trace very fine sand-sized black particles | | 4/25/07, 07:38 Begin drilling to 5' using tricone bit 07:40: SS-2 taken |
| 10 | 10.0 | | | | | | |
| 32.5 | 10.0 – 11.5 | 1.3 | SS-3 | 3-3-4 (7) | **Silty Sand (SM)** 10.0-11.25' - light olive gray to greenish gray, (5Y 6/1 to 5GY 6/1), wet, loose, very fine to fine grained, no HCl reaction, silica sand, 15% low plasticity fines, trace very fine black particles, trace organics | | 07:48: SS-3 taken |
| 15 | 15.0 | | | | | | |
| 27.5 | 15.0 – 16.5 | 1.5 | SS-4 | 4-4-4 (8) | **Silty Sand (SM)** 15.0-16.5' - light olive gray to light gray, (5Y 6/1 to N7), wet, loose, very fine to fine grained, no HCl reaction, silica sand, 30% low plasticity fines, trace very fine sand-sized black particles | | SS-4 is less plastic than SS-3 |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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

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 : 4.4 ft bgs on 4/26/07 START : 4/24/2007 END : 4/26/2007 LOGGER : B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.5 | 20.0–21.5 | 1.2 | SS-5 | 2-5-4 (9) | **Clayey Sand (SC)** 20.0-21.0' - yellowish gray to light gray, (5Y 8/1 to N7), moist, loose, high plasticity, no dilatancy, no HCl reaction, 28% fines | | |
| | | | | | **Fat Clay (CH)** 21.0-21.2' - light bluish gray, (5G 7/1), moist, stiff, high plasticity, no dilatancy, no HCl reaction | | |
| 25 / 17.5 | 25.0–26.5 | 1.4 | SS-6 | 1-2-2 (4) | **Clayey Sand (SC)** 25.0-26.4' - yellowish gray, (5Y 8/1), wet, very loose, very fine to fine grained, no HCl reaction, 25% medium plasticity fines, increasing to 40% by 26.2', silica sand | | |
| 30 / 12.5 | 30.0–31.5 | 1.5 | SS-7 | 2-2-2 (4) | **Silty Sand (SM)** 30.0-30.8' - grayish orange, (10YR 7/4), wet, very loose, very fine to fine grained, no HCl reaction, 20% no to low plasticity fines, silica sand | | |
| | | | | | **Organic Soil (OH)** 30.8-31.5' - olive black, (5Y 2/1), wet, soft, high plasticity, no to slow dilatancy, no HCl reaction, 10-15% very fine grained silica sand, white gravel-sized fragment at 30.9', medium grained | | |
| 35 / 7.5 | 35.0–36.5 | 1.5 | SS-8 | 2-3-1 (4) | **Clayey Sand (SC)** 35.0-36.5' - olive black with grayish orange mottling, (5Y 2/1 with 10YR 7/4), wet, very loose, very fine to fine grained, no HCl reaction, 12% low to medium plasticity fines, silica sand, some organic fines | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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

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 : 4.4 ft bgs on 4/26/07 START : 4/24/2007 END : 4/26/2007 LOGGER : B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.5 | 40.0 – 41.5 | 1.5 | SS-9 | 2-1-2 (3) | **Clayey Sand (SC)** 40.0-41.5' - Same as 35.0-36.0' except no HCl reaction, 16% fines, silica sand, varies in irregular beds throughout | | |
| 45 -2.5 | 45.0 – 46.5 | 1.1 | SS-10 | 1-2-1 (3) | **Silt (ML)** 45.0-46.1' - black mottled with moderate yellowish brown (5Y 2/1 mottled with 10YR 5/4), wet, soft, nonplastic, no dilatancy, no HCl reaction, trace to 10% very fine to fine grained, silica sand | | |
| 50 -7.5 | 50.0 – 51.5 | 1.5 | SS-11 | 0-1-1 (2) | **Fat Clay (CH)** 50.0-50.45' - Same as 45.0-46.1' except pale olive mottled with light olive gray and moderate yellowish brown, (10Y 6/2 mottled with 5Y 5/2 and 10YR 5/4), wet, soft, high plasticity, no dilatancy, no HCl reaction<br>**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<br>**Fat Clay (CH)** 51.3-51.5' - Same as 50.0-50.45' except interbedded fat clay (CH) with silty sand (SM) | | |
| 55 -12.5 | 55.0 – 56.4 | 1.3 | SS-12 | 34-44-50/4.5 (94/10.5") | **Silt (ML)** 55.0-56.3' - moderate yellowish brown, (10YR 5/4), moist, hard, low plasticity, rapid dilatancy, moderate HCl reaction, 5-10% fine to medium sand grained, trace organics, all carbonate | | 09:28: Setting casing to 59' (1" stick up 60' casing) |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-06 SHEET 4 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

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 : 4.4 ft bgs on 4/26/07 START : 4/24/2007 END : 4/26/2007 LOGGER : B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -17.5 | 60.0 | 0.2 | SS-13 | 50/4 (50/4") | **Silt (ML)** 60.0-60.2' - Same as 55.0-56.3' except light olive brown, (5Y 5/6), moderate to strong HCl reaction | | 10:48 Slight chatter while drilling<br>11:03 Bringing up SS-13 |
| 65<br>-22.5 | 65.0<br>65.4 | 0.2 | SS-14 | 50/4.5 (50/4.5") | **Limestone Fragments** 65.0-65.2' - dusky yellow, (5Y 6/4), mild HCl reaction, friable<br>Begin Rock Coring at 65.5 ft bgs<br>See the next sheet for the rock core log | | 11:22 Bringing up SS-14<br>11:41 Switching to core barrel |
| 70<br>-27.5 | | | | | | | |
| 75<br>-32.5 | | | | | | | |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-06 SHEET 5 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

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 : 4/26/2007 LOGGER : B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | 65.5 R1-NQ 1 ft 100% 66.5 | 0 | 2 | 65.5-65.7' - Bedding plane, horizontal, bedding change<br>65.8' - Fracture, 60 deg, rough, undulating<br>66.2' - Mechanical break | | **Silt (ML)**<br>65.5-65.7' - very fine grained, some organics<br>**Limestone**<br>65.7-66.5' - yellowish gray, (5Y 7/2), very fine grained, no to moderate HCl reaction, weak (R2), voids up to 1/16" over 20% of surface, poorly fossiliferous, infill of yellowish gray (5Y 8/1) over < 5%, infill has voids/fossils | Water level at 0.0 below ground surface (at surface); tooling in hole<br>13:30 Coring R1-NQ<br>13:45 Coring R2-NQ |
| | R2-NQ 5 ft 84% | 77 | 0 | | | | |
| | | | 4 | 67.5' - Mechanical break<br>67.9, 68.0, 68.2' - Bedding plane (3), <5 deg, rough, undulating, open up to 1/8" | | | |
| | | | 1 | 68.1' - Fracture, 85 deg, rough, undulating, open, no matching end<br>68.8' - Mechanical break | | | |
| 70<br>-27.5 | | | 0 | 69.3' - Fracture, 60 deg, smooth, undulating<br>69.8' - Mechanical break | | **Limestone**<br>66.5-67.9 and 68.5-69.8' - Same as 65.7-66.5' except no silt, light olive gray (5Y 5/2) from 67.9-68.5' voids up to 1/16" over 30% of surface, fossiliferous (fossil casts up to 1"), dissolution features up to 1/8", bedding feature of grayish orange (10YR 7/4) from 67.6-67.7' is fine grained, none to trace voids, fossils infill with light olive gray material<br>69.8-70.7' - yellowish gray, (5Y 7/2), very fine grained, weak to medium strong (R2 to R3), trace voids up to 1/16", poorly fossiliferous, no dissolution on surface<br>**No Recovery 70.7-71.5'**<br>**Limestone**<br>71.5-72.2' - Same as 65.7-66.5' except discontinuous organic laminations over < 5% of surface up to 1/8"x1/4", infill occurs over 20% of surface<br>72.2-72.6' - very fine grained, has laminar organic layers within, up to 1/2" width, dusky yellow (5Y 6/4) silt infill<br>72.6-74.9' - light olive gray to very pale orange, (5Y 5/2 to 10YR 8/2), very fine grained, trace voids up to 1/16", 73.4-73.9' silt infill yellowish gray to very pale orange mottled with very light gray (5Y 7/2 to 10YR 8/2 mottled with N8), 73.9-74.9', 73.9-74.9' has infill of very pale orange with 20% tiny voids, matrix has trace voids up to 1/16", poorly fossiliferous<br>74.8-74.9' - moderate olive brown, (5Y 4/4), bedding layer with organics of olive gray (5Y 3/2) <1/16" thick | |
| | | | 0 | | | | |
| | 71.5 | | NR | | | | |
| | R3-NQ 5 ft 99% | 63 | 1 | | | | 13:59 Coring R3-NQ<br>SC-1 collected at 71.5-72.2' |
| | | | 0 | 72.4' - Bedding plane, <5 deg, rough, undulating, with 0.4' of silt infill, very fine<br>72.2-72.6', has laminar organic layers within, up to 0.05' width | | | |
| | | | 1 | 73.0' - Mechanical break<br>73.6' - Bedding plane, <5 deg, rough, undulating | | | |
| 75<br>-32.5 | | | 1 | 73.9-74.0' - Mechanical break<br>74.7' - Bedding plane, <5 deg, smooth to rough, undulating | | | |
| | | | 0 | 75.3, 75.8, 76.8' - Mechanical break (3) | | | |
| | 76.5 | | NR | | | | |
| | R4-NQ 5 ft 76% | 31 | 3 | 76.55, 76.7, 76.8' - Bedding plane (3), <5 deg, rough to smooth, undulating, <5% organics on fracture surface | | | 14:20 Coring R4-NQ |
| | | | 4 | 77.3' - Mechanical break<br>77.85, 77.75' - Fractures (2), 10 deg, rough, undulating, fracturing associated with dissolution, open up to 1/2" | | | |
| | | | >10 | 78.2' - Fracture, 85 deg, smooth, undulating, a fragment at 79.6' is missing | | | |
| 80<br>-37.5 | | | 1 | 78.25' - Bedding plane, smooth to rough, undulating, intersects 78.2' | | | |
| | | | NR | 79.0' - Bedding plane, <5 deg, smooth to rough, undulating, change in lithology, open up to 1/4" | | | |
| | 81.5 | | | 79.05' - Fracture, 85 deg, rough, undulating, open up to 1/8" | | | |
| | R5-NQ 5 ft 92% | 80 | 1 | 79.1-79.25' - Fracture zone, intersecting fractures | | | 14:35 Begin R5-NQ |
| | | | 0 | 79.8' - Fractures, 65-70 deg, rough, undulating, intersecting fractures<br>80.2' - Mechanical break | | | |
| | | | 1 | 81.5-81.7' - Fracture zone<br>82.7' - Mechanical break | | | SC-2 collected at 82.7-83.7' |
| 85<br>-42.5 | | | 0 | 83.6' - Fracture, 10 deg, rough, undulating, fracturing associated with dissolution, open up to 1/2"<br>84.0' - Mechanical break | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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

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 : 4/26/2007 LOGGER : B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | 1 | 84.2, 85.7' - Mechanical break (2) | | 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% 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'. | |
| | 86.5 | | NR | | | | 15:10 Begin R6-NQ |
| | R6-NQ 5 ft 100% | 100 | 0 | 86.95' - Bedding plane or mechanical break, <5 deg, smooth, undulating | | **No Recovery 76.45-76.5'** | |
| | | | 1 | 87.3' - Mechanical break | | **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, 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' | |
| | | | 1 | 89.0' - Mechanical break | | | |
| 90 -47.5 | | | 1 | 89.15' - Bedding plane or mechanical break, <5 deg, rough, undulating | | | |
| | | | 0 | 89.7' - Mechanical break<br>90.4' - Bedding plane, <5 deg, rough, undulating, open up to 1/8" | | | |
| | 91.5 | | | | | | |
| | R7-NQ 5 ft 95% | 42 | 10 | 91.0, 91.7, 95.8' - Mechanical break (3) | | | 15:28 Drill R7-NQ |
| | | | 3 | 92.2' - Fracture, 60 deg, rough, undulating<br>92.4' - Mechanical break<br>92.7' - Fracture, 60 deg, rough, undulating, multiple missing pieces, intersecting fractures | | | |
| | | | 1 | 93.0' - Fracture, 80 deg, rough, undulating<br>93.8' - Bedding plane, <5 deg, silt infill of yellowish gray color (5Y 7/2), milimeters thick organic layers (discontinuous), thickness of infill is 93.5'-94.3' | | **No Recovery 80.3-81.5'** | |
| 95 -52.5 | | | 1 | | | **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 is approximately medium strong rock (R3), except 81.5'-81.8' is extremely weak to very weak rock (R0-R1) | |
| | | | 0 | 95.3' - Fracture, 60 deg, rough, undulating | | | |
| | 96.5 | | NR | | | | |
| | R8-NQ 5 ft 100% | 95 | 2 | 96.65, 96.7' - Bedding plane (2), <5 deg, smooth, stepped, open up to 1/8" | | | 16:09 Drill R8-NQ |
| | | | 0 | 98.05' - Mechanical break | | **No Recovery 86.1-86.5'** | |
| | | | 1 | 98.9, 100.5' - Bedding plane or mechanical break (2), <5 deg, rough, undulating | | **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 fine grained, 30% tiny voids up to 1/16", 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 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 | SC-3 collected at 98.05-98.9' |
| 100 -57.5 | | | 0 | 99.0' - Mechanical break<br>99.9' - Mechanical break | | | |
| | | | 1 | 100.6' - Mechanical break | | | |
| | 101.5 | | | | | | |
| | R9-NQ 5 ft 100% | 95 | 1 | 101.6' - Bedding plane, <5 deg, smooth, undulating | | | 16:10 Begin R9-NQ |
| | | | 2 | 102.5' - Fracture, 70 deg, smooth, undulating<br>102.55' - Mechanical break | | | |
| | | | 0 | 103.35' - Bedding plane, 15 deg, smooth, undulating<br>104.0' - Mechanical break | | | |
| 105 -62.5 | | | 1 | | | | |

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|---|---|
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# 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

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 : 4/26/2007 LOGGER : B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | 1 | 104.9' - Bedding plane, <20 deg, rough, undulating, open up to 1/4"<br>105.6' - Fracture, 70 deg, smooth, undulating, intersecting high angle fractures | | 91.7-93.5' - very fine grained, trace voids to 1/16", trace fossils up to 1/4", voids increasing with depth to 20% of surface<br>94.3-96.25' - yellowish gray, (5Y 7/2), fine to medium grained, strong HCl reaction, very weak to weak (R1 to R2), voids to 1/4" over 30-40% of surface, voids to 1/2" at 94.55', fossiliferous<br>**No Recovery 96.25-96.5'**<br>**Limestone**<br>96.5-101.5' - yellowish gray, (5Y 7/2), medium to fine grained, moderate to strong HCl reaction, very weak to weak (R1 to R2), voids up to 1/16" over 20-30% of surface, fossiliferous (casts/molds)<br>104.0-105.2' - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, very weak to weak (R1 to R2)<br>105.2-106.5' - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, very weak to weak (R1 to R2), trace tiny voids up to 1/16", poorly fossiliferous, slight increase in fossil casts (approximately 10%)<br>106.5-111.5' - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, very weak to weak (R1 to R2), fewer voids about 5% of rock<br>**No Recovery 111.3-111.5'**<br>**Limestone**<br>111.5-115.5' - from 111.5-112.7' same as R10-NQ<br>At 112.7' color goes from yellowish gray (5Y 7/2) to light olive gray (5Y 5/2) with depth, fine grained, voids begin to increase with depth to 15%, fossil casts and molds increase to 20% up to 1/4"x1/8", has <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"<br>**No Recovery 115.5-116.5'**<br>**Limestone**<br>116.5-121.5' - Same as 106.5-111.5' except light olive gray (5Y 5/2) with <5% very pale orange mottling, very fine to fine grained, trace fossils up to 1/4", casts and molds, trace tiny voids up to 1/16"<br>119.4-120.6' medium grained, extremely weak (R0) to weak (R2) rock, up to 30% fossil casts up to 1/4", trace dissolution cavities up to 1/4", 10% voids up to 1/16" | |
| 106.5 | | | 0 | | | | 16:30 Begin R10-NQ |
| | | | 0 | 107.8' - Mechanical break | | | |
| | R10-NQ<br>5 ft<br>96% | 85 | 2 | 108.6' - Bedding plane, <20 deg, rough, undulating, open up to 1/8"<br>109.0' - Mechanical break | | | |
| 110<br>-67.5 | | | 1 | 109.2' - Fracture, 75 deg, rough, undulating, open up to 1/8"<br>110.0' - Bedding plane, <5 deg, rough to smooth, undulating, open up to 1/8" | | | |
| 111.5 | | | 0 | | | | |
| | | | NR | | | | |
| | | | 1 | 111.7' - Bedding plane, <5 deg, smooth, planar, open up to 1/8" | | | 16:45 Begin R11-NQ |
| | | | 3 | 112.6, 112.7, 112.8' - Bedding plane (3), <5 deg, rough to smooth, undulating, open up to 1/8" | | | |
| | R11-NQ<br>5 ft<br>80% | 72 | 0 | 113.6' - Mechanical break<br>114.0' - Mechanical break | | | |
| 115<br>-72.5 | | | 0 | 114.6' - Mechanical break | | | |
| 116.5 | | | NR | | | | |
| | | | 1 | 117.0' - Fracture, 50 deg and 60 deg, rough, undulating | | | 17:00 Begin R12-NQ |
| | | | 1 | 117.5' - Fracture, 50 deg and 60 deg, smooth, undulating | | | |
| | R12-NQ<br>5 ft<br>100% | 78 | 1 | 118.7' - Bedding plane, smooth, undulating, open up to 1/8"<br>119.0' - Mechanical break | | | |
| 120<br>-77.5 | | | 2 | 119.4' - Mechanical break<br>120.0' - Bedding plane, <10 deg, rough, undulating, open up to 1/4" | | | |
| 121.5 | | | 1 | 120.3' - Fracture, 85 deg, rough, undulating<br>120.6' - Mechanical break | | | |
| | | | 4 | 121.6, 121.7' - Bedding plane (2), <5 deg, smooth, undulating, open up to 1/8" | | | 07:24 Water level at 4.4' below ground surface |
| | | | 0 | 121.9' - Fracture, 75 deg, rough, undulating, open up to 1/8"<br>122.25' - Bedding plane, 20 deg, rough, undulating | | | 07:31 Drilling R13-NQ |
| | R13-NQ<br>5 ft<br>100% | 79 | 1 | 123.0' - Mechanical break<br>123.6' - Fracture, 75 deg, rough, undulating, open up to 1/8" | | | |
| 125<br>-82.5 | | | 1 | 124.0' - Mechanical break<br>124.8' - Mechanical break | | | SC-4 collected at 124.0-124.8' |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: B-06 | SHEET 8 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

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 : 4/26/2007 LOGGER : B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 126.5 | | 1 | 125.1' - Bedding plane, <5 deg, smooth, undulating, associated with lithology change<br>125.5' - Mechanical break | | **Limestone**<br>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" | 07:42 Drilling R14-NQ |
| | R14-NQ<br>5 ft<br>100% | 87 | 1<br>2<br>1<br>0<br>1 | 126.3' - Bedding plane, 80 deg, rough, undulating, open up to 1/4"<br>126.6' - Bedding plane, <5 deg, rough to smooth, undulating, open up to 1/4"<br>127.8' - Bedding plane, <5 deg, smooth, stepped<br>128.25' - Bedding plane or mechanical break, <5 deg, rough, undulating<br>128.8-129.0' - Mechanical break<br>129.3' - Bedding plane, <5 deg, rough to smooth, undulating, open up to 1/4"<br>129.8' - Mechanical break<br>130.9' - Bedding plane or mechanical break, <5 deg, rough, undulating | | **Limestone**<br>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 5/2) to yellowish gray (5Y 7/2)<br>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) | |
| 130<br>-87.5 | 131.5 | | | | | | |
| | R15-NQ<br>5 ft<br>56% | 33 | 4<br>1<br>0<br>NR | 131.65, 131.7, 131.95, 132.5' - Bedding plane (4), <5 deg, smooth to rough, undulating, open <1/8"<br>133.3' - Fracture, 50 deg, rough, undulating, open up to 1/8"<br>133.8-134.3' - Mechanical break, multiple fragments | | **No Recovery 134.3-136.5'** | 07:55 Begin R15-NQ |
| 135<br>-92.5 | 136.5 | | | | | | |
| | R16-NQ<br>5 ft<br>50% | 28 | >10<br>0<br>>10<br>NR | 136.7-137.1' - Fracture zone, intersecting fractures<br>137.35' - Bedding plane, <5 deg, rough, undulating<br>138.3' - Mechanical break<br>138.75-139.0' - Fracture zone, intersecting fractures | | **Limestone**<br>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<br>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<br>**No Recovery 139.0-141.5'** | 08:13 Begin R16-NQ |
| 140<br>-97.5 | 141.5 | | | | | | |
| | R17-NQ<br>5 ft<br>98% | 90 | 1<br>1<br>1<br>2 | 142.2, 143.0, 144.0, 145.7, 145.9' - Bedding plane (5), <5 deg, smooth, undulating, open up to 1/8"<br>143.4' - Mechanical break | | **Limestone**<br>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<br>SC-5 collected at 142.2-143.0' |
| 145<br>-102.5 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-06 SHEET 9 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

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 : 4/26/2007 LOGGER : B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | 1 | 145.5' - Mechanical break | | **Limestone**<br>144.0-146.4' - Same as 141.5-144.0' except dusky yellow, (5Y 6/4), fine to medium grained, extremely weak (R0) at 146.0-146.4', zone at 144.5' and 145.3 are same as 136.5-137.1', extremely weak material (R0), rock at 141.5-144.0' is medium strong (R3) to strong rock (R4)<br>**No Recovery 146.4-146.5'**<br>**Limestone**<br>146.5-151.1' - Same as 141.5-144.0' except interbedded with dusky yellow (5Y 6/4) up to 1' thick, most beds are thick with zones of thin wavy bedding from 150.75-151.1' is same as R10-NQ rock, 146.5-150.75' is medium strong (R3) to strong rock (R4)<br>**No Recovery 151.1-151.5'**<br>Bottom of Boring at 151.5 ft bgs on 4/26/2007 | 09:42 Begin R18-NQ<br>SC-6 collected at 147.35-148.15' |
| | 146.5 | | NR | | | | |
| | R18-NQ<br>5 ft<br>92% | 77 | 4 | 146.65, 146.8' - Bedding plane (2), <5 deg, smooth, undulating, open up to 1/4"<br>146.7' - Fracture, 75 deg, smooth, undulating | | | |
| | | | 0 | 147.35' - Bedding plane, <5 deg, smooth, undulating<br>148.15' - Mechanical break | | | |
| | | | 3 | 148.9' - Bedding plane, <5 deg, smooth, undulating, open up to 1/8" | | | |
| 150<br>-107.5 | | | >10 | 149.4, 149.6, 149.9' - Bedding plane (3), <5 deg, smooth, undulating, open up to 1/8"<br>149.75' - Mechanical break | | | |
| | | | 1 | 150.05-150.15' - Fracture zone, intersecting fractures | | | |
| | 151.5 | | NR | 150.8' - Bedding plane (<5), smooth, undulating, open up to 1/4"<br>150.95' - Mechanical break | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-07 SHEET 1 OF 8 |

# SOIL BORING LOG

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

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 : 2.0 ft bgs on 5/4/07 START : 5/4/2007 END : 5/6/2007 LOGGER : P. De Sa'rego, R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 43.1 | 0.0 – 1.5 | 1.0 | SS-1 | 0-2-1 (3) | **Poorly Graded Sand With Organics (SP)** 0.0-1.0' - dark gray grading to very light gray, (N3 to N8), moist, very loose, very fine to fine grained silica sands, trace nonplastic fines, 10% organics and roots decreasing with depth, last 2.4' is dark yellowish brown (10YR 6/6) with 5% nonplastic fines, trace concretions to 1/2" | | Using 2' x 2" split spoon for SPT |
| 5 | 5.0 | | | | | | |
| 38.1 | 5.0 – 6.5 | 0.9 | SS-2 | 3-3-2 (5) | **Poorly Graded Sand (SP)** 5.0-5.9' - very pale orange, (10YR 8/2), wet, loose, very fine to fine grained silica sands, trace nonplastic fines, trace sand-sized black particles | | SS-2 taken 09:47 Assumed water level at 2.0' due to moisture content in SS-2 and water level measurements at B-9 |
| 10 | 10.0 | | | | | | |
| 33.1 | 10.0 – 11.5 | 1.0 | SS-3 | 3-3-5 (8) | **Poorly Graded Sand With Silt (SP-SM)** 10.0-11.0' - white to very light gray, (N9 to N8), very fine to fine grained silica sands, 10% nonplastic fines, sand-sized black particles | | SS-3 taken 09:53 Similar to SS-2 |
| 15 | 15.0 | | | | | | |
| 28.1 | 15.0 – 16.5 | 0.9 | SS-4 | 3-3-4 (7) | **Poorly Graded Sand With Silt (SP-SM)** 15.0-15.9' - mottled white and pale yellowish brown, (10YR 6/2), wet, very fine to fine grained silica sands, 7% nonplastic fines, trace very fine sand-sized black particles | | SS-4 taken 09:57 |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-07 SHEET 2 OF 8 |

# SOIL BORING LOG

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

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 : 2.0 ft bgs on 5/4/07 START : 5/4/2007 END : 5/6/2007 LOGGER : P. De Sa'rego, R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 23.1 | 20.0 – 21.5 | 1.1 | SS-5 | 4-5-5 (10) | **Silty Sand (SM)** 20.0-21.1' - pale yellowish brown, (10YR 6/2), wet, loose, no HCl reaction, very fine to fine grained silica sands, 20% nonplastic fines | | SS-5 taken 10:07 |
| 25 | 25.0 | | | | | | |
| 18.1 | 26.5 | 1.5 | SS-6 | 2-2-2 (4) | **Silty Sand (SM)** 25.0-26.5' - pale brown, (5YR 5/2), wet, very loose, no HCl reaction, very fine to fine grained silica sands, 20-25% nonplastic fines | | SS-6 taken 10:13 |
| 30 | 30.0 | | | | | | |
| 13.1 | 31.5 | 1.5 | SS-7 | 2-2-1 (3) | **Poorly Graded Sand With Silt (SP-SM)** 30.0-31.5' - yellowish gray, (5Y 7/2), wet, very loose, no HCl reaction, very fine to fine grained silica sand, 6% nonplastic fines, trace very fine sand-sized black particles | | SS-7 taken 10:20 |
| 35 | 35.0 | | | | | | |
| 8.1 | 36.5 | 1.5 | SS-8 | 1-1-1 (2) | **Poorly Graded Sand With Silt (SP-SM)** 35.0-36.5' - Same as 30.0-31.5' except yellowish gray, trace medium bluish gray mottling, (5Y 8/1 trace 5B 7/1) | | SS-8 taken 10:25 |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-07 SHEET 3 OF 8 |

# SOIL BORING LOG

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

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 : 2.0 ft bgs on 5/4/07 START : 5/4/2007 END : 5/6/2007 LOGGER : P. De Sa'rego, R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 3.1 | 40.0 – 41.5 | 1.5 | SS-9 | 2-2-3 (5) | **Poorly Graded Sand With Silt (SP-SM)** 40.0-41.5' - yellowish gray, (5Y 8/1), wet, loose, no HCl reaction, very fine to fine grained silica sand, 11% nonplastic fines, trace pyrite fragments | | SS-9 taken 10:45<br>Driller's Remark: Switched to 2-7/8" tricone drag bit |
| 45 | 45.0 | | | | | | |
| -1.9 | 46.5 | 1.5 | SS-10 | 2-2-3 (5) | **Poorly Graded Sand With Silt (SP-SM)** 45.0-46.5' - Same as 40.0-41.5' | | SS-10 taken 10:50 |
| 50 | 50.0 | | | | | | |
| -6.9 | 51.5 | 1.5 | SS-11 | 0-1-1 (2) | **Poorly Graded Sand With Silt (SP-SM)** 50.0-51.5' - moderate yellowish brown to pale yellowish brown, trace medium dark gray mottling, (10YR 5/4 to 10YR 6/2 with N4), wet, very loose, no HCl reaction, very fine to fine grained silica sand, 6% nonplastic fines | | SS-11 taken 10:57<br>Weight of hammer over 4", then 2 blows recorded as 0-1-1 (2) |
| 55 | 55.0 | | | | | | |
| -11.9 | 56.5 | 1.5 | SS-12 | 0-1-1 (2) | **Poorly Graded Sand With Silt (SP-SM)** 55.0-56.5' - Same as 50.0-51.5' except medium dark gray to dark gray (N4 to N3) mottling | | SS-12 taken 11:06<br>1 blow for first 12" |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-07 SHEET 4 OF 8 |

# SOIL BORING LOG

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

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 : 2.0 ft bgs on 5/4/07 START : 5/4/2007 END : 5/6/2007 LOGGER : P. De Sa'rego, R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -16.9 | 60.0 – 61.5 | 1.4 | SS-13 | 0-1-2 (3) | **Poorly Graded Sand With Silt (SP-SM)** 60.0-61.4' - Same as 50.0-51.5' except dusky blue, (5PB 3/2), trace concretions | | SS-13 taken 11:11 |
| | | | | | | | SS-14 has a jumbled appearance |
| 65 | 65.0 | | | | | | |
| -21.9 | 66.5 | 1.5 | SS-14 | 5-6-12 (18) | **Clay With Gravel (CL)** 65.0-66.4' - mottled grayish blue green and medium dark gray, (5BG 5/2 and N4), moist to wet, very stiff, high plasticity, no dilatancy, 20% fine to coarse gravel, carbonate derived, rounded to subrounded; silty sand (SM) lens at 66.0', 3.0' thick, white (N9) to yellowish gray (5Y 8/1), fine to coarse sand-sized carbonate material, gravel and silty sand have very strong HCl reaction, clay has no HCl reaction | | SS-14 taken 13:10 |
| 70 | 70.0 | | | | | | |
| -26.9 | 71.5 | 1.4 | SS-15 | 2-2-3 (5) | **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, 25% low plasticity fines, scattered irregular pockets of fat clay (CH), grayish blue green (5BG 5/2), high plasticity, 15-20% is fat clay | | SS-15 taken 13:26 |
| 75 | 75.0 | | | | | | |
| -31.9 | 76.5 | 1.5 | SS-16 | 4-2-1 (3) | **Fat Clay (CH)** 75.0-75.2' - moderate yellowish brown, (10YR 5/4), wet, soft, high plasticity, no dilatancy, sandy seam<br>**Poorly Graded Sand With Silt (SP-SM)** 75.2-76.5' - very pale orange heavily mottled with dark gray, (10YR 8/2 with N4), wet, very loose, very fine to fine grained silica sand, 10% nonplastic fines, trace very fine sand-sized black particles | | SS-16 taken 13:43 |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-07 SHEET 5 OF 8 |

# SOIL BORING LOG

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

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 : 2.0 ft bgs on 5/4/07 START : 5/4/2007 END : 5/6/2007 LOGGER : P. De Sa'rego, R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -36.9 | 80.0 – 81.5 | 1.5 | SS-17 | 1-1-2 (3) | **Silty Sand (SM)** 80.0-81.5' - pale yellowish brown, (10YR 6/2), wet, very loose, trace medium gray laminated mottling, very fine to fine grained silica sand, 25% nonplastic fines, trace very fine sand-sized black particles | | SS-17 taken 14:27 |
| | | | | | | | Driller's Remark: Light to medium chatter observed while drilling to 85' |
| 85 | 85.0 | | | | | | |
| -41.9 | 85.3 | 0.3 | SS-18 | 50/3 (50/3") | **Clayey Sand (SC)** 85.0-85.4' - mixed silty sands, fat clays (SM, CH), fat clay is mottled olive black (5Y 2/1) and grayish black (N2), silty sand is dark yellowish brown (10YR 4/2) with black streaks, wet, very loose/soft, trace medium to coarse sand-sized carbonate material with moderate HCl reaction, no HCl reaction in silty sands or fat clays | | SS-18 taken 14:32 |
| | | | | | | | Driller's Remark: Switch to 2-7/8" tricone roller bit at 15:07<br>SS-18 may be slough |
| 90 | 90.0 | | | | | | |
| -46.9 | 91.5 | 1.4 | SS-19 | 4-19-26 (45) | **Silt (ML)** 90.0-90.4' - yellowish gray, (5Y 8/1), nonplastic, rapid dilatancy, moderate to strong HCl reaction, very thinly laminated (<1/16" thick) with olive black (5Y 2/1) (organics), all carbonate<br>**Silty Sand With Gravel (SM)** 90.4-91.4' - yellowish gray, (5Y 8/1), wet, dense, strong HCl reaction, fine to coarse sand-sized, 20% fine to coarse gravel-sized, 30% nonplastic fines, all carbonate | | SS-19 taken 15:36 |
| 95 | 95.0 | | | | | | |
| -51.9 | 96.5 | 1.5 | SS-20 | 0-7-47 (54) | **Sandy Clay With Silt (CL-ML)** 95.0-96.5' - yellowish gray, (5Y 8/1), moist, hard, low plasticity, rapid dilatancy, strong HCl reaction, greenish black (5GY 2/1) mottling at 95.8', 10-15% fine to medium sand-sized, trace organics in pockets | | SS-20 taken 15:51<br>Weight of hammer for first 6" |
| 100 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-07 SHEET 6 OF 8 |

# SOIL BORING LOG

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

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 : 2.0 ft bgs on 5/4/07 START : 5/4/2007 END : 5/6/2007 LOGGER : P. De Sa'rego, R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -56.9 | 100.0<br>100.7 | 0.5 | SS-21 | 38-50/2<br>(88/8") | **Silty Sand (SM)**<br>100.0-100.5' - yellowish gray to very light gray, (5Y 7/2 to N8), wet, very dense, strong HCl reaction, fine to coarse sand-sized, 25% low plasticity fines, 10% fine gravel-sized, all carbonate | | SS-21 taken 17:03<br><br>11:50 100% circulation loss at 101.0'<br>Switch to 2-3/8" tricone roller drill bit<br><br>5/5/07 water level taken 08:38, 4.4' below ground surface<br>09:30 65.0' 4" HW casing installed<br>Driller's Remark: Will use 2-7/8" tricone drag bit to advance boring, AWJ rods |
| 105 | 105.0 | | | | | | |
| -61.9 | 106.5 | 0.9 | SS-22 | 10-6-23<br>(29) | **Silty Sand (SM)**<br>105.0-105.9' - yellowish gray, (5Y 7/2), wet, medium dense, strong HCl reaction, fine to coarse sand-sized, 35% low plasticity fines, 10% fine to coarse gravel-sized, all carbonate | | Light chatter while drilling with drag bit<br><br>10:40 Driller's Remark: Reached 90.0-91.0' and lost complete circulation<br>Installed 4" HW casing to 105.0' below ground surface |
| 110 | 110.0 | | | | | | |
| -66.9 | 111.5 | 1.5 | SS-23 | 13-22-11<br>(33) | **Silty Sand With Limestone Fragments (SM)**<br>110.0-111.5' - very light gray to light gray, (N5 to N7), wet, dense, strong HCl reaction, fine to coarse sand-sized, 35% fine to coarse gravel-sized limestone fragments, 20% low plasticity fines, material is carbonate and highly fossiliferous | | SS-23 taken 14:55 |
| 115 | 115.0 | | | | | | |
| -71.9 | 116.5 | 0.9 | SS-24 | 7-2-29<br>(31) | **Silty Sand With Limestone Fragments (SM)**<br>115.0-115.85' - Same as 110-111.5' | | SS-24 taken 15:13<br>Last SPT on 5/5/07 |
| 120 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-07 SHEET 7 OF 8 |

# SOIL BORING LOG

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

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 : 2.0 ft bgs on 5/4/07 START : 5/4/2007 END : 5/6/2007 LOGGER : P. De Sa'rego, R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -76.9 | 120.0 – 121.5 | 1.5 | SS-25 | 13-18-19 (37) | **Silty Sand With Limestone Fragments (SM)** 120.0-121.8' - yellowish gray, (5Y 8/1), wet, dense, strong HCl reaction, fine to coarse sand-sized, 42% low plasticity fines, 15-20% fine fragments-sized carbonate derived, highly fossiliferous with molds and casts | | Start drilling on 5/6/07 at 8:05<br>Water level at 6.4' below ground surface at beginning of day |
| 125 | 125.0 | | | | | | |
| -81.9 | 125.0 – 125.9 | 0.9 | SS-26 | 37-50/5 (87/11") | **Silty Sand With Limestone Fragments (SM)** 125.0-125.9' - Same as 120-121.8' except 25-30% gravel-sized material in wafer-like lenses up to 1/4"-1/2" thick | | Driller's Remark: Continued circulation loss from 120-125' - gained a little back at 125.0' |
| 130 | 130.0 | | | | | | |
| -86.9 | 130.0 – 130.5 | 0.4 | SS-27 | 50/5.5 (50/5.5") | **Silty Sand With Limestone Fragments (SM)** 130.0-130.4' - Same as 125.0-125.9' except trace organic fragments | | Driller's Remark: 130-135' drilled fairly hard and consistent |
| 135 | 135.0 | | | | | | |
| -91.9 | 135.0 – 135.4 | 0.1 | SS-28 | 50/4.5 (50/4.5") | **Limestone Fragments** 135.0-135.1' - strong HCl reaction | | Chatter at 136-136.5'<br>Driller's Remark: Harder |
| | 135.4 – 137.5 | | | | | | End soil sampling at 10:35 on 5/6/07<br>Switch to rock coring, see rock core log |
| | 137.5 – 137.6 | 0.0 | SS-29 | 50/2 (50/2") | **No Recovery 137.5-137.6'** Begin Rock Coring at 137.5 ft bgs<br>See the next sheet for the rock core log | | |
| 140 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-07 SHEET 8 OF 8 |

# ROCK CORE LOG

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 ORIENTATION : Vertical

WATER LEVELS : 2.0 ft bgs on 5/4/07 START : 5/4/2007 END : 5/6/2007 LOGGER : P. De Sa'rego, R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 137.5 | | | | | | Driller starts with new bit: Boart Longyear Alpha bit 4050089 NQ 06 R8 at 155 |
| | R1-NQ 4 ft 75% | 35 | 7 | 137.6-137.8' - Fractures (3), horizontal, smooth to rough, undulating to stepped, heavy drill action marks, open | | **Limestone** 137.5-138.7' - yellowish gray, (5Y 8/1), strong HCl reaction, medium strong (R3), banded with silt lenses between 1/4" and 2", small voids to 1/16" over 25% of surface in a few lenses, trace fossil molds, casts, cross-bedding from 138.5-138.7', strongly cemented | Limestone from 137.5-151.5' appears to be detrital limestone |
| | | | 3 | 137.9' - Fracture, horizontal, rough, stepped, possible black staining over 50% of surface, with 1/4" relief, lower side smooth and planar with wear from drilling, black staining with embedded particles over 60% of surface | | | |
| 140 -96.9 | | | 1 | 138' - Bedding plane, <5 deg, rough, undulating, 1/16" relief, open | | | |
| | | | NR | 138.35' - Bedding plane, 15 deg, rough, planar, tight | | 138.7-139.2' - Same as 137.5-138.7' | R1: 8 minutes |
| | 141.5 | | | | | 139.2-140.5' - very weak (R1), becomes more massive, highly fossiliferous with molds, casts, clasts of different limestone, subrounded, moderately cemented | |
| | R2-NQ 5 ft 100% | 76 | 3 | 138.4' - Bedding plane, horizontal, bottom surface is rough, undulating, heavy wear on upper side from drilling, <1/16" relief, open | | **No Recovery 140.5-141.5'** | SC-1 collected at 142.1-143.1' |
| | | | 2 | 138.7' - Mechanical break<br>138.9' - Fracture, 60 deg, rough, undulating, 3/16" relief, tight | | **Limestone** 141.5-143.5' - yellowish gray, (5Y 8/1), strong HCl reaction, very weak to weak (R1 to R2), very few voids of any size, massive appearance, scattered black grains (pyrite), trace fossils | |
| | | | 1 | 139.3' - Bedding plane, horizontal, rough, undulating, rock weak from drilling in upper surface, open | | | |
| 145 -101.9 | | | 4 | 139.45' - Fracture, 5 deg, rough, undulating, 1/16' relief, tight<br>139.6' - Fracture, 60 deg, rough, undulating, 1/16' relief, tight | | 143.5-144.4' - strong HCl reaction, becomes banded with gray particles throughout, 50% of surface covered with voids to 1/16" | |
| | | | 0 | 140.1' - Mechanical break | | | R2: 17 minutes |
| | 146.5 | | | 141.6' - Mechanical break, 0-90 deg, rough, undulating, <1/16" relief, open | | 144.4-146.5' - moderate HCl reaction, medium strong (R3), trace voids to 1/16", trace fossil molds, casts | |
| | R3-NQ 5 ft 76% | 60 | 4 | 141.8, 142.1' - Fractures, 70 deg, rough, undulating, 1/16" relief, tight | | | |
| | | | 1 | 143.3' - Fracture, 80 deg, rough, undulating, 1/16" relief, accretions of iridescent pyrite covering 30% of surface, tight | | 145.3-146.5' - mild to moderate HCl reaction, infilling in two 1.2" thick bands | |
| | | | 1 | 143.6' - Fracture, 70 deg, rough, undulating, up to 1/16" relief, tight<br>143.85' - Mechanical break | | 146.5-150.3' - yellowish gray, (5Y 8/1), strong HCl reaction, very weak to weak (R1 to R2), highly fossiliferous (molds, casts), echinoderms, brownish black laminations over 146.5-146.8', voids <1/16" over 30-35% surface over 149.4-150.3', particles in rock matrix (medium dark gray particle, fossil mold fragments, fossils) give the appearance of being fine to medium grain textured rock | |
| 150 -106.9 | | | 1 | 144.1-144.4' - Bedding plane, 0-5 deg, rough, undulating, open<br>144.6-145.5' - Fracture, vertical, undulating | | | |
| | | | NR | 145.9' - Mechanical break<br>146.6' - Bedding plane, horizontal, rough, undulating, open 5/8" | | | R3: 8 minutes |
| | 151.5 | | | 146.7' - Bedding plane, horizontal, rough, undulating, open 1/8", organics covering 50-70% surface<br>146.8' - Bedding plane, horizontal, rough, undulating, open 1/8", organics covering 50-70% surface<br>147.3' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1/8"<br>147.8' - Fracture, 30 deg, rough, undulating, tight<br>149.4' - Fracture, horizontal, rough, undulating, tight<br>149.7' - Bedding plane, 20 deg, rough, undulating, fossil fragment at surface of break, open up to 3/8" | | **No Recovery 150.3-151.5'**<br>Bottom of Boring at 151.5 ft bgs on 5/6/2007 | Assume core loss from bottom of run. Finish drilling at 13:00. Abandoned on 5/7/07 with 61 bags of Bonsal or Quikrete brand Portland Type I/II or Type I cement (47-lb bags) grouted to surface |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-07A SHEET 1 OF 9 |

# SOIL BORING 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

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 START : 6/15/2007 END : 6/17/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 43.2 | 0.0 – 1.5 | 1.2 | SS-1 | 2-2-3 (5) | **Poorly Graded Sand With Organics (SP)** 0.0-1.2' - medium dark gray grading to very light gray, (N4 to N8), moist, loose, fine grained, no HCl reaction, trace nonplastic fines, 20% organics and roots decreasing with depth, silica sand | | |
| 5 | 5.0 | | | | | | |
| 38.2 | 5.0 – 6.5 | 1.0 | SS-2 | 7-7-6 (13) | **Poorly Graded Sand (SP)** 5.0-6.0' - white to yellowish gray, (N9 to 5Y 8/1), wet, medium dense, fine grained, no HCl reaction, trace nonplastic fines, silica sand | | |
| 10 | 10.0 | | | | | | |
| 33.2 | 10.0 – 11.5 | 1.0 | SS-3 | 7-9-8 (17) | **Poorly Graded Sand (SP)** 10.0-10.1' - Same as 5.0-6.0' **Silty Sand (SM)** 10.1-11.0' - streaked light gray to medium gray, (N7 to N5), moist to wet, medium dense, very fine to fine grained, no HCl reaction, 15% low to medium plastic fines, silica sand | | |
| 15 | 15.0 | | | | | | |
| 28.2 | 15.0 – 16.5 | 0.9 | SS-4 | 5-8-11 (19) | **Poorly Graded Sand With Silt (SP-SM)** 15.0-15.9' - yellowish gray, (5Y 8/1), wet, medium dense, very fine to fine grained, no HCl reaction, 10% nonplastic fines, silica sand | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-07A SHEET 2 OF 9 |

# SOIL BORING 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

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 START : 6/15/2007 END : 6/17/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 23.2 | 20.0 – 21.5 | 1.5 | SS-5 | 6-6-7 (13) | **Poorly Graded Sand With Silt (SP-SM)** 20.2-21.5' - yellowish gray, (5Y 8/1), wet, medium dense, very fine to fine grained, no HCl reaction, 5-10% nonplastic fines, silica sand | | 1.65' recovery noted on log |
| 25 | 25.0 – 26.5 | 1.5 | SS-6 | 7-3-2 (5) | **Poorly Graded Sand With Silt (SP-SM)** 25.0-26.5' - Same as 20.0-21.5' | | 2.0' recovery noted on log |
| 18.2 30 | 30.0 – 31.5 | 1.5 | SS-7 | 1-2-2 (4) | **Silty Sand (SM)** 30.0-31.5' - yellowish gray, (5Y 7/2), wet, loose, fine grained, no HCl reaction, 15-20% nonplastic fines, silica sand | | 1.7' recovery noted on log |
| 13.2 35 | 35.0 – 36.5 | 1.5 | SS-8 | 2-1-2 (3) | **Poorly Graded Sand With Silt (SP-SM)** 35.0-36.5' - yellowish gray, (5Y 7/2), wet, very loose, very fine to fine grained, no HCl reaction, 8% nonplastic fines, silica sand | | 1.75' recovery noted on log |
| 8.2 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-07A SHEET 3 OF 9 |

# SOIL BORING 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

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 START : 6/15/2007 END : 6/17/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 3.2 | 40.0 – 41.5 | 1.5 | SS-9 | 1-1-2 (3) | **Silty Sand (SM)** 40.0-41.5' - Same as 35.0-36.5' except pale yellowish gray, (5Y 8/1), 20% nonplastic fines, black (organic) staining from 40.5-40.6' | | Driller's Remark: Weight of hammer causes 2' rod drop from 37-55' 2.0' recovery noted on log |
| 45 | 45.0 | | | | | | |
| -1.8 | 46.5 | 1.5 | SS-10 | 1-1-2 (3) | **Silty Sand (SM)** 45.0-46.5' - Same as 40.0-41.5' except 25% nonplastic fines, trace black (possibly organic) staining from 45.25-45.35' | | 1.8' recovery noted on log |
| 50 | 50.0 | | | | | | |
| -6.8 | 51.5 | 1.5 | SS-11 | 0-1-1 (2) | **Silty Sand (SM)** 50.0-51.5' - Same as 45.0-46.5' except limestone fragments in top 1" of sample, rock fragments are fossiliferous, no HCL reaction, trace coarse sand-sized concretions | | 1.75' recovery noted on log |
| 55 | 55.0 | | | | | | |
| -11.8 | 56.5 | 1.3 | SS-12 | 0-1-5 (6) | **Silty Sand (SM)** 55.0-56.3' - moderate yellowish brown, (10YR 5/4), wet, loose, very fine to fine grained, no HCl reaction, 40% low plasticity fines, trace moderate gray (N5) to dark reddish brown (10YR 3/4) concretions or pyrite nodules in upper 4" of sample, black (organic) staining over bottom 6" of sample | | Driller's Remark: "Drastic" change of material at 57.5', harder and different in color ("gray to green") Driller switch to tri-cone roller bit (from drag bit) at 57.5' Driller removes large (6" spherical) piece of silty clay with trace rock fragments from drill bit from 57-60' |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-07A SHEET 4 OF 9 |

# SOIL BORING 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

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 START : 6/15/2007 END : 6/17/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -16.8 | 60.0<br>60.6 | 0.6 | SS-13 | 25-50/1<br>(75/7") | **Elastic Silt (MH)**<br>60.0-60.6' - very light gray, (N8), mottled with 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 | | HW casing advanced to 61' |
| 65 | 65.0 | | | | | | |
| -21.8 | 65.4 | 0.4 | SS-14 | 50/5<br>(50/5") | **Clayey Sand (SC)**<br>65.0-65.4' - light gray to yellowish gray, (N7 to 5Y 8/1), 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 | | 1.0' recovery noted on log |
| 70 | 70.0 | | | | | | |
| -26.8 | 71.5 | 1.2 | SS-15 | 16-17-12<br>(29) | **Interbedded Poorly Graded Sand With Clay To Clayey Sand And Fat Clay (SP-SC, CH)**<br>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 | | | | | | |
| -31.8 | 76.5 | 1.5 | SS-16 | 4-2-4<br>(6) | **Poorly Graded Sand With Silt (SP-SM)**<br>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 | | 6/16/07: Water level at 4.5'<br>8:15: HW casing to 70'<br>8:30: At 75.0' switch to 2-7/8" rock bit<br>8:57 Driller's Remark: Casing slid approx. 2-1/2' down borehole, added 5' HW casing (to 75') |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-07A SHEET 5 OF 9 |

# SOIL BORING 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

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 START : 6/15/2007 END : 6/17/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -36.8 | 80.0 | 1.4 | SS-17 | 1-0-50/5 (50/11") | **Silty Sand (SM)** 80.0-80.9' - yellowish gray, (5Y 7/2), wet, very loose, 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<br>**Elastic Silt (MH)** 81.1-81.4' - medium gray, (N5), moist, hard, medium plasticity, slow to rapid dilatancy, strong HCl reaction, mottled | | |
| 85 | 85.0 | | | | | | |
| -41.8 | 85.1 | 0.1 | SS-18 | 50/1.5 (50/1.5") | **Silt With Sand (ML)** 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 | | 0.3' recovery noted on log |
| | | | | | | | Driller's Remark: Clay lens at 87.5-88.0' |
| | | | | | | | Driller's Remark: Very soft at 88.5' |
| 90 | 90.0 | | | | | | |
| -46.8 | | 1.5 | SS-19 | 6-9-29 (38) | **Silt (ML)** 90.0-91.5' - light olive gray, (5Y 5/2), wet, hard, nonplastic, slow to rapid dilatancy, strong HCl reaction, 10-15% fine to medium sand-sized particles (carbonate), carbonate silt | | 1.6' recovery noted on log |
| | 91.5 | | | | | | |
| 95 | 95.0 | | | | | | |
| -51.8 | 95.5 | 0.3 | SS-20 | 50/5.5 (50/5.5") | **Silty Sand And Limestone Fragments (SM)** 95.0-95.3' - yellowish gray, (5Y 8/1), wet, very dense, strong HCl reaction, fine sand-sized carbonate particles, 25% non to low plasticity fines, limestone fragments to 1/2" in "wafer" like pieces, 50% silty sand/50% limestone | | Driller's Remark: Losing circulation at 95.0' |
| 100 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-07A SHEET 6 OF 9 |

# SOIL BORING 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

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 START : 6/15/2007 END : 6/17/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -56.8 | 100.0 – 101.5 | 1.5 | SS-21 | 22-33-45 (78) | **Silty Sand (SM)** 100.0-101.5' - yellowish gray, (5Y 7/2), light gray mottling, wet, very dense, medium to coarse grained, strong HCl reaction, 25% low plasticity fines increasing to 35-40%, all carbonate | | 1.6' recovery noted on log |
| 105 | 105.0 | | | | | | |
| -61.8 | 105.0 – 105.9 | 0.9 | SS-22 | 37-50/5 (87/11") | **Poorly Graded Sand With Silt (SP-SM)** 105.0-105.1' - pale yellowish brown, (10YR 6/2), wet, very dense, strong HCl reaction in carbonates, 5-10% nonplastic fines, fine silica sand, medium carbonate sand, trace black medium sand-sized minerals<br>**Silty Sand (SM)** 105.1-105.9' - Same as 100.0-101.5' except very strong HCl reaction, 40% low-plasticity fines | | 1.35' recovery noted on log |
| 110 | 110.0 | | | | | | |
| -66.8 | 110.0 – 111.3 | 1.3 | SS-23 | 30-50-50/3 (100/9") | **Poorly Graded Sand With Silt (SP-SM)** 110.0-110.95' - Same as 105.0-105.1' except yellowish gray to pale yellowish brown, (5Y 7/2 to 10YR 6/2), predominately fine to medium silica sand, 5% white medium carbonate sand, 5-10% nonplastic fines increasing with depth; strong HCl reaction in fines and carbonate grains<br>**Limestone Fragments** 110.95-111.25' - yellowish gray, (5Y 7/2), fine to coarse grained, very strong HCl reaction, highly fossiliferous | | Driller's Remark: Likely to have no recovery if coring begins at 105.0'<br>2.0' recovery noted on log<br>15:12: Instruct driller to take one more spoon 115.0'-120.0' and if limestone present, begin coring with NQ |
| 115 | 115.0 | | | | | | |
| -71.8 | 115.0 – 116.5 | 1.2 | SS-24 | 25-31-32 (63) | **Silty Sand With Limestone Fragments (SM)** 115.0-116.2' - yellowish gray, (5Y 8/1), wet, very dense, 15% coarse sand to fine gravel-size limestone fragments, 30% low plasticity fines, all carbonate | | Driller extends casing (HW) to 110.0'<br>06/17/07: Water level at 8.0'<br>8:45: Driller clear hole with tri-cone roller bit |
| 120 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-07A SHEET 7 OF 9 |

# SOIL BORING 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

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 START : 6/15/2007 END : 6/17/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -76.8 | 120.0 | 0.2 | SS-25 | 50/3.5 (50/3.5") | **Silty Sand With Limestone Fragments (SM)**<br>120.0-120.2' - Same as 115.0-116.2' | | Resume drilling 6/16/07 at 8:57<br>Driller setting rod for SPT at 120.0'<br>Split spoon SS-26 driven from 125.0-125.15' |
| 125<br>-81.8 | 124.5 | 0.2 | SS-26 | 50/2 (50/2") | **Limestone Fragments**<br>125.0-125.15' - yellowish gray, (5Y 8/1), strong HCl reaction, friable<br>Begin Rock Coring at 125.0 ft bgs<br>See the next sheet for the rock core log | | Driller's Remark: 5% return of mud from 125-130'<br>Switched to NQ WL to begin rock core at 125.0' |
| 130<br>-86.8 | | | | | | | |
| 135<br>-91.8 | | | | | | | |
| 140 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-07A SHEET 8 OF 9 |

# 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 ORIENTATION : Vertical

WATER LEVELS : 4.5 ft bgs on 6/16/07 START : 6/15/2007 END : 6/17/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -81.8 | 125.0 | | 6 | 125.0, 125.1' - Bedding plane (2), horizontal, smooth, planar, fractures, open<br>125.35, 125.5' - Fractures (2), horizontal, rough, planar, open, some rock fragments (3) | | **Limestone**<br>125.0-129.4' - yellowish gray, (5Y 7/2), fine to medium grained, strong HCl reaction, very weak (R1), 10% voids up to 1/16", 5% casts/cavities up to 3/4"x3/8", poorly fossiliferous, slightly harder (R1-R2) from 127.9'-129.9' | Start rock coring at 125' with NQ WL casing |
| | | | >10 | 125.85, 125.9' - Fractures (2), horizontal, rough, undulating, open | | | |
| | R1-NQ<br>5 ft<br>88% | 13 | >10 | 126.0-127.9' - Fracture zone, smooth to rough, planar, bedding plane fractures, thin (1/2") beds, open to tight | | | |
| | | | 3 | 128.6, 128.9, 129.0' - Fractures (3), horizontal, rough, undulating, open | | | |
| | | | 2 | 129.1, 129.2' - Fractures (2), horizontal, rough, undulating to stepped, open | | | R1: 3 minutes |
| 130 | 130.0 | | NR | | | **No Recovery 129.4-130.0'** | |
| -86.8 | | | 3 | 130.1' - Fracture, horizontal, rough, undulating, open | | **Limestone**<br>130.0-130.1' - Same as 125.0-129.4'<br>130.1-131.55' - yellowish gray mottled with light gray, (5Y 7/2 and N7), moderate HCl reaction, weak to medium strong (R2 to R3), mottling associated with large cavities over 40% of surface, carbonate, fine to medium grained, 5-10% voids up to 1/8", 25% cavities (up to 2-3/8"x1-9/16" at 130.4-130.55', 130.75-130.8'), cavities infilled with carbonate material (pale yellowish brown, medium grained, weak (R2), 25% voids, mild HCl reaction, poorly fossiliferous)<br>131.55-132.45' - very pale orange, (10YR 8/2), fine grained, moderate HCl reaction, very weak (R1), thinly bedded (1/4"-1/2"), trace voids to 3/16", no visible casts, 25% extremely weak (R0), irregular gray lenses<br>132.45-133.75' - yellowish gray, mottled light gray, and very pale orange, (5Y 7/2, N7, and 10YR 8/2), fine grained, strong HCl reaction, medium strong (R3), 5-10% voids up to 1/16" increasing with depth, trace cavities up to 9/16"x3/8" | |
| | | | >10 | 130.4' - Fracture, horizontal, rough, undulating, open, associated with large infilled cavity | | | |
| | R2-NQ<br>5 ft<br>75% | 19 | >10 | 130.9, 131.0, 131.45' - Fractures (3), horizontal, rough, undulating, open, sandy organic soil infilling at 131.45' | | | |
| | | | 4 | 131.26-131.4' - Fracture zone, sandy black (possibly organic) soil infilling<br>131.6-131.85' - Fracture zone | | | |
| | | | NR | 131.9, 132.1, 132.2' - Bedding plane (3), <10 deg, rough, undulating<br>132.0-132.05' - Clay seam, (CH), reacts with HCl | | | R2: 6 minutes |
| 135 | 135.0 | | | | | | |
| -91.8 | | | >10 | 132.3-132.45' - Fracture zone<br>132.45-133.0' - Fracture, vertical, smooth, undulating, open, 70% light gray staining | | | Difficult to distinguish voids due to average worn appearance of unit from drilling action |
| | | | >10 | 133.0-133.1' - Fractures (3), horizontal, vertical, and 30 deg, rough, undulating, open | | | |
| | R3-NQ<br>5 ft<br>88% | 18 | 7 | 135.0-136.4', 136.6-136.8' - Bedding plane, horizontal, smooth, planar, fractures every 1/2" over interval, open | | | |
| | | | 6 | 137.05, 137.15, 137.2, 137.6, 137.8, 138.05, 138.15, 138.25, 138.35, 138.5' - Fractures (10), horizontal, smooth to rough, planar | | | |
| | | | 0 | 138.95' - Fracture, horizontal, rough, undulating, pale yellowish brown (10YR 6/2) clay infill up to 1/4" thick, open | | | R3: 4 minutes |
| 140 | 140.0 | | NR | | | **No Recovery 133.75-135.0'** | |
| -96.8 | | | 0 | | | **Limestone**<br>135.0-138.95' - yellowish gray, (5Y 7/2), medium grained, strong HCl reaction, very weak to weak (R1 to R2), trace voids to 1/6", trace casts/cavities to 1/4", poorly fossiliferous (with small 3/16" shell fragments) | |
| | | | 1 | 141.7' - Mechanical break | | | |
| | R4-NQ<br>5 ft<br>83% | 48 | >10 | 141.9' - Fracture, horizontal, smooth, planar, open<br>142.05-142.1' - Carbonate silt seam (possible infill of fracture with cuttings from drilling) | | | |
| | | | 3 | 142.15, 142.2, 142.3, 142.4, 142.5, 142.65, 142.7, 142.8, 142.9, 143.05' - Fractures (10), horizontal, smooth to rough, undulating, open | | | |
| | | | 0 | | | | R4: 5 minutes |
| 145 | 145.0 | | NR | 143.3' - Fracture, horizontal, smooth, undulating, open | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-07A SHEET 9 OF 9 |

# 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 ORIENTATION : Vertical

WATER LEVELS : 4.5 ft bgs on 6/16/07 START : 6/15/2007 END : 6/17/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -101.8 | R5-NQ 5 ft 77% | 42 | 8 | 143.55' - Fracture, horizontal, smooth, planar to undulating, open<br>145.1, 145.2, 145.35' - Fractures (3), horizontal, smooth, undulating, open | | 138.95-139.4' - yellowish gray to light gray, (5Y 7/2 to 5Y 5/2), fine to medium grained, mild HCl reaction, weak to medium strong (R2 to R3), 10% voids to 1/16" in size, trace voids to 3/8" in size, no visible cavities/casts<br>**No Recovery 139.4-140.0'**<br>**Limestone**<br>140.0-142.05' - Same as 138.45-139.4' except trace cavities up to 9/16"x3/8", and 20% voids up to 1/16" from 141.3-141.7'<br>142.05-144.15' - yellowish gray, (5Y 7/2 to 5Y 8/1), fine to medium grained, strong HCl reaction, very weak (R1), 10% voids up to 1/16", trace casts/cavities up to 5/16"x3/16" at 143.5-144.4', irregular gray laminatons and thread-like mottling in 1/16" to 3/16" thick bands at 142.0-142.4'<br>**No Recovery 144.15-145.0'**<br>**Limestone**<br>145.0-145.85' - yellowish gray, (5Y 7/2), fine to medium grained, strong HCl reaction, very weak (R1), trace voids to 1/8", trace casts/shell fragments up to 3/8"x3/16"<br>145.85-147.05' - pale yellowish brown to dusky yellow, (10Y 2/2 to 5Y 6/4), medium grained, moderate HCl reaction, very weak to weak (R1 to R2), 15-20% voids to 1/16", moderately fossiliferous<br>147.05-147.65' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3)<br>147.65-148.35' - Same as 145.0-145.85'<br>**No Recovery 148.5-150.0'**<br>Bottom of Boring at 150.0 ft bgs on 6/17/2007 | R5: 5 minutes<br><br>6/17/07 15:30: 15' HW casing removed to ensure no lock up in boring<br>6/18/07 8:02 Driller's Remark: Bottom of hole tagged to 138.5' over newer cave-in after casing removal |
| | | | 2 | 145.15-145.35' - Fracture, vertical, smooth, undulating, open | | | |
| | | | >10 | 145.85' - Fracture, horizontal, smooth to rough, undulating<br>146.35' - Fracture, <10 deg, rough, undulating, open | | | |
| | | | 1 | 146.95, 147.0, 147.2, 147.4' - Fractures (4), horizontal, rough, undulating, open | | | |
| | | | NR | 147.0-147.4' - Fracture, vertical, rough, undulating, open<br>147.5, 147.55, 147.65' - Fractures (3), horizontal, smooth, planar to undulating, open<br>147.65-147.8' - Fracture zone<br>147.95, 148.7' - Fractures (2), horizontal, rough, undulating, open | | | |
| 150 | 150.0 | | | | | | |
| -106.8 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-08 SHEET 1 OF 9 |

# SOIL BORING 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

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 : 4.0 ft bgs on 5/20/07 START : 5/20/2007 END : 5/22/2007 LOGGER : M. Faurote, N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.4 | 0.0–1.5 | 0.9 | SS-1 | 1-1-1 (2) | **Poorly Graded Sand With Organics (SP)** 0.0-0.9' - dark gray, (N2), dry to moist, very loose, angular to sub angular, fine silica sand, 25-30% organics, 10-15% roots and rootlets that are 1"-1.5" long and up to 3/16"x3/16" with organics | | 08:10 Driller's Remark: 50 lb bags of Halliburton Quik gel bentonite mud mixture<br>Water level assumed at approximately 4.0' below ground surface |
| 5 | 5.0–6.5 | 1.0 | SS-2 | 4-3-4 (7) | **Silty Sand (SM)** 5.0-6.0' - yellowish gray, (5YR 7/2), wet, loose, fine subangular, silica sands, 12% nonplastic fines, brownish black (5YR 2/1), a few very large roots (>5"), with rootlets (<1/8" x 1/8") | | |
| 10 | 10.0–11.4 | 1.0 | SS-3 | 20-34-50/5 (84/11") | **Silt (ML)** 10.0-11.0' - moderate yellow, (5YR 7/6), wet, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 5-10% fine to medium sand-sized carbonate particles, friable, trace black fine sand-sized, trace white carbonate grains, all carbonate | | Driller's Remark: 100% circulation loss after pulling out spoon<br>09:30: Install 10' 6" casing, additional 5' of 6" casing installed<br>11:00: 15' 6" casing installed to 14.0' below ground surface (1 foot stick up height), drilling and doing SPTs with a NW casing sized stabilizer installed on AWJ rods just above drill bit |
| 15 | 15.0–16.5 | 1.2 | SS-4 | 31-24-17 (41) | **Silty Sand With Limestone Fragments (SM)** 15.0-16.25' - grayish yellow, (5Y 8/4), wet, dense, fine to coarse grained, moderate HCl reaction, sand-sized carbonate material, 25% nonplastic fines, 1/8"-1/4" fossiliferous limestone casts (<1/16") limestone, 20-25% gravel-sized fragments, limestone also contains cast voids partially infilled with brilliant green (5G 6/6) material, all carbonate | | 13:53: Switched to 5 1/2" tricone bit, 100% circulation loss after pulling out spoon, add 1/2 bag bentonite |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

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 : 4.0 ft bgs on 5/20/07 START : 5/20/2007 END : 5/22/2007 LOGGER : M. Faurote, N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.4 | 20.0 | 0.1 | SS-5 | 50/3 (50/3") | **Limestone Fragments** 20.0-20.3' - Same as 15.0-16.25' except poor recovery | | 14:12: Full circulation loss, Driller's Remark: add another 5' 6" casing section, adding 1/2 bag bentonite to mud vat |
| 25 | 25.0 | | | | | | Driller's Remark: Drill bit slippage from 23.0'-24.0' |
| 17.4 | 25.9 | 0.6 | SS-6 | 13-50/4.5 (63/10.5") | **Limestone Fragments** 25.0-25.2' - Same as 15.0-16.25' **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" | | 14:47: Add 1/2 bag bentonite to mud vat |
| 30 | 30.0 | | | | | | |
| 12.4 | 31.5 | 1.3 | SS-7 | 20-11-13 (24) | **Silty Sand With Limestone Fragments (SM)** 30.0-31.3' - moderate yellow, (5Y 7/6), wet, medium dense, fine to coarse grained, moderate HCl reaction, 22% nonplastic fines, 30-35% fine to coarse gravel-sized limestone fragments, highly fossiliferous (casts/molds, shells), white-grayish yellow (5Y 8/1) and moderate yellow (5Y 7/6), all carbonate | | 15:10 Driller's Remark: No circulation, add 4" HW casing, 30' HW casing (4") installed |
| 35 | 35.0 | | | | | | |
| 7.4 | 35.3 | 0.3 | SS-8 | 50/4 (50/4") | **Limestone Fragments** 35.0-35.3' - moderate yellowish brown, (10YR 5/4), fine to coarse grained, mild HCl reaction, fine gravel-sized angular fragments, 10-15% nonplastic fines | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-08 SHEET 3 OF 9 |

# SOIL BORING 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

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 : 4.0 ft bgs on 5/20/07 START : 5/20/2007 END : 5/22/2007 LOGGER : M. Faurote, N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.4 | 40.0 | 0.2 | SS-9 | 50/5 (50/5") | **Limestone Fragments** 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 | | Driller's Remark: Install 4" HW casing to 40' below ground surface |
| | | | | | Begin Rock Coring at 41.0 ft bgs<br>See the next sheet for the rock core log | | |
| 45<br>-2.6 | | | | | | | |
| 50<br>-7.6 | | | | | | | |
| 55<br>-12.6 | | | | | | | |
| 60 | | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: B-08 | SHEET 4 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 ORIENTATION : Vertical

WATER LEVELS : 4.0 ft bgs on 5/20/07 START : 5/20/2007 END : 5/22/2007 LOGGER : M. Faurote, N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 41.0 | | | | | **No Recovery 41.0-43.7'** | 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 |
| | | | NR | | | | |
| | R1-NQ 5 ft 54% | 33 | | 43.3-43.9' - Fracture zone, 1"-2" fragments | | **Limestone** 43.7-46.0' - moderate olive brown, (5Y 4/4), wet, moderate HCl reaction, very weak (R1), highly fossiliferous (casts/molds), 15-20% voids on surface up to 1/16", 5-7% cavities infilled with medium gray (N5) up to 3/8", trace black sand-sized coarse grained and short 3/4" discontinuous laminations (<1/16" thick) | Driller's Remark: First 1.5' of run very fast drilling-slippage; will assume core loss occurs at top of run 4" HW casing installed to 47.0' below ground surface R1: 4 minutes |
| | | | >10 | | | | |
| | | | 0 | | | | |
| 45 -2.6 | | | 2 | 45.6, 45.8' - Bedding plane or mechanical break (2), horizontal, rough, undulating, tight | | | |
| | 46.0 | | | | | **No Recovery 46.0-48.3'** | |
| | | | NR | | | | |
| | R2-NQ 5 ft 46% | 24 | 1 | | | **Limestone** 48.3-51.0' - Same as 43.7-46.0' | |
| | | | 5 | 48.95' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1/2" | | | |
| 50 -7.6 | | | 2 | 49.1, 49.4' - Bedding plane or mechanical break (2), 25 deg, rough, undulating, tight 49.5, 49.6' - Bedding plane or mechanical break (2), horizontal, rough, undulating, open 1/16" | | | R2: 2 minutes |
| | 51.0 | | | | | 51.0-55.3' - medium olive brown, (5Y 4/4), moderate HCl reaction, weak to medium strong (R2 to R3), poorly to moderately fossiliferous (casts), 15-20% spheroidal voids mostly <1/16", trace coarse sized black grains, carbonate fines/silts from 54.6-54.85', fossil casts from 1/8"-1/2" | |
| | | | 2 | 49.9, 50.1' - Bedding plane or mechanical break (2), horizontal, rough, undulating, open 1/8" for 49.9', tight for 50.1' | | | |
| | | | 1 | 50.4, 50.5' - Bedding plane or mechanical break (2), horizontal, rough, undulating, open 1/16" | | | |
| | R3-NQ 5 ft 86% | 72 | 2 | 51.4' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | | |
| | | | 2 | 51.75' - Fracture, 50 deg, rough, undulating, tight | | | |
| 55 -12.6 | | | 0 | 52.8' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | | R3: 5 minutes |
| | 56.0 | | NR | 53.1' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1",very weak rock, friable | | **No Recovery 55.3-56.0'** | |
| | | | 0 | 53.3' - Mechanical break or bedding plane, horizontal, rough, undulating, tight | | **Limestone** 56.0-60.3' - moderate olive brown, (5Y 4/4), moderate HCl reaction, medium strong rock (R3) from 56.0-56.85', 56.8-58.5' black fine carbonate laminations, medium strong rock (R3), grading to very weak rock (R1) 58.5-60.3', 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) | |
| | | | 0 | 54.6-54.85' - Fracture zone, extremely weak, carbonate silt 56.85-58.5' - Fracture, extremely to very weak rock | | | |
| | R4-NQ 5 ft 86% | 45 | 1 | 58.75' - Fracture, 50 deg, rough, undulating, tight | | | |
| | | | 2 | | | | |
| 60 -17.6 | | | 0 | 60.0, 60.2' - Mechanical break or bedding plane (2), horizontal, rough, undulating, tight | | | R4: 3 minutes SC-1 collected at 58.75-60.0' |
| | 61.0 | | NR | | | **No Recovery 60.3-61.0'** | |

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|---|---|
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# 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 ORIENTATION : Vertical

WATER LEVELS : 4.0 ft bgs on 5/20/07 START : 5/20/2007 END : 5/22/2007 LOGGER : M. Faurote, N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R5-NQ 5 ft 100% | 90 | 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 HCl 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 medium grain sized, 3-7% medium to coarse sized, medium dark gray (N4) intraclasts from 65.5-66.0', subrounded bedding interval from 64.0-66.0', short discontinuous (3/8") black laminations and fine grain black grained, 20% staining in olive gray (5Y 3/2) | |
| | | | 1 | 62.75' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1/4" | | | |
| | | | 0 | 63.5' - Mechanical break | | | |
| | | | 1 | | | | |
| 65 -22.6 | | | 1 | 64.8' - Fracture, 50 deg, rough, undulating, tight | | | R5: 5 minutes |
| | 66.0 | | | 65.75' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | | |
| | R6-NQ 5 ft 100% | 88 | 3 | 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 (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 grained intraclasts, discontinuous, 68.7-69.7' short horizontal black laminations, trace olive gray (5Y 4/1) staining | |
| | | | 0 | 66.8, 66.95' - Bedding plane or mechanical break (2), horizontal, rough, undulating, tight | | | |
| | | | 0 | 67.9, 68.3, 68.55, 68.7, 68.75' - Mechanical break (5) | | | |
| | | | 2 | | | | |
| 70 -27.6 | | | 0 | 69.6' - Bedding plane, 20 deg, rough, undulating, tight, very weak rock (R1) 69.9' - Fracture, 60 deg, rough, undulating, tight | | | R6: 7 minutes |
| | 71.0 | | | | | | |
| | R7-NQ 5 ft 94% | 77 | 0 | | | **Limestone** 71.0-75.7' - light olive brown to moderate olive brown, (5Y 5/6 to 5Y 4/4), moderate to strong HCl reaction, poorly fossiliferous (casts), medium strong rock, R3, from 71.0-72.5', very weak rock, R1, to extremely weak rock, R0, from 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 (casts), bottom 2" has gritty feel, medium dark gray (N4) intraclast as seen in 66.0-71.0' interval | |
| | | | 0 | 72.0' - Fracture, 35 deg, rough, undulating, tight | | | SC-2 collected at 71.0-72.0' |
| | | | 0 | 72.6' - Bedding plane, horizontal, rough, undulating, tight | | | |
| | | | 0 | | | | |
| | | | 0 | 73.95, 75.1' - Fractures (2), horizontal, rough, undulating, tight | | | |
| 75 -32.6 | | | 1 | | | | R7: 7 minutes |
| | 76.0 | | NR | | | **No Recovery 75.7-76.0'** | |
| | | | 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, horizontal, rough, undulating, open 1/16" | | | |
| | | | >10 | 78.8' - Fracture, 15-20 deg, rough, undulating, open 1/6" | | | |
| 80 -37.6 | | | 0 | 78.95' - Fracture or mechanical break, horizontal, open 1-1/4" | | | R8: 10 minutes |
| | 81.0 | | | | | | |

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|---|---|---|

# 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 ORIENTATION : Vertical

WATER LEVELS : 4.0 ft bgs on 5/20/07 START : 5/20/2007 END : 5/22/2007 LOGGER : M. Faurote, N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R9-NQ 5 ft 88% | 74 | 3 | 79.15' - Fracture, horizontal, rough, undulating, open 1/8" | | **Limestone** 78.0-81.0' - light olive brown, (5Y 5/6), strong to moderate HCl reaction, medium strong to strong (R3 to R4), 78.0-78.5' dissolution cavity zone, 10-25% voids mostly <1/16", poorly fossiliferous (casts <3/16") trace cavities 3/16"x1/8", trace black fragment 3/4"x1/8", bedding discontinuity up to 5/8" at 80.7' | |
| | | | 2 | 79.25' - Fracture, horizontal, rough, undulating, tight<br>79.65-79.95' - Fracture zone | | | |
| | | | 1 | 81.3' - Bedding plane, horizontal, rough, undulating, open 1/2"<br>81.45' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1/8" | | | |
| | | | 1 | 81.9' - Bedding plane, horizontal, rough, planar | | | |
| 85 -42.6 | | | 0 | 82.2' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | **Limestone** 81.0-85.4' - light olive brown to dusky yellow, (5Y 5/6 to 5Y 6/4), moderate to strong HCl reaction, poorly to moderately fossiliferous (casts), 81.0-81.8' strong rock (R4), trace voids <1/16", trace medium dark gray (N4) staining, 81.5-85.4' weak rock (R2), 30% voids/casts <1/16", trace cavities, 10-15% medium gray (N5) staining at 84.5' | R9: 8 minutes |
| | | | NR | 82.9' - Fracture, 20 deg, rough, undulating, tight | | | |
| | 86.0 | | | | | | |
| | R10-NQ 5 ft 88% | 74 | 1 | 83.45' - Fracture, 60-70 deg, rough, undulating, tight<br>84.4' - Fracture, 60 deg | | | |
| | | | 0 | 86.7' - Bedding plane, horizontal, rough, undulating, tight | | | |
| | | | >10 | 88.0' - Bedding plane, 5-10 deg, rough, undulating, open 1/8"<br>88.2-88.5' - Fracture zone | | **No Recovery 85.4-86.0'** | |
| | | | 2 | 88.5' - Fracture, 15-20 deg, rough to undulating, black staining over 15% of surface | | **Limestone** 86.0-90.4' - light olive brown to dusky yellow, (5Y 5/6 to 5Y 6/4), moderate to strong HCl reaction, weak (R2), moderate to strongly fossiliferous (molds, casts), 3-7% medium coarse grain-sized black laminations <1/16" thick, casts/molds up to 5/8", voids/casts <1/16" over 25-30% of surface, 3-7% medium to coarse sized, medium dark gray (N4) subrounded sand-sized in rock matrix, 89.9' black intraclast also at 1/8" | SC-3 collected at 88.5-89.4' |
| 90 -47.6 | | | 0 | 89.4' - Bedding plane, 5-10 deg, rough, stepped, 1/8" black layer organics | | | R10: 9 minutes |
| | 91.0 | | NR | 89.7' - Bedding plane, 30 deg, rough, undulating, tight | | | |
| | R11-NQ 5 ft 92% | 60 | 1 | | | | |
| | | | 1 | 91.85' - Bedding plane, 0-5 deg, smooth, undulating, tight, <1/16" fine infill | | | |
| | | | 3 | 92.95' - Fracture, 40 deg, rough, undulating, tight, fracture surface parallels friable zone 1" thick | | **No Recovery 90.4-91.0'** | |
| | | | 4 | 93.65, 93.7' - Fractures (2), 45 deg, rough, undulating, tight | | **Limestone** 91.0-92.5' - Same as 86.0-90.4' 91.0-95.6' - light olive brown (5Y 5/6) grading to white (N9) at 92.5', light olive gray (5Y 6/1) mottling, strong HCl reaction 92.5-95.0' - yellowish gray (5Y 8/1), medium strong rock (R3), cavities fine grained infill at 92.9', very weak zones at 93.7' with a chalk-like feel, 5-10% voids to <1/16" over surface 95.0-95.25' - very weak (R1), 20-25% voids to <1/16" over surface 95.25-95.6' - very weak (R1), with 25% (<1/16") black laminations | SC-4 collected at 92.95-93.65' |
| 95 -52.6 | | | 2 | 93.8' - Fracture, 50 deg, rough, undulating, open 1/16" | | | R11: 16 minutes |
| | 96.0 | | NR | 94.0' - Fracture, 55 deg, rough, undulating, tight | | | |
| | R12-NQ 5 ft 76% | 69 | 0 | 94.2' - Fracture, horizontal, rough, undulating, open 5/8", friable zone<br>94.6' - Fracture, 60 deg, rough, undulating, tight | | | |
| | | | 2 | 94.7' - Fracture, horizontal, rough, undulating, open 1/8" | | | |
| | | | 0 | 95.1' - Bedding plane, horizontal, very weak rock (white) below<br>95.4' - Bedding plane, horizontal, 1/2" thick organic layer | | **No Recovery 95.6-96.0'** | |
| | | | 2 | 97.8-97.9' - Fracture zone | | | |
| 100 -57.6 | | | NR | 97.9' - Bedding plane, horizontal, rough, undulating<br>99.0' - Fracture, 10-20 deg, rough, undulating, open 1/2" | | | R12: 4 minutes |
| | 101.0 | | | | | | |

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# 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 ORIENTATION : Vertical

WATER LEVELS : 4.0 ft bgs on 5/20/07 START : 5/20/2007 END : 5/22/2007 LOGGER : M. Faurote, N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R13-NQ 5 ft 90% | 65 | 1 | 99.4' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1" | | **Limestone** 96.0-99.8' - yellowish gray, (5Y 8/1), strong HCl reaction, very weak (R1), grading to weak rock (R2), highly fossiliferous (casts, molds), 1/2" fossils decreases with depth, trace brownish black (5YR 2/6) infill, diverse fossil types over upper 2.0' and lower 0.5', 10-15% medium gray (N5) fine to medium sized | |
| | | | 4 | 101.55, 102.0' - Fractures (2), 70 deg, rough, undulating, tight<br>102.2' - Bedding plane, horizontal, rough, undulating, tight | | | |
| | | | 2 | 102.7' - Fracture, 70 deg, rough, undulating, tight<br>102.95' - Fracture, 40 deg, rough, undulating, tight | | | |
| | | | 1 | 103.1' - Fracture, 60 deg, rough, undulating, dark gray stains over 80%, tight | | **No Recovery 99.8-101.0'** | |
| 105<br>-62.6 | | | 0 | 103.5' - Fracture, 30 deg, rough, undulating, tight | | **Limestone** 101.0-105.5' - Same as 96.0-99.8' except yellowish gray, (5Y 7/2), strong HCl reaction, 20-25% medium dark gray (N4), fine medium sized grains | R13: 5 minutes |
| | 106.0 | | NR | 104.7' - Fault, 40 deg, rough, undulating, tight, 50% dark gray staining | | | |
| | R14-NQ 5 ft 100% | 98 | 0 | | | **No Recovery 105.5-106.0'** | |
| | | | 0 | | | **Limestone** 106.0-111.0' - Same as 96.0-99.8' except yellowish gray, (5Y 8/1), with gradational change to smaller (mostly microforams) fossils starting at 107.5' | |
| | | | 2 | 108.4' - Fracture, 60 deg, rough, undulating, black staining over 100% surface, tight | | | |
| | | | 1 | 108.75' - Fracture, 30 deg, black staining over 100% of surface | | | |
| 110<br>-67.6 | | | 3 | 109.3' - Fracture, 70 deg, rough, undulating, trace dark gray (N3) staining, tight<br>110.25' - Fracture, 70 deg, rough, undulating, dark gray stains over 100% over surface, tight | | | R14: 5 minutes |
| | 111.0 | | | | | | |
| | R15-NQ 5 ft 98% | 80 | 1 | 110.5' - Fracture, 70 deg, rough, undulating, tight, dark gray stains over 100% of surface | | **Limestone** 111.0-115.9' - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, very weak (R1), gritty/powder-like feel, highly fossiliferous (microforams, shells, casts, molds), grain size increases with depth, 15-20% fine sized, medium dark gray (N4) grains in matrix | |
| | | | 2 | 110.75' - Fracture, 70 deg, rough, undulating, dark gray stains over 100% of surface, tight<br>111.1' - Bedding plane or mechanical break, horizontal, rough, planar, tight, open 1/16" | | | SC-5 collected at 112.5-113.3' |
| | | | 1 | 112.0' - Fracture or mechanical break, 40 deg, rough, undulating, tight | | | |
| | | | 0 | 112.5' - Fracture, 60 deg, rough, undulating, open 1/16" | | | |
| 115<br>-72.6 | | | 2 | 113.3' - Fracture or mechanical break, horizontal, rough, undulating, tight<br>115.2' - Fracture, 75-80 deg, rough, undulating, open 1/16" | | | R15: 5 minutes |
| | 116.0 | | NR | 115.8' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1/16" | | **No Recovery 115.9-116.0'** | |
| | R16-NQ 5 ft 100% | 100 | 0 | | | **Limestone** 116.0-118.5' - yellowish gray, (5Y 8/1), medium grained, strong HCl reaction, highly fossiliferous (microforams, casts, molds), 15-25% moderate dark gray (N4) intraclasts, 160.4' bedding contact, fossil casts >3/4" (corals) | |
| | | | 1 | 117.2' - Fracture, 70 deg, rough, undulating, tight, large casts | | | |
| | | | 0 | | | | |
| | | | 2 | 119.25' - Bedding plane or mechanical break, horizontal, rough, undulating, tight, fracture through bioturbated zone | | 118.5-121.0' - yellowish gray, (5Y 7/2), 5/8" through coring cavities infilled at 118.7', fossil casts >1/2" fragments (yellowish gray, medium dark gray, light olive brown) medium sized grains | |
| 120<br>-77.6 | | | 0 | 119.6' - Bedding plane or mechanical break, horizontal, rough, planar, tight | | | R16: 6 minutes |
| | 121.0 | | | | | | |

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# 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 ORIENTATION : Vertical

WATER LEVELS : 4.0 ft bgs on 5/20/07 START : 5/20/2007 END : 5/22/2007 LOGGER : M. Faurote, N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | NR | | | **No Recovery 121.0-123.3'** | 07:40: Water level on 5/22/07 at 4.9' below ground surface in 6" SW casing |
| | R17-NQ 5 ft 54% | 37 | >10 | 123.3-123.7' - Fracture zone, subangular to subrounded 3/4"-1 5/8" limestone fragments, very weak (friable texture) rock (R1) | | **Limestone** 123.3-123.85' - yellowish gray, (5Y 8/1), highly fossiliferous (fragments, shells, molds, casts), friable | |
| | | | 1 | 123.85, 124.0' - Bedding plane (2), horizontal, rough, planar, open 1/16" | | 123.85-126.0' - strong HCl reaction, very weak (R1), highly fossiliferous (casts, shells), 1/2"x1/2" shells, 10-15% voids <1/16", very fine to medium grain rock texture, 7-10% yellowish gray (5Y 7/2) mottling | |
| 125 -82.6 | | | 2 | 125.3' - Bedding plane, horizontal, rough, undulating, open 1/16" | | | R17: 5 minutes Add 7.0' of 4" HW casing, now set at 53.0' below ground surface |
| | 126.0 | | | | | | |
| | | | 2 | 125.4' - Bedding plane, rough, undulating, tight, fracture through/across bedding plane | | 126.0-128.0' - Same as 123.85-126.0' | |
| | | | 4 | 126.05, 126.15, 127.45, 127.55, 127.65, 129.75' - Bedding plane or mechanical break (6), horizontal, rough, planar, open <1/16" | | | |
| | R18-NQ 5 ft 78% | 56 | 2 | 127.9-128.0' - Fracture zone, horizontal, rough, undulating | | **Limestone** 128.0-129.9' - medium grained, strong HCl 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' very fine grain with >1/2" casts, crystalline carbonate material in rock matrix as cavity infilling and matrix grains | |
| | | | 3 | 128.4, 129.55, 129.55' - Bedding plane or mechanical break (3), horizontal, rough, undulating, tight | | | |
| 130 -87.6 | | | NR | | | | R18: 5 minutes |
| | 131.0 | | | | | | |
| | | | 3 | 131.1' - Bedding plane, horizontal, rough, undulating, open 1/8" | | **No Recovery 129.9-131.0'** | All material is carbonate; larger (1/2"x1/8") shells appear to be bedded at approximate 20°-30° dip over 132.0-133.4' interval SC-6 collected at 131.3-132.55' |
| | | | 1 | 131.25, 131.30' - Bedding plane (2), horizontal, rough, undulating, open 1/4" | | **Limestone** 131.0-133.4' - yellowish gray, (5Y 8/1), very weak (R1), 30-40% voids/casts <1/16", trace cavities 3/16"x1/16", friable, highly fossiliferous (casts, molds, shells), very fine grain sized limestone, all carbonate | |
| | R19-NQ 5 ft 76% | 47 | 3 | 132.55' - Fracture or mechanical break, horizontal, rough, undulating, tight<br>133.3' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | | |
| | | | 5 | 133.5, 133.6, 133.7' - Bedding plane (3), horizontal, rough, planar, open <1/16" | | | |
| 135 -92.6 | | | NR | 134.05' - Bedding plane, horizontal, rough, undulating, tight<br>134.1' - Bedding plane, horizontal, rough, undulating, open 1/8" | | 133.4-134.8' - yellowish gray, (5Y 8/1), very fine to medium grained, (grain size coarsening with depth), thin bedded, medium-sized rounded particles of different colors bedded from 133.5-134.8, carbonate materials | R19: 6 minutes |
| | 136.0 | | | | | | |
| | | | 2 | 134.2, 134.4, 134.5' - Bedding plane (3), horizontal, rough, undulating, open 1/8" | | **No Recovery 134.8-136.0'** | |
| | | | 3 | 136.1, 137.1' - Bedding plane or mechanical break (2), 5-10 deg, rough, undulating, tight<br>136.3' - Bedding plane or mechanical break, horizontal, rough, planar, tight | | | SC-7 collected at 136.3-137.1' |
| | R20-NQ 5 ft 80% | 58 | 2 | 137.85, 137.95' - Bedding plane or mechanical break (2), horizontal, rough, undulating, tight | | | |
| | | | >10 | 138.1' - Fracture, 70 deg<br>138.9' - Fracture, 15-20 deg<br>139.3' - Bedding plane, 5 deg, rough, undulating | | | |
| 140 -97.6 | | | NR | 139.3-140.0' - Fracture, angular stained black along fracture surfaces | | | R20: 8 minutes |
| | 141.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-08 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 ORIENTATION : Vertical

WATER LEVELS : 4.0 ft bgs on 5/20/07 START : 5/20/2007 END : 5/22/2007 LOGGER : M. Faurote, N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 145<br>-102.6 | R21-NQ<br>5 ft<br>92%<br>146.0 | 60 | 3<br>2<br>3<br>1<br>3<br>NR | 141.2' - Bedding plane or mechanical break, 15-20 deg, rough, undulating, open fractured through cavity<br>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<br>142.8' - Bedding plane, 10 deg, rough, undulating, black stains over 10% of surface, open 1/16"<br>143.1' - Bedding plane, 15-20 deg, brownish black stains over 85% of surface, tight<br>143.25' - Bedding plane, horizontal, rough, undulating, open 1/8" | | **Limestone**<br>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 | R21: 10 minutes |
| 150<br>-107.6 | R22-NQ<br>5 ft<br>92%<br>151.0 | 77 | 1<br>2<br>1<br>2<br>1<br>NR | 143.9' - Bedding plane, horizontal, rough, stepped<br>144.25' - Fracture, 25 deg, rough, undulating, tight<br>145.05' - Bedding plane, horizontal, rough, undulating, tight<br>145.35' - Bedding plane, horizontal, rough, undulating, open 1/16"<br>145.5' - Fracture, 80 deg, rough, undulating, tight<br>146.1' - Bedding plane or mechanical break, horizontal, rough, undulating, open 1"<br>147.35, 147.75' - Bedding plane or mechanical break (2), horizontal, rough, undulating<br>148.2, 148.5' - Mechanical break (2), tight<br>148.9' - Bedding plane, horizontal, rough, undulating, tight<br>149.15' - Fracture, vertical, rough, undulating, tight<br>149.8' - Fracture, 40-50 deg, rough, undulating, tight<br>150.3' - Fracture or mechanical break, horizontal, rough, undulating, tight, fractured through partially infilled cavity | | **Limestone**<br>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"<br>**No Recovery 140.0-141.0'**<br>**Limestone**<br>141.0-145.05' - very fine grained, strong HCl 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<br>145.05-145.6' - light olive brown, (5Y 5/6), strong HCl reaction, weak (R2), 3-5% moderate dark gray (N4) rounded grains, fine to medium grained, trace voids <1/8"<br>**No Recovery 145.6-146.0'**<br>**Limestone**<br>146.0-148.9' - yellowish gray grading to light olive brown, (5Y 8/1 grading to 5Y 5/6), medium grained, strong HCl 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' interval | R22: 9 minutes<br><br>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 bags of grout mix used) |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: B-08 SHEET 10 OF 10 |
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# 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 ORIENTATION : Vertical

WATER LEVELS : 4.0 ft bgs on 5/20/07 START : 5/20/2007 END : 5/22/2007 LOGGER : M. Faurote, N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | | | 148.9-151.6' - fine to very fine grained, strong HCl reaction, medium strong to strong (R3 to R4), fine to very fine grain texture (decreasing with depth), 3-7% voids <1/16", poorly fossiliferous (casts), dense heft, moderate olive brown (5Y 4/4) grading to yellowish gray (5Y 7/2) at 149.5' **No Recovery 150.6-151.0'** | |
| | | | | | | Bottom of Boring at 151.0 ft bgs on 5/22/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-09 SHEET 1 OF 9 |

# SOIL BORING 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

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 : 4.0 ft bgs on 5/3/07 START : 5/1/2007 END : 5/3/2007 LOGGER : R. Bitely, K. Coke, A. Erickson, W. Elliott

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.9 | 0.0 – 1.5 | 1.1 | SS-1 | 1-1-2 (3) | **Poorly Graded Sand With Organics (SP)** 0.0-1.1' - dark gray to very light gray, (N3 to N8), moist, very loose, fine grained sands, trace nonplastic fines that are primarily organic, trace roots, decreasing with depth, silica sand | | Wet at 3.0' below ground surface (SS-1 dry but SS-2 wet) |
| 5 | 5.0 – 6.5 | 1.0 | SS-2 | 3-1-2 (3) | **Clayey Sand (SC)** 5.0-6.0' - dark yellowish brown, (10YR 6/6), brownish black mottling, moist to wet, very loose, fine grained sand, 14% medium plastic fines, 5% concretions up to 1/2" in size, silica sand | | |
| 37.9 | | | | | | | |
| 10 | 10.0 – 11.5 | 0.9 | SS-3 | 5-4-6 (10) | **Silt (ML)** 10.0-10.9' - grayish yellow, (5Y 8/4), wet, stiff, nonplastic, rapid dilatancy, mild to moderate HCl reaction, trace fine grained sand, trace concretions, carbonate derived | | |
| 32.9 | | | | | | | |
| 15 | 15.0 – 16.5 | 0.9 | SS-4 | 11-2-2 (4) | **Silt (ML)** 15.0-15.9' - Same as 10.0-10.9' except trace brown-black mottling, soft, trace fine white grained sand, fine to coarse grained sand, carbonate derived | | Driller's Remark: Some loss circulation after pulling split spoon |
| 27.9 | | | | | | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-09 SHEET 2 OF 9 |

# SOIL BORING 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

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 : 4.0 ft bgs on 5/3/07 START : 5/1/2007 END : 5/3/2007 LOGGER : R. Bitely, K. Coke, A. Erickson, W. Elliott

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.9 | 20.0 | 0.1 | SS-5 | 50/3 (50/3") | **Well Graded Gravel (GW)** 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 single limestone fragment, silica sand | | Driller's Remark: 4" HW casing advanced to 23.0'<br>Driller's Remark: Circulation loss<br>Last SPT of 5/1/07 |
| 25 | 25.0 | | | | | | |
| 17.9 | 26.5 | 1.2 | SS-6 | 25-37-42 (79) | **Silty Sand With Limestone Fragments (SM)** 25.0-26.2' - grayish yellow, (5Y 8/4), wet, very dense, moderate HCl reaction, fine to coarse grained sand-sized, 41% nonplastic fines, 15% fine grained gravel-sized limestone fragments, trace white carbonate streaks, trace black with green very fine grained sand, all carbonate derived | | SS-6 is first run of 5/2/07, 08:03 water level = +0.8' |
| 30 | 30.0 | | | | | | |
| 12.9 | 31.5 | 1.3 | SS-7 | 27-31-29 (60) | **Silty Sand (SM)** 30.0-31.3' - Same as 25.0-26.2' except 30-35% nonplastic fines and 10-15% fine sized limestone fragments | | |
| 35 | 35.0 | | | | | | |
| 7.9 | 36.5 | 1.5 | SS-8 | 29-40-19 (59) | **Silty Sand With Limestone Fragments (SM)** 35.0-36.5' - Same as 25.0-26.2' except 20% sized limestone fragments | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-09 SHEET 3 OF 9 |

# SOIL BORING 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

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 : 4.0 ft bgs on 5/3/07 START : 5/1/2007 END : 5/3/2007 LOGGER : R. Bitely, K. Coke, A. Erickson, W. Elliott

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.9 | 40.0 – 41.5 | 1.5 | SS-9 | 20-40-46 (86) | **Sandy Silt (ML)** 40.0-41.5' - grayish yellow, (5Y 8/4), moist to wet, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 33% fine to medium grained sand, all carbonate | | |
| 45 -2.1 | 45.0 – 46.5 | 1.5 | SS-10 | 16-22-36 (58) | **Sandy Silt (ML)** 45.0-46.5' - Same as 40.0-41.5' | | |
| 50 -7.1 | 50.0 – 50.3 | 0.0 | SS-11 | 50/4 (50/4") | **No Recovery 50.0-50.3'** | | |
| 55 -12.1 | 55.0 – 55.4 | 0.1 | SS-12 | 50/5 (50/5") | **Limestone Fragments** 55.0-55.1' - grayish yellow, (5Y 8/4), moderate HCl reaction, fine to coarse grained sand and fine sized limestone fragments | | Driller's Remark: Last 2.0' were harder drilling, light chatter |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

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 : 4.0 ft bgs on 5/3/07 START : 5/1/2007 END : 5/3/2007 LOGGER : R. Bitely, K. Coke, A. Erickson, W. Elliott

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -17.1 | 60.0 | 0.1 | SS-13 | 50/4 (50/4") | **Limestone Fragments** 60.0-60.1' - grayish yellow, (5Y 8/4), mild to moderate HCl reaction<br>Begin Rock Coring at 61.0 ft bgs<br>See the next sheet for the rock core log | | Last SPT sample, switching to NQ coring<br>Driller's Remark: 4" HW casing advanced to 60.0' |
| 65 -22.1 | | | | | | | |
| 70 -27.1 | | | | | | | |
| 75 -32.1 | | | | | | | |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.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 ORIENTATION : Vertical

WATER LEVELS : 4.0 ft bgs on 5/3/07 START : 5/1/2007 END : 5/3/2007 LOGGER : R. Bitely, K. Coke, A. Erickson, W. Elliott

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 61.0 | | | | | **Limestone** | NQ coring assembly, 60.0' 4" HW casing installed, tape measured total depth to 61.0' |
| | R1-NQ 5 ft 66% | 8 | 4 | 61.25, 61.55' - Bedding plane or mechanical break (2), horizontal, rough, undulating, open 1/16", shell casts on fracture surface | | 61.0-64.4' - grayish yellow, (5Y 8/4), mild to strong HCl reaction, very weak (R1) (top most) to medium strong (R3) (lower 2/3 sample), voids (<1/16") over 25-30% of surface, moderately fossiliferous (casts, molds), medium gray (N5) staining over lower 2/3 sample, fossils up to 3/8" in size | 14:00 Start coring, using 10.0' sections of NQ barrel |
| | | | 6 | 61.7' - Fracture, 50 deg, rough, undulating, tight | | | |
| | | | 3 | 61.95' - Fracture, 80 deg, rough, undulating, black staining in microfractures on surface | | | |
| | | | 1 | 62.1, 62.25' - Bedding plane or mechanical break (2), horizontal, rough, undulating, 1/8" open | | | |
| 65 -22.1 | | | NR | 62.5' - Fracture, 50 to 60 deg, rough, undulating, tight<br>62.6' - Mechanical break or fracture, horizontal, rough, undulating, tight | | **No Recovery 64.4-66.0'** | R1: 3 minutes |
| | 66.0 | | | | | | |
| | R2-NQ 5 ft 100% | 92 | 2 | 62.7' - Fracture, 50 to 60 deg, rough, undulating, tight<br>62.9' - Fracture, horizontal, rough, planar, tight | | **Limestone**<br>66.0-71.0' - grayish yellow, (5Y 8/4), strong HCl reaction, voids (<1/16") over 25-30% of surface, moderate to highly fossiliferous (casts, molds), extremely weak (R0) from 66.0-66.3', rest of sample medium strong rock (R3), grayish stains on rock surface | |
| | | | 2 | 63.1' - Fracture or mechanical break, horizontal, rough, undulating, open to 3/4" | | | |
| | | | 2 | 63.5, 63.75' - Fractures or mechanical break (2), horizontal, rough, undulating, dark grayish staining, open 1/16" | | | |
| | | | 1 | 64.0' - Fracture or mechanical break, 30 deg, rough, undulating, dark grayish staining on surface, tight | | | SC-1 collected at 68.75-69.65' |
| 70 -27.1 | | | 0 | 66.1, 66.3' - Mechanical break or fractures (2), horizontal, rough, undulating, open up to 1/2" | | | R2: 11 minutes |
| | 71.0 | | | | | | |
| | R3-NQ 5 ft 84% | 75 | 2 | 67.15' - Fracture, 50 deg, rough, planar, dark staining over 80% of surface, tight<br>67.95' - Fracture, 10 to 20 deg, smooth, stepped, tight | | 71.0-75.2' - stained medium gray, (N5), strong HCl reaction, very weak to weak (R1 to R2)<br>71.0-71.65' - voids (<5/8") over 5-10% of surface, hard medium dark gray (N4) mineralization and olive gray (5Y 4/1) soft plastic very fine grained infilling | |
| | | | 0 | 68.5' - Mechanical break, 10 to 20 deg, rough, undulating, mechanical break to get into box, tight | | | |
| | | | 0 | 68.75, 68.85' - Mechanical break or bedding plane (2), 10 to 20 deg, rough, undulating, open 1/16" | | | |
| | | | 1 | 69.65' - Mechanical break or bedding plane, horizontal, rough, undulating | | 71.65-75.2' - yellowish gray, (5Y 8/1), chalk-like texture, highly fossiliferous (shell fragments, casts, molds), most fossils <1/16" in size up to 3/8" casts | Driller's Remark: Slight (20%) loss of circulation over first foot of run |
| 75 -32.1 | | | NR | 71.1' - Bedding plane or mechanical break, horizontal, rough, undulating, open up to 1/4"<br>71.65' - Bedding plane, horizontal, rough, undulating, open to 1/2" contact between 2 colors, infilled voids and soft plastic fines on surface above | | 73.0-73.8' - moderate yellowish brown staining, (10YR 5/4), horizontally oriented medium dark gray (N4) 3/8" long fossils | R3: 7 minutes |
| | 76.0 | | | | | | |
| | R4-NQ 5 ft 62% | 43 | 2 | | | 74.3-75.2' - moderate yellowish brown (10yr 5/4) staining, horizontally oriented medium dark gray (N4) 3/8" long fossils | Driller's Remark: Loss of core interval from 76.65-78.5' |
| | | | NR | 74.85' - Mechanical break or bedding plane, horizontal, rough, undulating, tight<br>76.2' - Mechanical break or fracture, horizontal, rough, planar, open 1/16" | | **No Recovery 75.2-76.0'** | |
| | | | 1 | 76.4' - Fracture or mechanical break, 30 deg, rough, undulating<br>76.65' - Fracture, horizontal, rough, undulating | | **Limestone**<br>76.0-76.65' - yellowish gray, (5Y 8/1), very fine grained, strong HCl reaction, very weak (R1), voids (<1/16") over 5-10% of surface | Driller's Remark: Loss of circulation at approximately 78' (100%) |
| | | | 3 | 78.5' - Fracture, horizontal, rough, undulating | | | |
| 80 -37.1 | | | 0 | 79.0. 79.25' - Fractures (2), horizontal, rough, undulating, top and base of crumbled rock fragments, tight | | **No Recovery 76.65-78.55'** | SC-2 collected at 79.8-81.0'<br>R4: 25 minutes |
| | 81.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
| 338884.FL | B-09 | SHEET 6 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 ORIENTATION : Vertical

WATER LEVELS : 4.0 ft bgs on 5/3/07 START : 5/1/2007 END : 5/3/2007 LOGGER : R. Bitely, K. Coke, A. Erickson, W. Elliott

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R5-NQ 5 ft 100% | 86 | 1 | 79.8' - Bedding plane or mechanical break, horizontal, rough, planar, open <1/16" | | **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) 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 (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 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 HCl 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) | |
| | | | 2 | 81.5' - Mechanical break, 50 to 60 deg, rough, undulating, tight | | | |
| | | | 3 | 81.8' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | | |
| | | | 0 | 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 | | | |
| 85 -42.1 | | | 1 | 83.3' - Bedding plane or mechanical break, horizontal, rough, undulating, open up to 1" | | | R5: 14 minutes |
| | 86.0 | | | 83.5' - Mechanical break, mechanical break to get into box | | | |
| | R6-NQ 5 ft 100% | 86 | 2 | 83.7' - Bedding plane or mechanical break, horizontal, rough, undulating, slight darker discoloration/staining | | | |
| | | | 1 | 84.2' - Mechanical break, 10 deg, rough, undulating, tight | | | |
| | | | 0 | 85.4' - Bedding plane, 0 to 5 deg, rough, undulating, soft fine material infill 1/16" thick | | | |
| | | | 1 | 86.2, 86.7' - Bedding plane or mechanical break (2), horizontal, rough, undulating, open 1/8" | | | |
| 90 -47.1 | | | 2 | 87.2' - Mechanical break or bedding plane, horizontal, smooth, planar | | | R6: 21 minutes |
| | 91.0 | | | 87.4' - Fracture, vertical, rough, undulating, black stains over 10-15% of surface | | | |
| | R7-NQ 5 ft 98% | 82 | 3 | 89.25' - Bedding plane, 70 deg, 3/4" thick soft fine infill (olive gray 5Y 3/2) | | | Driller's Remark: Depth to water 4.0' below ground surface |
| | | | 0 | 90.0' - Fracture, 70 deg, rough, undulating, light gray staining over 100% of surface, tight | | | |
| | | | 0 | 90.45' - Fracture, 30 deg, rough, undulating, tight | | | |
| | | | 1 | 91.1, 91.5' - Mechanical break or bedding plane (2), horizontal, rough, undulating, open 1/16" | | | Last run on 5/2/07 |
| 95 -52.1 | | | 3 | 91.9' - Mechanical break or bedding plane, horizontal, rough, undulating, open up to 1/2", fossils on surface of break | | | R7: 20 minutes |
| | 96.0 | | NR | 92.6, 93.65' - Mechanical break (2), horizontal, rough, undulating, tight | | | |
| | R8-NQ 5 ft 100% | 86 | 1 | 94.4' - Mechanical break or bedding plane, horizontal, rough, undulating, tight | | | First core run on 5/3/07 |
| | | | 0 | 95.25' - Mechanical break or bedding plane, horizontal, rough, planar, shell casts on fracture surface, open 1/16" | | | Water level 4.0' below ground surface at 07:49 |
| | | | 1 | 95.55' - Mechanical break or bedding plane, horizontal, rough, undulating, tight, fossil cast on surface | | | SC-3 collected at 97.35-98.5' |
| 100 -57.1 | | | 0 | 95.65' - Mechanical break or fracture, 30 deg, rough, undulating, open 3/8"-1/4" | | | R8: 4 minutes |
| | 101.0 | | 2 | 96.3' - Fracture or mechanical break, 30 deg, rough, undulating, tight to open 3/4" 98.2' - Fracture or mechanical break, horizontal, rough, undulating, gray staining 100.25' - Mechanical break, horizontal, rough, undulating, light gray staining, tight | | | |

| PROJECT NUMBER: | BORING NUMBER: |
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# 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 ORIENTATION : Vertical

WATER LEVELS : 4.0 ft bgs on 5/3/07 START : 5/1/2007 END : 5/3/2007 LOGGER : R. Bitely, K. Coke, A. Erickson, W. Elliott

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R9-NQ 5 ft 96% | 42 | 1 | 100.55' - Fracture, 50 deg, rough, undulating, tight | | **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 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 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 | Driller's Remark: Continued 90-95% loss of circulation |
| | | | 2 | 101.3' - Mechanical break or fracture, horizontal, rough, undulating, gray staining over 100% of surface, tight | | | |
| | | | >10 | 101.65' - Fracture, 80 to 90 deg, rough, undulating, gray staining, tight<br>102.0' - Fracture, 10 to 15 deg, rough, undulating, 40% gray staining, tight | | | |
| | | | 3 | 102.5' - Fracture, 80 deg, rough, undulating, >1' length, tight, casts/molds on surface | | | |
| 105<br>-62.1 | | | 0 | 104.15' - Fracture, 5 to 10 deg, rough, undulating, tight, casts/molds on surface<br>104.3' - Fracture, 80 deg, rough, undulating, light gray staining on 70-80% of surface, tight | | | R9: 4 minutes |
| | 106.0 | | NR | 104.7' - Fracture or mechanical break, 30 deg, rough, undulating, open up to 1" | | | |
| | R10-NQ 5 ft 100% | 100 | 0 | | | **No Recovery 105.8-106.0'**<br>**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 40-45% of surface, trace cavities up to 3/4", elongate in shape and partially infilled like bioturbated areas, sample grades with depth to a yellowish gray (5Y 8/1) below 109.25' 111.0-116.0' - yellowish gray grading to light gray at 114.5', (5Y 8/1 to N7), very fine grained, strong HCl reaction, very weak (R1), medium to highly fossiliferous | |
| | | | 0 | | | | |
| | | | 1 | 108.45' - Mechanical break or fracture, horizontal, rough, undulating, brown staining over 80% of surface, tight | | | |
| | | | 0 | 109.2' - Mechanical break, horizontal, rough, stepped, tight | | | |
| 110<br>-67.1 | | | 0 | | | | R10: 4 minutes |
| | 111.0 | | | | | | |
| | R11-NQ 5 ft 100% | 98 | 1 | 110.85' - Mechanical break, 70 deg, rough, undulating, tight<br>111.1' - Mechanical break or fracture, horizontal, rough, planar, open 1/16" | | | |
| | | | 1 | 112.4' - Fracture or mechanical break, 15 to 20 deg, rough, undulating, open 1/8" | | | |
| | | | 0 | 113.55' - Mechanical break, 20 deg, rough, undulating, tight | | | |
| | | | 0 | | | | |
| 115<br>-72.1 | | | 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 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 change from "chalk/powder" like feel to friable/gritty feel with depth, moderately to highly fossiliferous | R11: 2 minutes |
| | 116.0 | | | | | | |
| | R12-NQ 5 ft 70% | 68 | 1 | 116.1' - Fracture or mechanical break, horizontal, rough, planar | | | |
| | | | 1 | 117.45' - Fracture or mechanical break, 20 deg, rough, undulating, tight | | | SC-4 collected at 117.45-118.55' |
| | | | 1 | 118.55' - Fracture, 30 deg, rough, planar, open 1/16" | | | |
| | | | 1 | 119.1' - Fracture or mechanical break, horizontal, rough, undulating, tight, fossil casts on surface | | | |
| 120<br>-77.1 | | | NR | | | | R12: 2 minutes |
| | 121.0 | | | | | | |

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# 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 ORIENTATION : Vertical

WATER LEVELS : 4.0 ft bgs on 5/3/07 START : 5/1/2007 END : 5/3/2007 LOGGER : R. Bitely, K. Coke, A. Erickson, W. Elliott

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R13-NQ 5 ft 98% | 98 | 1 | 121.35' - Fracture, 70 deg, rough, undulating, tight | | **Limestone** 116.0-119.5' - fine grained, strong HCl reaction, very weak to weak (R1 to R2), highly fossiliferous (microforams, molds/casts), grades in color from light gray (N7) from 116.0-118.0' to medium gray (N5) from 118.0-119.5', similar sequence to 111.0-116.0', becoming friable, voids and fossils increase in percentage with depth, 5-10% cavities with white (N9) and translucent mineral replacement, cavities are elongated 5/8"x3/8", translucent to clear crystal grains (calcite) (1/32"-1/16"), voids (<1/16") over 35-45% of surface | |
| | | | 2 | 122.05, 122.1' - Bedding plane or mechanical break (2), 5 to 10 deg, rough, undulating, black speckling as stains on 25% of surface, tight | | | |
| | | | 1 | 123.15, 123.4' - Mechanical break (2), mechanical break to get in to box | | | |
| | | | 1 | 123.55' - Fracture, 60 to 70 deg, rough, undulating, tight | | | |
| 125 -82.1 | | | 0 | 124.4, 124.65' - Mechanical break, horizontal, rough, undulating, broken by driller, tight<br>124.9' - Fracture, 80 deg, rough, undulating, black speckled staining over 60% of surface, tight | | | R13: 2 minutes |
| | 126.0 | | NR | | | **No Recovery 119.5-121.0'** | |
| | R14-NQ 5 ft 52% | 22 | >10 | 125.05' - Mechanical break, <5 deg, rough, undulating, black stains, tight | | **Limestone** 121.0-125.9' - yellowish gray to light gray, then to medium light gray at 125.0', (5Y 8/1 to N7 to N6), fine grained, strong HCl reaction, very weak (R1), voids/microforams casts (<1/16") over 30-35%of surface, highly fossiliferous (casts, molds, microforams), fossil casts of shells and spiral tubes up to 9/16", echinoderms with white (N9) mineral replacement 9/16" x 3/16" in size, similar to 101.0-105.8' | |
| | | | 1 | 126.15-126.45' - Fracture zone, subangular and subrounded limestone fragments 3/4"-1-1/8" in size | | | |
| | | | 3 | 127.85' - Fracture or mechanical break, 60 to 70 deg, rough, undulating, tight to open 7/8" | | | |
| | | | NR | 128.0' - Fracture or mechanical break, horizontal, rough, planar, tight<br>128.5' - Fracture or mechanical break, horizontal, smooth, planar, tight | | | |
| 130 -87.1 | | | | | | | R14: 3 minutes |
| | 131.0 | | | | | | |
| | R15-NQ 5 ft 90% | 80 | 3 | 131.3, 131.4' - Mechanical break or fracture (2), horizontal, rough, undulating, open <1/8" | | 124.9-125.9' - possible calcite crystals | |
| | | | 1 | 131.75' - Mechanical break or fault, horizontal, rough, planar, tight | | **No Recovery 125.9-126.0'** | |
| | | | 0 | 132.3' - Fracture, 25 deg, rough, undulating, tight | | **Limestone** 126.0-128.6' - medium gray to yellowish gray, (N5 to 5Y 7/2), strong HCl reaction, very weak to weak (R1 to R2), inverse sequence of 106.0-111.0', grades from friable/gritty to powder-like at 127.5', highly fossiliferous (casts up to 7/8", molds, microforams), 3-7% 3/4" echinoderms (rimmed cavities with white (N9) to translucent mineralization), bottom-most 1' has 3/8" thick horizontal bioturbated lenses | CS-5 collected at 132.3-133.5' |
| | | | 2 | 133.5-133.75' - Mechanical break, 0 to 10 deg, rough, planar, mechanical break to get in to box, tight | | | |
| 135 -92.1 | | | 0 | 134.55' - Fracture or mechanical break, 5 to 10 deg, rough, undulating, tight to open 1/16" | | | R15: 3 minutes |
| | 136.0 | | NR | 134.6' - Fracture or mechanical break, 0 to 5 deg, rough, planar, tight to open 1/16" | | | |
| | R16-NQ 5 ft 50% | 36 | 1 | 136.6' - Fracture or mechanical break, horizontal, rough, undulating, open up to 1" | | **No Recovery 128.6-131.0'** | |
| | | | 2 | 137.3' - Bedding plane, horizontal, rough, undulating, open to 5/8" | | | |
| | | | 2 | 137.4' - Mechanical break or fracture, 50 deg, rough, undulating, tight | | | |
| 140 -97.1 | | | NR | 138.1, 138.2' - Fractures (2), rough, undulating, fracture intersecting 70° fractures with 6" lengths, tight | | | R16: 6 minutes |
| | 141.0 | | | | | | |

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# 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 ORIENTATION : Vertical

WATER LEVELS : 4.0 ft bgs on 5/3/07 START : 5/1/2007 END : 5/3/2007 LOGGER : R. Bitely, K. Coke, A. Erickson, W. Elliott

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R17-NQ 5 ft 86% | 60 | 2 | 141.55' - Fracture or mechanical break, horizontal, rough, undulating, 1/2" open | | **Limestone** 131.0-135.5' - yellowish gray, (5Y 8/1), medium to coarse grained, strong HCl 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'** | |
| | | | 1 | 141.85' - Bedding plane or mechanical break, 85 deg, smooth, undulating, open 1/16" | | | |
| | | | 3 | 142.25, 143.1, 143.45, 143.8' - Fractures (4), 20 to 60 deg, rough, undulating, tight | | | |
| | | | 5 | 144.2' - Fracture or mechanical break, 10 deg, rough, undulating, tight | | | Driller's Remark: Probable jostling of rock fragments during coring R17: 16 minutes |
| 145 -102.1 | | | 0 | 144.55, 144.65, 144.8, 144.95' - Mechanical break or fractures (4), 0 to 10 deg, smooth, undulating, open <1/16" | | | |
| | 146.0 | | NR | | | | |
| | R18-NQ 5 ft 84% | 78 | 1 | 146.8' - Fracture, 50 deg, rough, undulating, tight | | **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) | |
| | | | 1 | 147.1' - Bedding plane or mechanical break, horizontal, rough, planar, tight | | | |
| | | | 1 | 147.6' - Mechanical break, horizontal, rough, undulating, tight | | | |
| | | | 2 | 148.25' - Mechanical break, horizontal, rough, undulating, tight | | | |
| 150 -107.1 | | | 0 | 148.5' - Fracture or mechanical break, rough, undulating, 15% black speckled staining, tight | | | R18: 8 minutes |
| | 151.0 | | NR | 149.35-149.6' - Mechanical break or bedding plane, 5 to 10 deg, rough, undulating, open <1/16" | | | |
| | | | | | | 137.25-138.5' - yellowish gray (5Y 8/1), very fine grained, moderate to strong HCl reaction, medium strong (R3), bioturbated areas with voids <1/16" 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'** | |

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# 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 ORIENTATION : Vertical

WATER LEVELS : 4.0 ft bgs on 5/3/07 START : 5/1/2007 END : 5/3/2007 LOGGER : R. Bitely, K. Coke, A. Erickson, W. Elliott

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES | | | SYMBOLIC LOG | LITHOLOGY | COMMENTS |
|---|---|---|---|---|---|---|---|
| | | R Q D (%) | FRACTURES PER FOOT | DESCRIPTION<br>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. |
| | | | | | | **Limestone**<br>146.0-150.2' - yellowish gray, (5Y 7/2), strong HCl reaction, weak (R2) to medium strong (R3) rock, voids (<1/16") over 10-15% of surface, poorly fossiliferous (casts, molds, some echinoderms), medium grained intervals have barely visible distinct grain colors, yellowish gray (5Y 7/2) and light gray (N6), fine grained intervals are yellowish gray (5Y 8/1) in color and have voids (<1/16") over 20% of surface, trace infilled cavities up to 1/4" diameter<br>149.6-150.2' - horizontal bedding<br>**No Recovery 150.2-151.0'**<br>Bottom of Boring at 151.0 ft bgs on 5/3/2007 | |

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|---|---|
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# 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

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

WATER LEVELS : 2.0 ft bgs on 4/7/07 START : 4/6/2007 END : 4/9/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.0 | 0.0 – 1.5 | 0.8 | SS-1 | 2-3-5 (8) | **Topsoil** 0.0-0.25' - brownish black to light brown, (5YR 2/1 to 5YR 5/6), moist, root matter, wood fragments, and organics, with fine silica sand | | Cathead Operator: F. Cani<br>Driller's Remark: Rapid, smooth drilling<br>Water level between 1.5-3.0' below ground surface<br>Driller's Remark: Light chatter |
| | | | | | **Poorly Graded Sand With Silt (SP)** 0.25-0.8' - brownish gray, (5YR 4/1), moist, loose, very fine grained, silica sand, 5% nonplastic fines, trace organics | | |
| 5 | 5.0 | | | | | | |
| 37.0 | 6.5 | 1.2 | SS-2 | 4-4-3 (7) | **Sandy Lean Clay (CL)** 5.0-6.2' - light gray, (N7), moist, medium stiff, medium plasticity, slow dilatancy, no HCl reaction, 30% very fine silica sand | | |
| 10 | 10.0 | | | | | | |
| 32.0 | 11.5 | 1.2 | SS-3 | 4-22-22 (44) | **Clayey Sand (SC)** 10.0-10.5' - transitions from black to yellowish gray, (N1 to 5Y 8/1), moist to wet, soft, high plasticity, no to slow dilatancy, strong HCl reaction, <5% fine to medium grained carbonate sand | | |
| | | | | | **Silt (ML)** 10.5-11.2' - grayish orange, (10YR 7/4), dry to moist, hard, nonplastic, rapid dilatancy, moderate to strong HCl reaction, 10% medium sand-sized, trace fine gravel-sized limestone fragments, all carbonate material | | |
| 15 | 15.0 | | | | | | |
| 27.0 | 16.5 | 1.0 | SS-4 | 5-15-19 (34) | **Silt (ML)** 15.0-16.0' - Same as 10.5-11.2' except coarse gravel-sized limestone fragments (1") at top of interval, no sand-sized material | | Driller's Remark: Light chatter, variable at 15-20', drill rate slowing |
| 20 | | | | | | | |

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|---|---|
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# 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

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

WATER LEVELS : 2.0 ft bgs on 4/7/07 START : 4/6/2007 END : 4/9/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.0 | 20.0 20.5 | 0.3 | SS-5 | 50\5.5 (50\5.5") | **Silt (ML)** 20.0-20.3' - Same as 15.0-16.0' except <5% fine 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 | 25.0 | | | | | | |
| 17.0 | 26.5 | 1.0 | SS-6 | 23-30-30 (60) | **Sandy Silt With Limestone Fragments (ML)** 25.0-26.0' - grayish orange, (10YR 7/4), moist to wet, hard, nonplastic, rapid dilatancy, moderate to strong HCl reaction, 25-30% fine to coarse sand-sized, weak (R2) limestone lenses (<1/2" thick) throughout, all carbonate material | | Driller's Remark: 100% loss of circulation at 24'<br>Driller's Remark: Partial to full circulation return with use of thicker mud |
| 30 | 30.0 | | | | | | |
| 12.0 | 31.5 | 1.2 | SS-7 | 11-24-30 (54) | **Sandy Silt (ML)** 30.0-31.2' - grayish orange, (10YR 7/4), moist to wet, hard, nonplastic, rapid dilatancy, moderate HCl 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 | | Driller's Remark: Moderate drilling rate at 30-45', intermittent light to moderate chatter |
| 35 | 35.0 | | | | | | |
| 7.0 | 36.5 | 1.5 | SS-8 | 9-12-5 (17) | **Silty Sand (SM)** 35.0-36.5' - moderate yellowish brown, (10YR 5/4), moist to wet, very stiff, fine to medium grained, moderate HCl reaction, 40% nonplastic fines, interbedded (>5) extremely weak (R0) limestone lenses (<1" thick), all carbonate material | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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

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

WATER LEVELS : 2.0 ft bgs on 4/7/07 START : 4/6/2007 END : 4/9/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.0 | 40.0 | 0.1 | SS-9 | 50/4 (50/4") | **Limestone Fragments** 40.0-40.1' - moderate yellowish brown, (10YR 5/4), mild to moderate HCl reaction, medium to coarse sand-sized and fine gravel-sized fragments | | Driller's Remark: Light to heavy chatter at 40-45', very dense, slow drilling rate |
| | | | | | | | 18:30 on 4/6/07 End drilling for the day at 49', water at ground surface |
| 45 -3.0 | 45.0 | | | | | | |
| | 46.5 | 1.4 | SS-10 | 17-29-31 (60) | **Sandy Silt With Limestone Fragments (ML)** 45.0-46.4' - moderate yellowish brown, (10YR 5/4), moist to wet, hard, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 35-40% fine to coarse sand-sized, extremely weak (R0) limestone lenses (<1/2" thick) interbedded throughout sample, all carbonate material | | 08:00 on 4/7/07 Resume drilling from 49' Water level at 2' below ground surface<br>Driller's Remark: Moderately slow drilling rate at 45-60', intermittent light chatter |
| 50 -8.0 | 50.0 | | | | | | |
| | 51.5 | 1.3 | SS-11 | 37-29-15 (44) | **Sandy Silt With Limestone Fragments (ML)** 50.0-51.3' - Same as 45.0-46.4' | | |
| 55 -13.0 | 55.0 | | | | | | |
| | 55.4 | 0.4 | SS-12 | 50/5 (50/5") | **Limestone Fragments** 55.0-55.4' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, extremely weak (R0) limestone lenses (<1/2" thick) interbedded with silt-sized material, all carbonate material | | |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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

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

WATER LEVELS : 2.0 ft bgs on 4/7/07 START : 4/6/2007 END : 4/9/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND 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), moist, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 25% medium to coarse sand-sized and 5% fine to coarse gravel-sized material, all carbonate material, trace organic laminations | | 11:00 on 4/7/07 Set HW casing to 60.5' to begin NQ rock coring |
| | | | | | Begin Rock Coring at 61.0 ft bgs<br>See the next sheet for the rock core log | | |
| 65<br>-23.0 | | | | | | | |
| 70<br>-28.0 | | | | | | | |
| 75<br>-33.0 | | | | | | | |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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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

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

WATER LEVELS : 2.0 ft bgs on 4/7/07 START : 4/6/2007 END : 4/9/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| 61.0<br>61.5 | R1-NQ<br>0.5 ft<br>60% | 0 | 2<br>NR | 61.35, 61.4' - Fractures or mechanical break (2), <10 deg, smooth, undulating, tight<br>61.7, 62.15' - Fractures or mechanical break (2), <10 deg, smooth, undulating, open 1/4" | | **Limestone**<br>61.0-61.3' - dark yellowish brown, (10YR 4/2), fine grained, strong HCl reaction, weak (R2), 15% laminated organics decreasing with depth, trace voids (<3/16") over surface, poorly fossiliferous<br>**No Recovery 61.3-61.5'**<br>62.5-64.3' - Same as 61.0-62.5' except extremely weak to very weak (R0 to R1), 10% laminated organics, poorly fossiliferous, trace voids (3/16"), few cavities (<1/2")<br>64.3-66.3' - Same as 61.0-62.5' | Begin rock coring at 61.0'<br>R1: 1 minute<br>SC-1 collected from 62.2-63.25'<br>R2: 10 minutes |
| | R2-NQ<br>5 ft<br>100% | 68 | 2<br>0<br>3<br>3<br>4 | 63.25' - Mechanical break<br>63.75' - Fracture, 30 deg, rough, undulating, open 1/4"<br>64.0' - Mechanical break<br>64.3' - Fracture, 20 deg, rough, undulating, open 1/4"<br>64.45' - Fracture, vertical, rough, undulating, tight<br>64.55, 64.85, 65.4' - Bedding plane (3), horizontal, smooth, planar, tight | | | |
| 65<br>-23.0 | | | | | | | |
| 66.5 | R3-NQ<br>5 ft<br>78% | 66 | 1<br>1<br>1<br>4<br>NR | 65.25' - Fracture or mechanical break, 80 deg, rough, undulating, tight<br>65.6-66.3' - Fracture zone or mechanical break, 80 deg and 85 deg, rough, undulating, some horizontal fractures, tight<br>66.3' - Bedding plane, horizontal, rough, undulating, soil contact, open <1/2"<br>66.7' - Bedding plane, horizontal, rough, undulating, open 1/2"<br>67.6' - Fracture or mechanical break, horizontal, rough, undulating, open 1/4"<br>68.85' - Fracture or mechanical break, horizontal, rough, undulating, open 1/4"<br>69.5' - Fracture or mechanical break, vertical, rough, undulating, open 1/4" | | **Silt And Limestone Fragments (ML)**<br>66.3-66.5' - dark yellowish brown, (10YR 4/2), moderate to strong HCl reaction, with extremely weak (R0) limestone and trace organics<br>**Limestone**<br>66.5-66.7' - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to 10YR 4/2), very fine to fine grained, extremely weak (R0), with silt, trace cavities (<1/2"), poorly fossiliferous<br>66.7-68.85' - Same as 66.5-66.7' except medium strong (R3), voids (<1/16") over 60-80% of surface, moderately fossiliferous with fossil casts (<1/2") and many cavities (<1/2")<br>68.85-70.4' - Same as 66.5-66.7' except moderate HCl reaction, extremely weak to very weak (R0 to R1), voids (<1/16") over 30-50% of surface, trace cavities (1/2"), poorly fossiliferous<br>**No Recovery 70.4-71.5'** | Driller's Remark: 50% water loss at 66.5'<br>R3: 3 minutes |
| 70<br>-28.0 | | | | | | | |
| 71.5 | R4-NQ<br>5 ft<br>97% | 70 | 7<br>0<br>2<br>1<br>0<br>NR | 70.25-70.40' - Fracture zone, rough, undulating, open 1/2"<br>71.50-71.95', 71.95-72.40' - Fracture zone, vertical, rough, undulating, vertical fractures intersect bedding plane fractures or mechanical breaks, open <1/2"<br>73.7, 73.75, 75.1' - Fractures or mechanical break, rough, undulating, tight to open 1/4"<br>74.0, 74.5, 75.9' - Mechanical break | | **Limestone**<br>71.5-72.45' - moderate yellowish brown, (10YR 5/4), very fine to fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), voids (<3/16") over 30-40% of surface, few cavities (<1/2"), moderately fossiliferous<br>72.45-73.75' - Same as 71.5-72.45' except extremely weak to very weak (R0 to R1), voids (<3/16") over 30-50% of surface, few cavities (<3/4")<br>73.75-75.1' - Same as 71.5-72.45' except medium strong (R3), mottled with very light gray (N8), voids (<3/16") over 30-60% of surface, trace organics, many cavities <1/8" | SC-2 collected from 75.1-76.35'<br>R4: 15 minutes |
| 75<br>-33.0 | | | | | | | |
| 76.5 | R5-NQ<br>5 ft<br>68% | 54 | 1<br>0<br>3<br>1<br>NR | 76.65, 79.1, 79.15, 79.3, 79.55' - Bedding plane or mechanical break (5), <10 deg, rough, undulating, open <1/4"<br>77.3, 77.75, 78.7' | | | R5: 21 minutes |
| 80<br>-38.0 | | | | | | | |

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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

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

WATER LEVELS : 2.0 ft bgs on 4/7/07 START : 4/6/2007 END : 4/9/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 81.5 | | | | | 75.1-76.35' - Same as 73.75-75.1' except very light gray, (N8), medium strong to strong (R3 to R4), voids (<1/16") over 20% of surface, elongate cavities (<2"x1") with secondary, dark yellowish brown (10YR 4/2) infill | 16:30 on 4/7/07 End drilling for the day at 81.5', water level at ground surface 07:30 on 04/09/07 Resume drilling, water level at 1.0' below ground surface |
| | R6-NQ 5 ft 74% | 62 | 5 | 81.5-82.0' - Fracture zone, rough, undulating, angular gravel-sized (<1-1/2") fragments | | **No Recovery 76.35-76.5'** | |
| | | | 0 | 82.95, 84.0' - Mechanical break (2) | | **Limestone** | |
| | | | 1 | | | 76.5-79.9' - very light gray transitioning to dark yellowish brown with depth, (N8 to 10YR 5/4), very fine to fine grained, moderate to strong HCl reaction, medium strong 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 laminae, extremely weak rock (R0) lens (1/2" thick) at 76.65' | |
| 85 -43.0 | | | 0 | 84.4' - Bedding plane or mechanical break, rough, undulating, open 1/2" | | | Driller's Remark: Core barrel locked in formation at 85', advance NW casing from 0.0-80' R6: 20 minutes SC-3 collected from 86.5-87.3' |
| | | | NR | | | | |
| | 86.5 | | | | | | |
| | R7-NQ 5 ft 68% | 46 | 0 | 87.3, 89.0' - Mechanical break (2) | | **No Recovery 79.9-81.5'** | |
| | | | >10 | 88.05-88.4', 89.4-89.5' - Fracture zone, rough, undulating, angular gravel-sized (<2") fragments | | **Limestone** | |
| | | | >10 | 88.6' - Fracture or mechanical break, rough, undulating, open <1") | | 81.5-85.2' - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to 10YR 6/1), very fine to fine grained, mild HCl reaction, weak to medium strong (R2 to R3), voids (<3/16") over 50% of surface with 20% very fine infill, elongate cavities (<2"x1") over 40% of surface, 80% of cavities with pale yellowish brown (10YR 6/1) weak to medium strong (R1 to R3) secondary infill, poorly fossiliferous | |
| 90 -48.0 | | | 1 | 89.6' - Fracture or mechanical break, rough, undulating, tight | | | |
| | | | NR | | | | R7: 19 minutes |
| | 91.5 | | | | | | |
| | R8-NQ 5 ft 74% | 54 | NR | | | | Driller's Remark: Core loss (91.5-92.8') due to core barrel blockage |
| | | | >10 | 92.8-93.1' - Fracture zone, rough, undulating, angular gravel-sized (<1") fragments | | **No Recovery 85.2-86.5'** | |
| | | | 1 | 93.2' - Fracture or mechanical break, <10 deg, rough, undulating, tight 93.85' - Fracture or mechanical break, 30 deg, rough, undulating, tight | | **Limestone** | |
| 95 -53.0 | | | 0 | 94.0, 95.0, 95.55' - Mechanical break (3) | | 86.5-89.9' - moderate yellowish brown, (10YR 5/4), very fine to fine grained, mild HCl reaction, weak to medium strong (R2 to R3), voids (<3/16") over 25-40% of surface, few elongate cavities (<1/2"x1/4"), transition from poor to moderately fossiliferous with depth, molds (<1/4"), trace laminations at 86.9-87.4', very weak (R0) lenses from 87.1-87.35' and 89.4-89.5' | |
| | | | 3 | 95.15, 96.2, 96.25' - Fractures or mechanical break (3), smooth to rough, undulating, tight to open <1/8" | | | R8: 33 minutes |
| | 96.5 | | | | | | |
| | R9-NQ 5 ft 95% | 64 | >10 | 97.0-97.1' - Fracture zone, rough, undulating, angular gravel-sized (1"-1-1/2") fragments | | **No Recovery 89.9-92.8'** | |
| | | | >10 | 97.45-97.65' - Fracture zone or bedding plane, rough, undulating, open <1/2" | | **Limestone** | |
| | | | 5-10 | 98.65, 98.9' - Fracture zone or mechanical break (2), 35 deg, rough, undulating, tight to open 1/4" | | 92.8-95.6' - moderate yellowish brown, (10YR 5/4), very fine to fine grained, mild HCl reaction, weak to medium strong (R2 to R3), very weak (R1) from 93.6-93.9', voids (<3/16") over 40-60% of surface, few cavities (<2"x1"), light gray (N8) medium strong (R3) secondary infill, moderately fossiliferous, trace organics | |
| 100 -58.0 | | | >10 | 99.15' - Fractures (2), vertical, rough, undulating, tight | | | |
| | | | 0 | 99.35' - Bedding plane, rough, undulating, tight | | | R9: 15 minutes |

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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

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

WATER LEVELS : 2.0 ft bgs on 4/7/07 START : 4/6/2007 END : 4/9/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | 101.5 | | NR | 99.75-100.0' - Fracture zone, rough, undulating, angular gravel-sized (<2") fragments | | 95.6-96.5' - yellowish gray, (5Y 8/1), very fine to fine grained, strong HCl reaction, extremely weak to very weak (R0 to R1), trace voids (<3/16"), poorly fossiliferous, few molds (<1/2" diameter) | |
| | | | 1 | 101.65' - Bedding plane or mechanical break, horizontal, rough, undulating, tight to open 1/8" | | 96.5-98.2' - yellowish gray, (5Y 8/1), very fine grained, strong HCl reaction, weak to medium strong (R2 to R3), extremely weak to very weak (R0-R1) from 97.0-97.5', trace voids (<3/16"), trace bioturbation | |
| | | | 0 | | | | |
| | R10-NQ 5 ft 100% | 95 | 0 | 104.0, 105.2' - Mechanical break (2) | | | |
| 105 -63.0 | | | 0 | | | 98.2-100.0' - Same as 96.5-98.2' except voids (<3/16") over 30-40% of surface, moderately to highly fossiliferous with molds (<1/2"), <20% organic laminations concentrated in extremely weak (R0) rock from 98.9-99.2' | |
| | | | 1 | | | | R10: 13 minutes |
| | 106.5 | | | | | | |
| | | | 0 | 106.4' - Fracture, 65 deg, rough, undulating, tight to open <1/4" | | 100.0-101.25' - Same as 98.2-100.0' except moderately fossiliferous, few cavities (<1") with secondary infill, trace organics | |
| | | | 0 | 107.5, 109.0, 110.3' - Mechanical break (3) | | **No Recovery 101.25-101.5'** | |
| | R11-NQ 5 ft 100% | 100 | 0 | | | **Limestone** 101.5-106.5' - yellowish gray, (5Y 8/1), very fine to fine grained, strong HCl reaction, very weak to weak (R1 to R2), voids (<3/16") over 20-40% of surface, few cavities (<1"x1/2") with secondary infill, moderately to highly fossiliferous with elongate molds and casts (<1x1/2"), trace organics | |
| 110 -68.0 | | | 0 | | | | |
| | | | 0 | | | | R11: 18 minutes |
| | 111.5 | | | | | | |
| | | | >10 | 111.65-113.95' - Bedding plane or fracture (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, very weak to weak (R1 to R2), moderate yellowish brown (10YR 5/4) from 107.1-108.0', extremely weak (R0) from 107.75-108.3', voids (<3/16") over 30% of surface, laminated bedding from 107.1-108.0', highly fossiliferous with elongate molds, casts (<3/4x1/4") | |
| | | | 6 | | | | SC-4 collected from 113.1-113.9' |
| | R12-NQ 5 ft 100% | 68 | 1 | | | | |
| 115 -73.0 | | | 1 | 114.8' - Fracture, 45-50 deg, rough, undulating, tight | | | |
| | | | 0 | | | 111.5-116.5' - Same as 106.5-111.5' except strong HCl reaction, voids over 10-30% of surface, poorly fossiliferous with molds at 116.0-116.5' | R12: 11 minutes |
| | 116.5 | | | | | | |
| | | | >10 | 116.5-116.7' - Fracture zone, rough, undulating, angular gravel-sized (<1-1/2") fragments | | 116.5-121.3' - Same as 111.5-116.5' except fossil molds concentrated from 120.25-121.3' | |
| | | | >10 | 117.1' - Fracture, vertical, rough, undulating, open 1", runs from 116.7' to 117.6' | | | |
| | R13-NQ 5 ft 96% | 64 | >10 | 117.6-117.8' - Fracture zone, rough, undulating, angular gravel-sized (<2") fragments | | | |
| 120 -78.0 | | | >10 | 118.0' - Fracture, vertical, rough, undulating, open <1" 118.85-119.1' - Fractures (3), vertical, rough, undulating, open <1/2" | | | R13: 6 minutes |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-10 SHEET 8 OF 9 |

# 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

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

WATER LEVELS : 2.0 ft bgs on 4/7/07 START : 4/6/2007 END : 4/9/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 121.5 | | 0 | 119.5' - Fracture, vertical, rough, undulating, open 1", length is from 119.1-119.5' | | **No Recovery 121.3-121.5'** | |
| | | | NR | 119.95-120.25' - Fracture zone, rough, undulating, angular gravel-sized (<2") fragments | | **Limestone** 121.5-126.5' - Same as 116.5-121.3' except moderately fossiliferous overall with poorly fossiliferous interval from 124.0-125.0', secondary infill at 121.8', very fine grained from 125.2-125.4' | |
| | | | 0 | | | | |
| | | | 1 | 123.25, 124.1, 124.8' - Fractures or mechanical break (3), 60 deg, rough, undulating, tight | | | |
| | R14-NQ 5 ft 100% | 100 | 1 | 123.9, 124.0, 124.2, 125.0' - Mechanical break (4) | | | |
| 125 -83.0 | | | 1 | | | | |
| | | | 0 | | | | R14: 10 minutes |
| | 126.5 | | | | | | |
| | | | 2 | 126.6, 128.4, 129.8, 131.25' - Fractures or mechanical break (4), horizontal, smooth, undulating, tight | | 126.5-131.45' - yellowish gray, (5Y 8/1), very fine to fine grained, strong HCl reaction, very weak to weak (R1 to R2), voids over <10% of surface except from 126.5-127.6' (30%), poorly fossiliferous, becoming yellowish gray (5Y 7/2) at 129.0-129.65' | |
| | | | 1 | | | | |
| | R15-NQ 5 ft 99% | 93 | 0 | | | | |
| 130 -88.0 | | | 0 | | | | |
| | | | 1 | | | | R15: 5 minutes |
| | 131.5 | | | | | | |
| | | | NR | | | **No Recovery 131.45-131.5'** | |
| | | | 4 | 131.7, 132.35, 132.45' - Mechanical break (3), horizontal, smooth, undulating, infilling | | **Limestone** 131.5-136.45' - yellowish gray, (5Y 5/1), very fine to fine grained, moderate to strong HCl reaction, very weak to weak (R1 to R2), light olive gray (5Y 6/1) from 132.5-132.65', extremely weak (R0) from 132.0-132.5', voids and cavities (<1/2") over <10% of surface, poorly fossiliferous with molds (1/4"), laminated from 132.45-132.65' | |
| | | | 0 | 132.55, 132.9, 134.4, 134.55, 134.62' - Fractures or mechanical break (5), horizontal, smooth, undulating, tight | | | SC-5 collected from 133.1-133.9' |
| | R16-NQ 5 ft 99% | 87 | 2 | | | | |
| 135 -93.0 | | | 2 | | | | |
| | | | 0 | | | | R16: 6 minutes |
| | 136.5 | | | | | | |
| | | | NR | | | **No Recovery 136.45-136.5'** | |
| | | | >10 | 137.0, 137.1, 137.2, 137.25, 137.3, 137.35, 137.4, 137.45' - Bedding plane (8), horizontal, smooth, undulating, tight | | **Limestone** 136.5-141.45' - yellowish gray from 136.5-138.5' and moderate yellowish brown from 138.5-141.45', (5Y 8/1, 10YR 5/4), very fine to fine grained, mild to strong HCl reaction, very weak to weak (R1 to R2), extremely weak (R0) from 138.25-138.35', poorly fossiliferous (fossils up to 1/4"x1/4"), laminated organic layers (4) at intervals 136.6-136.7', 131.0-137.5', 137.8-138.35', and 139.20-139.70' | |
| | | | >10 | 137.25-137.50' - Fracture zone, rough, undulating, angular gravel-sized (<1-1/2") fragments | | | |
| | R17-NQ 5 ft 99% | 65 | 1 | 138.0, 138.2, 138.3, 138.35, 138.45, 139.4, 139.65, 140.75' - Bedding plane or mechanical break (8), horizontal, smooth, undulating, tight | | | |
| 140 -98.0 | | | 1 | | | | |
| | | | | | | | R17: 6 minutes |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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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

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

WATER LEVELS : 2.0 ft bgs on 4/7/07 START : 4/6/2007 END : 4/9/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 141.5 | | 1 | | | **No Recovery 141.45-141.5'** | |
| | | | NR | | | **Limestone** | |
| | | | 1 | 142.1, 143.4, 144.9, 145.7' - Bedding plane or mechanical break (4), <10 deg, smooth, undulating, tight except for open 1" at 143.4' | | 141.5-143.5' - yellowish gray to olive 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 surface, many elongate cavities (1-1/2"x1") with secondary infill, poorly fossiliferous, trace laminated bedding | |
| | | | 1 | | | | |
| | R18-NQ 5 ft 94% | 91 | 0 | | | | |
| 145 -103.0 | | | 1 | | | | |
| | | | 1 | | | 143.5-146.2' - very light gray, (N8), very fine to fine grained, moderate HCl reaction, medium strong to strong (R3 to R4), voids (3/16") over 10-30% of surface , cavities (<2"x1") over 30% of surface, 60% of cavities with secondary infill, poorly fossiliferous | R18: 15 minutes |
| | 146.5 | | NR | | | **No Recovery 146.2-146.5'** | |
| | | | >10 | 146.5-146.9' - Fracture zone, rough, undulating, angular gravel-sized (<1-1/2") fragments | | **Limestone** | |
| | | | 2 | 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" | | 146.5-147.25' - light olive gray and moderate yellowish brown, (5Y 6/1, 10YR 5/4), very fine to fine grained, very weak to weak (R1 to R2), voids (3/16") over 20% of surface, many cavities (<1-1/2"x1/4") over >5% of surface, secondary infill of 50% of cavities, poorly to moderately fossiliferous | |
| | R19-NQ 5 ft 73% | 43 | 0 | 148.45, 149.0, 149.6' - Mechanical break (3) | | | |
| 150 -108.0 | | | 2 | | | | |
| | | | NR | | | | 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" | 18:00 on 4/9/07 Water level at ground surface |
| | | | | | | 147.5-149.8' - Same as 146.5-147.25' except no to moderate HCl 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 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

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 bgs on 5/20/07 START : 5/19/2007 END : 5/20/2007 LOGGER : J. Burkard, C. Dellaria, B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.7 | 0.0 | 1.5 | SS-1 | 3-4-5 (9) | **Poorly Graded Sand (SP)** 0.0-0.2' - pale yellowish brown, (10YR 6/2), dry, loose, road material, fine silica sand | | |
| | 1.5 | | | | **Topsoil** 0.2-1.5' - brownish black, (5YR 2/1), dry to moist, stiff, 70% organic fines, 30% roots/vegetation | | |
| 5 | 5.0 | | | | | | |
| 37.7 | | 0.9 | SS-2 | 0-2-4 (6) | **Lean Clay (CL)** 5.0-5.9' - light olive gray, (5Y 5/2), moist to wet, firm, high plasticity, no dilatancy, 10-15% very fine to fine silica sand | | |
| | 6.5 | | | | | | |
| 10 | 10.0 | | | | | | |
| 32.7 | | 1.0 | SS-3 | 6-13-16 (29) | **Silt (ML)** 10.0-11.0' - moderate yellow, (5Y 7/6), wet, very stiff, nonplastic, rapid dilatancy, moderate HCl reaction, 10-15% fine to medium sand-sized, all carbonate | | |
| | 11.5 | | | | | | |
| 15 | 15.0 | | | | | | |
| 27.7 | 15.1 | 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, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 10-15% fine to medium sand-sized, all carbonate, limestone lenses 1/4" thick | | Driller's Remark: Lost a little circulation |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-11 SHEET 2 OF 9 |

# SOIL BORING 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

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 bgs on 5/20/07 START : 5/19/2007 END : 5/20/2007 LOGGER : J. Burkard, C. Dellaria, B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.7 | 20.0 – 21.5 | 1.2 | SS-5 | 21-24-11 (35) | **Silty Sand (SM)** 20.0-21.2' - grayish yellow, (5Y 8/4), moist to wet, dense, mild to moderate HCl reaction, fine to coarse grained, 35% nonplastic fines, trace angular fine gravel-sized, all carbonate | | |
| 25 | 25.0 | | | | | | |
| 17.7 | 25.0 – 26.5 | 1.0 | SS-6 | 9-8-6 (14) | **Silty Sand (SM)** 25.0-26.0' - yellowish gray, (5Y 7/2), wet, medium dense, moderate HCl reaction, fine to coarse grained, 30-40% nonplastic fines, all carbonate | | |
| 30 | 30.0 | | | | | | |
| 12.7 | 30.0 – 30.3 | 0.3 | SS-7 | 50/4 (50/4") | **Silty Sand With Limestone Fragments (SM)** 30.0-30.3' - dusky yellow, (5Y 6/4), wet, very dense, mild to moderate HCl reaction, fine to coarse grained, 20% nonplastic fines, 35-40% fine to coarse gravel-sized limestone, all carbonate | | |
| 35 | 35.0 | | | | | | |
| 7.7 | 35.0 – 35.8 | 0.6 | SS-8 | 22-50/3 (72/9") | **Silty Sand (SM)** 35.0-35.6' - moderate yellow, (5Y 7/6), moist to wet, very dense, strong HCl reaction, fine to coarse grained, 30% nonplastic fines, trace fine gravel, all carbonate | | |
| 40 | | | | | | | |

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|---|---|
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# SOIL BORING 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

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 bgs on 5/20/07 START : 5/19/2007 END : 5/20/2007 LOGGER : J. Burkard, C. Dellaria, B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.7 | 40.0 | 0.3 | SS-9 | 50/3 (50/3") | **Limestone Fragments** 40.0-40.3' - dusky yellow, (5Y 6/4), strong HCl reaction, coarse sand-sized to fine gravel-sized | | |
| 45 -2.3 | 45.0 / 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, strong HCl reaction, fine to coarse grained, 15% nonplastic fines, 40% fine to coarse limestone fragments, all carbonate | | |
| 50 -7.3 | 50.0 / 50.4 | 0.3 | SS-11 | 50/5 (50/5") | **Limestone Fragments** 50.0-50.3' - moderate yellowish brown, (10YR 5/4), strong HCl reaction, fine to coarse sand-sized and fine to coarse gravel-sized | | Soil sampling completed at 10:55 on 5/19/07 |
| | | | | | Begin Rock Coring at 51.5 ft bgs<br>See the next sheet for the rock core log | | |
| 55 -12.3 | | | | | | | |
| 60 | | | | | | | |

| PROJECT NUMBER: | 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 ORIENTATION : Vertical

WATER LEVELS : 6.0 ft bgs on 5/20/07 START : 5/19/2007 END : 5/20/2007 LOGGER : J. Burkard, C. Dellaria, B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | 51.5 | | | | | | |
| | R1-NQ 5 ft 60% | 8 | 4 | 51.55-52.3' - Fracture zone, 0-15 deg, rough, undulating, bedding plane fractures or mechanical breaks, up to 3/4" fragments | | **Limestone** 51.5-54.5' - moderate yellowish brown, (10YR 5/4), very fine to coarse grained, strong HCl reaction, weak (R2), 40% coverage of voids 1/16" or less on surface, few cavities <1/2" diameter, trace secondary infill recrystallization | Rock coring begins at 11:25 on 5/19/07 Driller's Remark: Soft at 52.0-52.5', 53.0-53.5', 54.5-54.9' |
| | | | >10 | 52.6-54.25' - Fracture zone, rough, undulating to stepped, fine to coarse angular gravel, up to 2" diameter | | | |
| | | | >10 | | | | |
| 55 -12.3 | | | NR | | | **No Recovery 54.5-56.5'** | R1: 3 minutes |
| | 56.5 | | | | | | |
| | R2-NQ 5 ft 69% | 20 | >10 | 56.5-56.6' - Fracture zone, smooth to rough, undulating, fine to coarse angular gravel | | **Limestone** 56.5-59.95' - pale yellowish brown, (10YR 6/2), very fine to fine grained, strong HCl reaction, weak (R2), 40% coverage of voids 1/16" or less on surface, few cavities some elongate and some spherical, trace spots of black organic material <1/2" diameter | |
| | | | 3 | 56.9-57.55' - Fracture zone, smooth to rough, undulating, fine to coarse angular gravel 57.8' - Mechanical break, 30 deg, rough, undulating, tight to <1/16" open | | | |
| | | | 0 | 58.25' - Bedding plane, 10 deg, smooth, undulating, <1/4" open 58.4-58.5' - Fracture zone, smooth to rough, undulating, fine to coarse angular gravel | | | |
| 60 -17.3 | | | 0 | 59.05' - Mechanical break | | | |
| | | | NR | 59.5' - Mechanical break | | **No Recovery 59.95-61.5'** | R2: 5 minutes |
| | 61.5 | | | | | | |
| | R3-NQ 5 ft 58% | 24 | 1 | 61.7-61.8' - Fracture zone | | **Limestone** 61.5-64.4' - moderate yellowish brown, (10YR 5/4), fine to medium grained, mild HCl reaction, weak to medium strong (R2 to R3), 0-10% coverage of voids 1/16" or less except 20% coverage of voids up to 1/8" on surface at 61.5-61.8', no visible fossils or cavities except 61.5-61.8' cavities up to 3/8" covering 5% of rock, trace black organic staining | |
| | | | 4 | 62.65' - Fracture, horizontal, rough, stepped 62.9' - Fracture, horizontal, smooth, undulating | | | |
| | | | 3 | 63.1' - Fracture, horizontal, smooth to rough, undulating 63.2' - Fracture, horizontal, rough, undulating 63.5-63.6' - Fracture zone | | | |
| 65 -22.3 | | | NR | 64.1' - Fracture, 28 deg, rough, stepped 64.4' - Mechanical break 65.9-66.1' - Fracture zone | | **No Recovery 64.4-66.5'** | R3: 5 minutes Driller's Remark: Soft at 66.0-67.0', 68.0-68.5' |
| | 66.5 | | | | | | |
| | R4-NQ 5 ft 66% | 37 | 3 | 67.3, 67.4' - Fractures (2), <10 deg, rough, stepped | | **Limestone** 66.5-66.95' - Same as 61.5-64.4' 66.95-67.75' - moderate yellowish brown, (10YR 5/4), fine to medium grained, mild HCl reaction, very weak (R1), 30% coverage of voids 1/16" or less on surface, trace dark organic inclusions, no visible cavities or fossils | |
| | | | 4 | 67.6, 67.4, 67.6, 67.9' - Fractures (4), 0-18 deg, rough, undulating | | | |
| | | | 1 | 69.0' - Fracture, 20 deg, smooth to rough, undulating | | | |
| 70 -27.3 | | | 0 | | | | |
| | | | NR | | | | R4: 4 minutes |
| | 71.5 | | | | | | |

| PROJECT NUMBER: | 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 ORIENTATION : Vertical

WATER LEVELS : 6.0 ft bgs on 5/20/07 START : 5/19/2007 END : 5/20/2007 LOGGER : J. Burkard, C. Dellaria, B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R5-NQ 5 ft 70% | 37 | 10 | 71.5-71.8' - Fracture zone, pieces to 1" x 3"<br>72.0' - Bedding plane, <5 deg, smooth to rough, undulating, 1/4" open, missing faces | | **Limestone**<br>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 | Driller's Remark: 71-72' and 74-74.5' void |
| | | | 10 | 72.8-72.9' - Fracture zone, pieces to 1/2" diameter | | | |
| | | | 3 | 73.15' - Bedding plane, horizontal, smooth, planar, tight<br>73.9' - Fracture, 15 deg, smooth, undulating, tight | | | |
| 75<br>-32.3 | | | 3 | 74.25' - Bedding plane, horizontal, smooth to rough, undulating, tight to 1/4" open | | **No Recovery 69.8-71.5'**<br>**Limestone**<br>71.5-74.4' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, weak (R2), 0-10% 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<br>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" | |
| | | | NR | 74.4' - Bedding plane, rough, undulating, tight to 1/4" open<br>74.6' - Bedding plane, horizontal, smooth to rough, undulating, tight to 1/4" open | | | R5: 6 minutes |
| | 76.5 | | | | | | |
| | R6-NQ 5 ft 54% | 43 | 10 | 74.7' - Fracture, vertical, smooth, undulating, tight<br>74.85' - Fracture, 60 deg, smooth, undulating, tight | | | |
| | | | 10 | 77.25-77.8' - Fracture zone, pieces to 2" diameter | | | |
| | | | 0 | | | | |
| 80<br>-37.3 | | | NR | | | | R6: Run time not recorded |
| | 81.5 | | | | | **No Recovery 75.0-76.5'**<br>**Limestone**<br>76.5-77.4' - Same as 66.95-67.75'<br>**Silt (ML)**<br>77.4-77.7' - moderate yellowish brown, (10YR 5/4), carbonate derived, overlying dark gray (N3) fat clay (CH) | End of drilling for 5/19/07<br>Resume drilling 5/20/07 07:35<br>Water level is 6.0' below ground surface |
| | R7-NQ 5 ft 46% | 10 | 2 | 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 | | | |
| | | | 8 | | | | |
| | | | 1 | 82.1, 83.15, 83.25, 83.45' - Bedding plane or mechanical break, 10 deg, smooth to rough, undulating to stepped, <1/2" open | | | Driller's Remark: Soft at 82-82.5', 83-83.5', 84.5-85' |
| 85<br>-42.3 | | | NR | 82.6, 82.9' - Fractures (2), 70 deg, rough, stepped to undulating, double fracture | | **Limestone**<br>77.7-79.2' - grayish orange, (10YR 7/4), fine grained, moderate HCl 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 | R7: 5 minutes |
| | 86.5 | | | | | **No Recovery 79.2-81.5'** | |
| | R8-NQ 5 ft 80% | 58 | 2 | 86.35' - Bedding plane or mechanical break, 10 deg, smooth to rough, undulating, tight to 3/4" open | | **Limestone**<br>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 | |
| | | | 0 | 86.5-86.6' - Fracture zone, with pieces to 2" diameter | | | |
| | | | 1 | 88.6' - Mechanical break | | | SC-1 collected at 88.7-89.55' |
| 90<br>-47.3 | | | 6 | 89.4-89.65' - Fracture zone, 0-10 deg, smooth to rough, undulating, all bedding plane fractures, tight to 1/2" | | | |
| | | | NR | 90.25-90.5' - Fracture zone, with pieces to 2" diameter | | | R8: 4 minutes |
| | 91.5 | | | | | | |

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|---|---|
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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 ORIENTATION : Vertical

WATER LEVELS : 6.0 ft bgs on 5/20/07 START : 5/19/2007 END : 5/20/2007 LOGGER : J. Burkard, C. Dellaria, B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (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 1/16" or less on surface, few cavities, few black laminations | |
| | | | >10 | 92.95, 93.0, 93.2' - Fractures (3), horizontal, rough, undulating | | **No Recovery 83.8-86.5'** | |
| | R9-NQ 5 ft 88% | 29 | 7 | 93.3-93.8' - Fracture zone, horizontal, rough, undulating, fractures along bedding plane | | **Limestone** | |
| 95 -52.3 | | | 9 | 94.0' - Fracture, horizontal, smooth, undulating<br>94.1' - Fracture, horizontal, rough, undulating<br>94.5, 94.6' - Fractures (2), horizontal, smooth to rough, undulating | | 86.5-90.5' - moderate yellowish 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 rock, trace fossil casts to 1/4" diameter | R9: 5 minutes |
| 96.5 | | | NR | 94.7, 94.9, 95.0' - Fractures (3), horizontal, smooth to rough, planar | | **No Recovery 90.5-91.5'** | |
| | | | >10 | 95.1, 95.25, 95.3, 95.8' - Fractures (4), horizontal, smooth, planar to undulating | | **Limestone** | Driller's Remark: Sampler clogged; shoe jammed closed with rock resulting in sample loss |
| | R10-NQ 5 ft 10% | 0 | NR | 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<br>92.2-93.8' - moderate yellowish brown, (10YR 5/4), fine to medium grained, moderate to strong HCl reaction, very weak (R1), 10-20% coverage of voids 1/2" or less, trace cavities up to 3/8" in diameter, moderately fossiliferous, trace black organic material at 93.6' up to 1/16" diameter | |
| 100 -57.3 | | | | | | | R10: 9 minutes |
| 101.5 | | | 1 | 101.6-101.8' - Fracture zone | | 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) | |
| | R11-NQ 5 ft 10% | 0 | NR | | | **No Recovery 95.9-96.5'** | |
| 105 -62.3 | | | | | | **Limestone** | |
| 106.5 | | | | | | 96.5-97.0' - grayish yellow, (5Y 7/2), fine grained, strong HCl reaction, very weak to weak (R1 to R2), trace voids 1/16" or less, no visible cavities or fossils | R11: Run time not recorded |
| | | | 7 | 106.8' - Bedding plane, horizontal, smooth, planar, tight | | **No Recovery 97.0-101.5'** | |
| | | | >10 | 106.9, 106.95, 107.0, 107.1, 107.2 107.5' - Bedding plane (6), horizontal, smooth, undulating to stepped | | **Limestone** | |
| | R12-NQ 5 ft 69% | 0 | >10 | 107.5-109.3' - Fracture zone, horizontal, smooth, undulating, bedding plane fractures, up to 1/8" open | | 101.5-102.0' - very pale orange to grayish orange, (10YR 8/2, 10YR 7/4), fine to medium grained, strong HCl reaction, very weak (R1), 15% coverage of voids 3/16" or less, fossil casts up to 10% | |
| 110 -67.3 | | | >10 | 109.3-109.65' - Fracture zone | | **No Recovery 102.0-106.5'** | |
| | | | | | | **Limestone** | |
| | | | NR | | | 106.5-109.95' - Same as 101.5-102.0' except extremely weak (R0) from 107.2-109.3' | R12: Run time not recorded |
| 111.5 | | | | | | **No Recovery 109.95-111.5'** | |

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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 ORIENTATION : Vertical

WATER LEVELS : 6.0 ft bgs on 5/20/07 START : 5/19/2007 END : 5/20/2007 LOGGER : J. Burkard, C. Dellaria, B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R13-NQ 5 ft 85% | 0 | >10 | 111.5-111.9' - Bedding plane, horizontal, smooth, planar, 1" bedding<br>111.9-112.4' - Fracture zone | | **Limestone**<br>111.5-111.65' - Same as 101.5-102.0'<br>111.65-115.25' - yellowish gray, (5YR 7/2), fine grained, very weak (R1), trace voids up to 1/16", thinly bedded (1/8"-3/4"), extremely weak rock (R0) at 114.3-114.9' | |
| | | | >10 | 112.65-115.75' - Bedding plane, smooth, planar to undulating, 1/8" to 1/2" beds | | | |
| | | | >10 | | | | |
| 115<br>-72.3 | | | >10 | | | | |
| | | | >10 | | | | R13: 5 minutes |
| | 116.5 | | NR | | | **No Recovery 115.75-116.5'** | |
| | R14-NQ 5 ft 72% | 13 | >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 deg, rough, undulating | | **Limestone**<br>116.5-119.1' - yellowish gray, (5Y 8/1), medium grained, strong HCl reaction, weak (R2), trace voids up to 1/16", no visible cavities, trace fossil casts 3/8" X 3/16", trace dark organic material | |
| | | | 7 | 117.0-117.2' - Fracture zone | | | |
| | | | >10 | 119.0-119.5' - Fracture zone | | 119.1-120.1' - yellowish gray, (5Y 8/1), medium to coarse grained, strong HCl reaction, weak (R2), 15-25% coverage of voids to 3/16", fossil casts up to 1" x 3/8" over 60% of rock | |
| 120<br>-77.3 | | | 1 | 119.8' - Fracture, 15 deg, smooth, undulating, tight | | | |
| | | | NR | | | | R14: 3 minutes |
| | 121.5 | | | | | **No Recovery 120.1-121.5'** | |
| | R15-NQ 5 ft 47% | 12 | 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, 1/8"-1/4" open | | **Limestone**<br>121.5-123.25' - Same as 116.5-119.1' | |
| | | | 10 | 122.9-123.25' - Fracture zone or bedding plane, 10 deg, smooth, undulating, 1/4" open, beds are 1/2" thick | | 123.25-123.85' - Same as 119.1-120.1' except 5-10% coverage of <3/8" fossil casts | |
| | | | 1 | 123.35-123.6' - Fracture zone, fine to coarse pieces | | | |
| 125<br>-82.3 | | | NR | 123.75' - Fracture, 20 deg, rough, undulating | | **No Recovery 123.85-126.5'** | |
| | 126.5 | | | | | | R15: 4 minutes<br>Driller's Remark: Last foot "feels like gravel" |
| | R16-NQ 5 ft 70% | 8 | 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, along bedding, tightly healed to 1/8" open | | **Limestone**<br>126.5-128.4' - Same as 116.5-119.1' | |
| | | | 6 | 127.85-127.95' - Fracture zone | | | |
| | | | 7 | 128.2, 128.4, 128.6, 128.75, 128.85, 129.0, 129.2, 129.45, 129.6, 129.75, 129.8' - Fractures (11), horizontal, rough, undulating, 1/8" -1/4" open | | 128.4-129.25' - Same as 119.1-120.1' | |
| 130<br>-87.3 | | | 3 | | | | |
| | | | NR | | | | R16: 3 minutes |
| | 131.5 | | | | | | |

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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 ORIENTATION : Vertical

WATER LEVELS : 6.0 ft bgs on 5/20/07 START : 5/19/2007 END : 5/20/2007 LOGGER : J. Burkard, C. Dellaria, B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | 4 | 131.5-131.7' - Fracture zone<br>131.95-132.2' - Bedding plane, 5 deg, smooth, planar to undulating, 1/4" open | | **Limestone**<br>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<br>**No Recovery 130.0-131.5'**<br>131.5-132.35' - Same as 116.5-119.1'<br>**No Recovery 132.35-136.5'** | Driller's Remark: Brief loss of circulation |
| | R17-NQ<br>5 ft<br>17% | 0 | NR | | | | |
| 135<br>-92.3 | | | | | | | R17: 5 minutes |
| | 136.5 | | | | | | |
| | | | >10 | 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" | | **Limestone**<br>136.5-137.6' - Same as 116.5-119.1' | |
| | | | >10 | 137.7-138.95' - Fracture zone or bedding plane, 5 deg, rough, planar to undulating, open 1/8" or less | | 137.6-139.85' - very pale orange, (10YR 8/2), medium grained, strong HCl 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"<br>**No Recovery 139.85-141.5'** | |
| | R18-NQ<br>5 ft<br>67% | 0 | >10 | | | | |
| 140<br>-97.3 | | | 1 | 139.2, 139.45, 139.6' - Bedding plane or mechanical break (3), 10 deg, rough, planar, tight | | | |
| | | | NR | | | | R18: 5 minutes |
| | 141.5 | | | | | | |
| | | | 5 | 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 | | **Limestone**<br>141.5-143.2' - yellowish gray, (5YR 7/2), medium grained, strong HCl reaction, weak (R2), trace voids up to 1/16", no visible cavities, trace fossil casts 3/8" X 3/16", trace dark organic material<br>143.2-144.2' - yellowish gray, (5Y 7/2), fine grained, strong HCl 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 sized carbonate material, fossil molds, trace dark (organic) infill<br>144.2-145.3' - pale yellowish brown, (10YR 6/2), fine grained, weak (R2), 5-10% coverage of voids up to 3/16", 5-10% coverage of cavities up to 3/8" x 9/16", dark laminations at 145.1'<br>145.3-145.4' - yellowish brown, (10YR 6/2), mild HCl reaction, medium strong (R3), no visible fossils or cavities, dark red staining on fracture surfaces<br>**No Recovery 145.4-146.5'** | |
| | | | >10 | 142.4, 143.2' - Fractures (2), <5-90 deg, smooth to rough, planar, bedding plane separation zone, beds are up to 1" thick | | | |
| | R19-NQ<br>5 ft<br>78% | 14 | >10 | 143.2-144.15' - Fracture zone, 0-90 deg, rough, undulating to stepped, open up to 1", angular fragments | | | |
| 145<br>-102.3 | | | 1 | 144.15-144.7' - Fracture zone | | | |
| | | | NR | 145.43' - Mechanical break, 20 deg, tight | | | R19: Run time not recorded |
| | 146.5 | | | | | | |
| | | | 7 | 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 | | | |
| | | | 2 | 146.9-147.1' - Fracture zone<br>147.5-147.65' - Fracture zone | | | |
| | R20-NQ<br>5 ft<br>62% | 30 | 1 | | | | |
| 150<br>-107.3 | | | 0 | 149.2-149.6' - Fracture, 70 deg, smooth to rough, undulating, tight | | | |
| | | | NR | | | | R20: Run time not recorded |
| | 151.5 | | | | | | |

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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 ORIENTATION : Vertical

WATER LEVELS : 6.0 ft bgs on 5/20/07 START : 5/19/2007 END : 5/20/2007 LOGGER : J. Burkard, C. Dellaria, B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES | | | SYMBOLIC LOG | LITHOLOGY | COMMENTS |
|---|---|---|---|---|---|---|---|
| | | R Q D (%) | FRACTURES PER FOOT | DESCRIPTION<br>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. |
| | | | | | | **Limestone**<br>146.5-147.9' - moderate yellowish brown to yellowish gray, (10YR 6/4 to 5Y 7/2), medium to coarse grained, strong HCl reaction, very weak (R1), trace voids to 1/16", no visible cavities or fossils<br>147.9-149.35' - dusky yellow, (5Y 6/4), fine to medium grained, moderate HCl reaction, medium strong (R3), trace coarse grain sized inclusions, trace voids up to 1/16", no visible cavities or fossils<br>**No Recovery 149.6-151.5**<br>Bottom of Boring at 151.5 ft bgs on 5/20/2007 | Drilling completed at 14:56 on 5/20/07 |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

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 bgs on 5/17/07 START : 5/8/2007 END : 5/17/2007 LOGGER : R. Gomez, R. Bitely, T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 43.3 | 0.0 – 1.5 | 1.3 | SS-1 | 0-2-2 (4) | **Poorly Graded Sand With Organics (SP)** 0.0-1.25' - dark gray grading to very light to light gray, (N3 to N8 to N7), moist, very loose, very fine to fine grained, 20% organics decreasing to <5% with depth, trace nonplastic fines, sand is silica | | |
| 5 | 5.0 | | | | | | |
| 38.3 | 5.0 – 6.5 | 1.5 | SS-2 | 2-1-0 (1) | **Poorly Graded Sand With Silt (SP-SM)** 5.0-6.5' - dusky yellow, (5Y 6/4), wet, very loose, very fine to fine grained, trace roots, trace concretions to coarse sand-sized, 8% nonplastic fines, sand is silica | | For SS-2 the last 6" SPT was weight of hammer |
| 10 | 10.0 | | | | | | |
| 33.3 | 10.0 – 10.8 | 0.8 | SS-3 | 34-50/4 (84/10") | **Silt (ML)** 10.0-10.8' - yellowish gray, (5Y 7/2), moist to wet, hard, nonplastic, very rapid dilatancy, mild HCl reaction, trace to 10% very fine to fine sand-sized carbonate | | |
| 15 | 15.0 | | | | | | |
| 28.3 | 15.0 – 15.8 | 0.8 | SS-4 | 47-50/4 (97/10") | **Silt (ML)** 15.0-15.8' - yellowish gray, (5Y 7/2), moist to wet, hard, nonplastic, very rapid dilatancy, mild HCl reaction, carbonate, trace fine gravel-sized limestone fragments | | Driller's Remark: Harder at 18' |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

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 bgs on 5/17/07 START : 5/8/2007 END : 5/17/2007 LOGGER : R. Gomez, R. Bitely, T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 23.3 | 20.0 – 21.5 | 1.2 | SS-5 | 15-17-14 (31) | **Silt With Sand (ML)** 20.0-21.2' - dusky yellow, (5Y 6/4), moist to wet, dense, fine to coarse grained, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 5% fine gravel-sized, 20% fine to coarse sand, all carbonate | | |
| 25 | 25.0 | | | | | | |
| 18.3 | 26.0 | 0.7 | SS-6 | 17-50/6 (67/12") | **Silty Sand With Limestone Fragments (SM)** 25.0-25.7' - dusky yellow, (5Y 6/4), moist to wet, very dense, fine to coarse grained, mild to moderate HCl reaction, 25-30% nonplastic fines, 15% fine gravel-sized limestone, all carbonate | | |
| 30 | 30.0 | | | | | | |
| 13.3 | 31.5 | 0.9 | SS-7 | 26-15-8 (23) | **Limestone Fragments** 30.0-30.4' - dusky yellow, (5Y 6/4), mild HCl reaction, wafer shaped fragments to 1/2" thick<br>**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 carbonate | | |
| 35 | 35.0 | | | | | | |
| 8.3 | 36.5 | 1.0 | SS-8 | 6-10-19 (29) | **Silty Sand With Limestone Fragments (SM)** 35.0-36.0' - dusky yellow, (5Y 6/4), moist to wet, medium dense, fine to coarse grained, mild to moderate HCl reaction, 34% nonplastic fines, 15% fine-coarse gravel-sized limestone, all carbonate | | Driller's Remark: Hit hard layer at 38' |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-12 SHEET 3 OF 8 |

# SOIL BORING 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

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 bgs on 5/17/07 START : 5/8/2007 END : 5/17/2007 LOGGER : R. Gomez, R. Bitely, T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 3.3 | 40.0 | 0.3 | SS-9 | 50/3 (50/3") | **Limestone Fragments** 40.0-40.3' - light olive gray, (5Y 5/2), mild HCl reaction, fragments up to 1" in size | | Driller's Remark: Run was hard until last few tenths |
| 45 -1.7 | 45.0 | 1.5 | SS-10 | 10-18-20 (38) | **Silt (ML)** 45.0-46.5' - moderate olive brown, (5Y 4/4), moist to wet, dense, fine to coarse grained, mild HCl reaction, 57% nonplastic fines, 15-20% fine gravel-sized limestone fragments, all carbonate | | |
| 50 -6.7 | 46.5 / 50.0 | 1.3 | SS-11 | 24-37-48 (85) | **Silty Sand With Limestone Fragments (SM)** 50.0-51.3' - moderate olive brown, (5Y 4/4), moist to wet, dense, fine to coarse grained, mild HCl reaction, 25% nonplastic fines and 30-35% fine to coarse gravel-sized limestone fragments | | |
| 55 -11.7 | 51.5 / 55.0 | 0.8 | SS-12 | 21-31-50/1 (81/7") | **Silty Sand With Limestone Fragments (SM)** 55.0-55.8' - moderate olive brown, (5Y 4/4), moist to wet, dense, fine to coarse grained, mild HCl reaction, 25% nonplastic fines and 30-35% fine to coarse gravel-sized limestone fragments | | |
| 60 | 56.1 / 60.0 / 60.1 | 0.1 | SS-13 | 50/1 (50/1") | **Limestone Fragments** 60.0-60.1' - moderate olive brown, (5Y 4/4), mild HCl reaction, one limestone fragment recovered | | End soil sampling at 60.0' |
| | | | | | Begin Rock Coring at 60.0 ft bgs<br>See the next sheet for the rock core log | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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 ORIENTATION : Vertical

WATER LEVELS : 4.3 ft bgs on 5/17/07 START : 5/8/2007 END : 5/17/2007 LOGGER : R. Gomez, R. Bitely, T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -16.7 | 60.0 | | 5 | 60.1-60.3' - Mechanical break, rough, undulating, multiple angles | | **Limestone** | |
| | | | 5 | 60.4' - Fracture, 50 deg, rough, undulating, open, dark gray accretion over 30% of surface, <0.01' thick | | 60.0-61.8' - pale yellowish brown, (10YR 6/2), fine grained, mild to moderate HCl reaction, medium strong (R3), small voids 1/16"-1/8" over 40% of surface, trace organics, 5% voids to 3/8" | Begin rock coring at 60' |
| | R1-NQ 5 ft 98% | 58 | >10 | 60.75' - Fracture, horizontal, rough, undulating, tight<br>61.15-61.3' - Fracture zone, rough, undulating, multiple angles | | 61.8-62.6' - pale yellowish brown, (10YR 6/2), mild HCl reaction, extremely weak to very weak (R0 to R1), trace to 30% organics | |
| | | | 1 | 61.8' - Fracture, horizontal, rough, undulating, tight | | 62.6-63.25' - Same as 60.0-61.8' except up to 50% coverage of small voids and trace fossil molds/casts | R1: 8 minutes |
| | | | 2 | 62.3' - Bedding plane, horizontal, at interface with soft material<br>62.4-62.6' - Fracture zone, soft material, multiple fragments | | 63.25-64.5' - Same as 61.8-62.6' | |
| 65 -21.7 | 65.0 | | NR | | | 64.5-64.9' - Same as 60.0-61.8' except 10% coverage of small voids | |
| | | | 0 | 63.3, 64.2, 64.4' - Bedding plane (3), horizontal, rough, undulating, tight | | **No Recovery 64.9-65.0'** | |
| | | | NR | 64.5' - Fracture, 20 deg, rough, undulating, open | | **Limestone**<br>65.0-66.0' - light olive gray, grading to yellowish brown, (5Y 5/2, 10YR 5/9), <10% small (<1/16") voids on surface, deep dissolution cavity up to 1-1/2"x1" at 65.8' | Driller's Remark: Very soft at 66.0-68.0'<br>Assume core loss from 66.0-67.8' based on driller report and recovery |
| | R2-NQ 5 ft 64% | 40 | | | | **No Recovery 66.0-67.8'** | |
| | | | 0 | | | **Limestone** | Driller's Remark: Hard at 68.0-70.0' |
| | | | 2 | 68.2' - Bedding plane, <20 deg, pieces missing could be because soft material or dissolution, open <1/8" | | 67.8-70.0' - moderate olive brown, (5Y 4/4), with compacted carbonate silts, trace fossils on surface, trace small voids to 1/16" | |
| | | | 3 | 68.8' - Fracture, 75 deg, rough, undulating, open <1/8" | | | R2: 7 minutes |
| 70 -26.7 | 70.0 | | 2 | 69.1' - Fracture, 40-50 deg, rough, undulating, open | | 70.0-73.45' - light olive gray, yellowish brown and moderate olive brown, (5Y 5/2, 10YR 5/9 and 5Y 4/4), moderate HCl reaction, weak (R2), very weak (R1) from 70.7-71.5, <10% small voids to 1/16", no fossils seen on surface | |
| | | | >10 | 69.7, 69.9' - Bedding plane (2), <10 deg, pieces missing could be because soft material or dissolution, open <1/8"<br>70.7, 71.85, 72.5 and 73.45' - Bedding plane (4), <5 deg, rough, undulating, open <1/8" | | | |
| | R3-NQ 5 ft 80% | 48 | 2 | 70.85, 71.1' - Bedding plane (2), <5 deg, rough, undulating, tight<br>71.15-71.45' - Fracture zone | | | |
| | | | >10 | 71.95' - Bedding plane, <5 deg, rough, undulating, open 1/2"<br>73.8-74.0' - Fracture zone | | 73.45-74.0' - yellowish brown, (10YR 5/4), moderate HCl reaction, very weak (R1), tightly compacted silts, shows "infill" of pale olive 10YR 6/2 and medium light gray (N6), shallow dissolution features to 1/2", trace fossils to 1/4", in both the rock and tightly compacted silts the clasts/infill are up to 1/4" | |
| | | | NR | | | | R3: 8 minutes |
| 75 -31.7 | 75.0 | | >10 | 75.0-75.3' - Fracture zone<br>75.4, 75.6, 75.7' - Bedding plane (3), <10 deg, rough, undulating, open to 1/8" | | **No Recovery 74.0-75.0'** | |
| | | | 1 | 76.25' - Bedding plane, <10 deg, rough, undulating, open to 1/8", not fully broken | | | |
| | R4-NQ 5 ft 42% | 22 | | | | | Driller's Remark: No resistance felt-very soft at 77.0-77.5' and 78.0-78.2'<br>Assume core loss from 77.1' onward |
| | | | NR | | | | R4: 6 minutes |
| 80 | 80.0 | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: B-12 | SHEET 5 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 ORIENTATION : Vertical

WATER LEVELS : 4.3 ft bgs on 5/17/07 START : 5/8/2007 END : 5/17/2007 LOGGER : R. Gomez, R. Bitely, T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -36.7 | R5-NQ 5 ft 72% | 23 | 1 | 80.1' - Fracture zone, rough | | **Limestone** 75.0-77.1' - Same as 70.0-73.45' except color grades from pale olive (10Y 6/2) to light olive grey (5Y 5/2) at 75.2', moderate yellowish brown (10YR 5/4) mottling, moderate HCl reaction, very weak, weak to medium strong (R2 to R3) at 75.6-77.1', tightly compacted silts, <10% small voids to 1/16", no fossils seen on surface | End drilling for the day, 80.0' at 1800 hrs on 5/9/07 P. De Sa'Rego begins logging borehole |
| | | | 6 | 81.2, 81.3' - Fracture (2), 7 deg, rough, undulating | | | SC-1 collected at 80.2-81.1' |
| | | | 3 | 81.4-81.6' - Fracture zone 81.8' - Mechanical break, 60 deg, rough, undulating, tight | | | |
| | | | 2 | 82.1' - Fracture, horizontal, rough, planar, open <1/8" | | | |
| | | | NR | 82.3' - Bedding plane, horizontal, smooth, planar 82.4, 82.75, 83.1, 83.4' - Fractures, <10 deg, smooth to rough, undulating | | **No Recovery 77.1-80.0'** **Silt (ML)** 80.0-80.2' - moderate yellowish brown, (10YR 5/4), medium plasticity, 3/4" limestone fragments | R5: 11 minutes |
| 85 | 85.0 | | | | | | |
| -41.7 | R6-NQ 5 ft 62% | 20 | 4 | 85.2-85.25' - Fractures (2), 20-30 deg, smooth to rough, planar | | **Limestone** 80.2-83.6' - moderate yellowish brown, (10YR 5/4), moderate HCl reaction, weak to medium strong (R2 to R3), small (1/16") voids 15-20% of surface, larger cavities/fossil molds up to 3/4", fine grained interval from 81.3-82.5' | |
| | | | 4 | 85.35, 85.55' - Fractures (2), horizontal, rough, planar | | | |
| | | | >10 | 86.2' - Fracture, horizontal, rough, undulating, tight 86.3' - Mechanical break, 45 deg 86.9' - Fracture, horizontal, rough to smooth, undulating, tight | | | Driller's Remark: "soft" zones 87.5-88.0', 89.5-90.0' |
| | | | NR | 87.2-87.3' - Fracture zone 87.6-87.8' - Fracture zone, 30 deg, rough, stepped to undulating, possible mechanical break | | **No Recovery 83.6-85.0'** **Limestone** 85.0-86.0' - moderate yellowish brown, (10YR 5/4), medium grained, 30-40% voids up to 1/8" in size, trace fossil molds/cavities up to 3/8", trace fossil casts up to 5/16" | R6: 5 minutes |
| 90 | 90.0 | | | | | | |
| -46.7 | R7-NQ 5 ft 80% | 37 | >10 | 90.0-90.6' - Fracture zone | | 86.0-88.1' - Same as 85.0-86.0' except fine grained, weak (R2), 10-20% inclusions of dark orange material up to 3/8" from 87.2-87.4' | |
| | | | 4 | 91.1' - Mechanical break, <5 deg, rough, undulating, tight, possibility due to large cavity | | **No Recovery 88.1-90.0'** **Limestone** 90.0-92.2' - Same as 85.0-86.0' 92.2-94.0' - grayish orange, (10YR 7/4), fine grained, weak (R2), voids (up to 1/16") 0-5% from 92.2-93.2', trace fossils casts/cavities up to 3/8"x1-3/16" at 92.8' and at 93.2-93.7', very weak rock (R1) at 93.0-93.2' | |
| | | | 4 | 91.65-92.2' - Fracture zone, 0-30 deg, rough, planar to undulating | | | SC-2 collected at 92.6-93.45' |
| | | | 2 | 93.0' - Fracture, horizontal, rough, undulating, 1/8" relief 93.2' - Fracture, horizontal, smooth, planar | | | |
| | | | NR | 93.6' - Fracture, horizontal, smooth, planar, 1/4" relief | | | R7: 8 minutes |
| 95 | 95.0 | | | | | | |
| -51.7 | R8-NQ 5 ft 48% | 28 | >10 | 95.05' - Fracture, horizontal, smooth, undulating, 3/16" relief | | **No Recovery 94.0-95.0'** **Limestone** 95.0-96.3' - very pale orange, (10YR 8/2), very fine to fine grained, weak (R2), <5% voids up to 1/16" in size, dark laminae over 50% of surface at 95.5-95.7' | |
| | | | 5 | 95.32-95.56' - Clay seam, horizontal, smooth, planar, contact on both sides, tight, some black staining on lower surface 95.8-96.0' - Fracture zone | | | |
| | | | 1 | 96.2-96.3' - Fracture zone | | | |
| | | | NR | 96.65-96.95' - Mechanical break | | 96.3-97.4' - Same as 95.0-96.3' except very weak (R1), voids (1/16"-1/8") up to 15%, fossil molds/cavities up to 3/8"x3/16" over 5-10% of rock, poorly to moderately fossiliferous with depth **No Recovery 97.4-100.0'** | R8: 8 minutes |
| 100 | 100.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-12 SHEET 6 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 ORIENTATION : Vertical

WATER LEVELS : 4.3 ft bgs on 5/17/07 START : 5/8/2007 END : 5/17/2007 LOGGER : R. Gomez, R. Bitely, T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -56.7 | R9-NQ 5 ft 68% | 26 | 3 | 100.2' - Fractures (3), 40 deg, planar, small fragments | | **Limestone** 100.0-103.4' - very pale orange, (10YR 8/2), very fine to fine grained, strong HCl reaction, extremely weak (R0), exhibits 8-15% fossil cast related open space, and there are sporadic small <1/4" shells, blebs of carbon are visible at 1% or less | M. Faurote begins logging borehole |
| | | | 5 | 100.4' - Mechanical break, 2-5 deg, smooth, planar<br>101.2, 101.6' - Mechanical break, 0-2 deg, smooth, planar | | | |
| | | | >10 | 101.8' - Fracture, 60 deg, rough, undulating, open, the fracture is sub parallel to another fracture that is not separated | | | |
| | | | >10 | 101.9, 101.95' - Fractures (2), fragments are 1" in diameter | | **No Recovery 103.4-105.0'** | |
| | | | NR | 102.5, 102.65, 102.7' - Bedding plane (3), smooth, undulating | | | R9: 4 minutes |
| 105 | 105.0 | | | | | | |
| -61.7 | R10-NQ 5 ft 69% | 28 | >10 | 105.2-106.05' - Fracture zone, 0-3 deg, smooth, undulating, bedding plane separations, primarily depositional, 1/2" spacing | | **Limestone** 105.0-108.45' - very pale orange, (10YR 8/2), very fine to fine grained, strong HCl reaction, extremely weak (R0), thin bedding, the organic content remains the same, but exhibits planar surface coating at 105.1', numerous 1/2" beds with distinctive partings in two zones. The thin bedded materials show 10-15% open space from fossil casts and molds. The more persistent, larger beds exhibit larger shell openings and small dissolution cavities up to 3/8" | |
| | | | 2 | 106.7' - Mechanical break | | | |
| | | | >10 | 107.1' - Mechanical break<br>107.2-107.7' - Fracture zone, 0-3 deg, smooth, undulating, bedding plane separations, primarily depositional, 1/2" spacing | | | |
| | | | 0 | | | | |
| | | | NR | 108.0' - Mechanical break, horizontal | | | R10: 5 minutes |
| 110 | 110.0 | | | | | | |
| -66.7 | R11-NQ 5 ft 69% | 22 | 3 | 110.7-112.0' - Bedding plane, multiple partings with beds from 1/8" or less to 8" or more | | **No Recovery 108.45-110.0'**<br>**Limestone** 110.0-113.45' - very pale orange, (10YR 8/2), very fine to fine grained, strong HCl reaction, extremely weak (R0), exhibits 8-15% fossil cast related open space, and there are sporadic small <1/4" shells, blebs of carbon are visible at 1% or less | There is a carbonate sand associated with some of the lost recovery zones. This limestone continues to at least 115.0' |
| | | | 2 | | | | |
| | | | >10 | | | | |
| | | | >10 | | | **No Recovery 113.45-115.0'** | |
| | | | NR | | | | R11: 6 minutes<br>End drilling for the day at 17:51 on 5/10/07 |
| 115 | 115.0 | | | | | | |
| -71.7 | R12-NQ 5 ft 0% | 0 | NR | | | **No Recovery 115.0-120.0'** | D. Whitaker begins logging borehole<br>Core barrel slid back to bottom of hole<br>Medium dark sand grains on outside of barrel may/may not not be carbonate<br>R12: 5 minutes |
| 120 | 120.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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 ORIENTATION : Vertical

WATER LEVELS : 4.3 ft bgs on 5/17/07 START : 5/8/2007 END : 5/17/2007 LOGGER : R. Gomez, R. Bitely, T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -76.7 | | | | | | **No Recovery 120.0-125.0'** | Water level 4.3' below ground at 08:00, 05/17/08<br>Interval may be sand, not rock |
| | R13-NQ 5 ft 0% | 0 | NR | | | | R13: 4 minutes |
| 125 -81.7 | 125.0 | | | | | **No Recovery 125.0-130.0'** | |
| | R14-NQ 5 ft 0% | 0 | NR | | | | R14: 3 minutes |
| 130 -86.7 | 130.0 | | | | | | |
| | R15-NQ 5 ft 46% | 0 | >10<br>>10<br>>10<br>NR | 130.0-130.4' - Fracture zone, rough, undulating, gravel size fragments <2" diameter<br>130.5-132.25' - Bedding plane (14), <10 deg, smooth to rough, undulating, tight to open 1/2" | | **Limestone**<br>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<br>**No Recovery 132.3-135.0'** | R15: 4 minutes |
| 135 -91.7 | 135.0 | | | | | | |
| | R16-NQ 5 ft 70% | 20 | >10<br>>10<br>1<br>>10<br>NR | 135.0-135.1, 135.5-135.6, 135.8-135.9, 136.05-136.2, 138.1-138.2, 138.3-138.4' - Fracture zone (6), rough, undulating, gravel size fragments <1" diameter<br>135.2-135.45, 135.6, 135.85-135.95, 136.35-138.05' - Bedding plane or mechanical break (18), <10 deg, smooth to rough, undulating, open <3/4" | | **Limestone**<br>135.0-135.7' - yellowish gray, (5Y 8/1), very fine to medium grained, extremely weak to very weak (R0 to R1), trace coarse grains<br>135.7-136.2' - Same as 135.0-135.7' except very fine to fine grained, medium strong (R3), no voids<br>136.2-138.5' - Same as 135.0-135.7' except fine to coarse grained, strong HCl reaction, voids 1/4" or less over 10% of surface, trace fossils and fossil molds, no cavities<br>**No Recovery 138.5-140.0'** | R16: 5 minutes |
| 140 | 140.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-12 SHEET 8 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 ORIENTATION : Vertical

WATER LEVELS : 4.3 ft bgs on 5/17/07 START : 5/8/2007 END : 5/17/2007 LOGGER : R. Gomez, R. Bitely, T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -96.7 | R17-NQ 5 ft 48% | 10 | 9 | 140.1-140.9' - Bedding plane (8), <10 deg, slickensided to rough, undulating, open 1/2" or less | | **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 (1/16" or less) voids, few fossils, trace recrystallization, trace coarse grained | |
| | | | >10 | 140.95-141.4, 142.0-142.4' - Fracture zone (2), rough, stepped to undulating, fine to coarse gravel sized fragments <2" diameter | | | |
| | | | >10 | | | | |
| | | | NR | | | 141.0-142.4' - yellowish gray, (5Y 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 | R17: 9 minutes |
| 145 | 145.0 | | | | | **No Recovery 142.4-145.0'** | |
| -101.7 | R18-NQ 5 ft 90% | 72 | 2 | | | **Limestone** 145.0-146.05' - yellowish gray, (5Y 8/1), very fine grained, moderate HCl reaction, weak (R2), 5% voids 1/16" over 50% of interval, no cavities or fossils | |
| | | | 3 | 145.6' - Fractures (2), 60 deg, smooth and undulating, rough and stepped, perpendicular fractures, open <1/8" 146.0' - Mechanical break | | | |
| | | | 0 | 146.3-146.9' - Bedding plane (5), <10 deg, slickensided to rough, undulating, open <1/2" | | 146.05-149.5' - yellowish gray, (5Y 8/1), very fine to medium grained, strong HCl reaction, very weak (R1), 20% coverage of voids 1/16", trace fossils and fossil molds | SC-3 collected at 147.0-148.0' |
| | | | 1 | 148.0' - Mechanical break | | | |
| | | | 3 | 148.85-149.45' - Bedding plane (4), <10 deg, slickensided to rough, undulating, open <1/2" | | | R18: 8 minutes |
| 150 | 150.0 | | NR | | | **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: |
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| 338884.FL | B-13 SHEET 1 OF 8 |

# SOIL BORING 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

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

WATER LEVELS : 2.0 ft bgs on 6/05/07 START : 6/5/2007 END : 6/6/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.2 | 0.0 – 1.5 | 0.9 | SS-1 | 2-2-2 (4) | **Topsoil** 0.0-0.1' - dark gray, (N2), moist, very fine to fine grained, organic fines, silica sand<br>**Poorly Graded Sand With Organics (SP)** 0.1-0.9' - light to medium gray, (N7 to N6), moist, very loose, very fine to fine grained, trace nonplastic fines, 10-15% organic fines and rootlets, decreasing with depth, silica sand | | |
| 5 / 37.2 | 5.0 – 6.5 | 0.6 | SS-2 | 1-1-0 (1) | **Silty Sand (SM)** 5.0-5.6' - moderate yellowish brown, (10YR 5/4), wet, very loose, no HCl reaction, 10% fines, trace black (non carbonate) gravel, silica sand | | |
| 10 / 32.2 | 10.0 – 11.5 | 1.1 | SS-3 | 29-30-34 (64) | **Silt (ML)** 10.0-11.1' - grayish orange, (10YR 7/2), wet, hard, rapid dilatancy, mild HCl reaction, trace very fine-grained sand, all carbonate | | |
| 15 / 27.2 | 15.0 – 15.1 | 0.1 | SS-4 | 50/1 (50/1") | **Limestone Fragments** 15.0-15.1' - grayish orange, (10YR 7/2), mild HCl reaction, extremely weak (R0), coarse sand-sized pyrite nodules | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
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# SOIL BORING 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

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

WATER LEVELS : 2.0 ft bgs on 6/05/07 START : 6/5/2007 END : 6/6/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.2 | 20.0 – 21.5 | 1.2 | SS-5 | 29-36-26 (62) | **Silty Gravel With Sand (GM)** 20.0-21.2' - grayish orange, (5Y 8/4), wet, very dense, fine to coarse grained, mild HCl reaction, 30% fine to coarse limestone gravel, 30% nonplastic fines | | |
| | | | | | | | Some rig chatter from 20-25' |
| 25 / 17.2 | 25.0 – 26.5 | 0.6 | SS-6 | 5-11-14 (25) | **Sandy Silt (ML)** 25.0-25.6' - grayish yellow, (5Y 8/4), wet, very stiff, nonplastic, rapid dilatancy, moderate HCl reaction, 25-30% fine to medium grained sand, trace fine gravel, all carbonate | | |
| 30 / 12.2 | 30.0 – 30.2 | 0.0 | SS-7 | 50/2 (50/2") | **No Recovery 30.0-30.2'** | | |
| 35 / 7.2 | 35.0 – 36.4 | 1.3 | SS-8 | 32-43-50/5 (93/11") | **Silty Sand With Limestone Fragments (SM)** 35.0-36.3' - grayish yellow, (5YR 8/4), wet, very dense, fine to coarse grained, mild to moderate HCl reaction, 20-25% nonplastic fines, 30% fine to coarse limestone gravel, organic black staining on some rock fragments, all carbonate | | |
| | | | | | | | Hard drilling at 38' |
| 40 | 40.0 – 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 reaction, extremely weak (R0) | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: B-13 | SHEET 3 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

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

WATER LEVELS : 2.0 ft bgs on 6/05/07 START : 6/5/2007 END : 6/6/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 2.2 | 40.0 | | 10 | 40.0-40.35' - Fracture zone, limestone fragments, various orientations | | **Limestone** 40.0-41.7' - dusky yellow, (5Y 6/4), mild to moderate HCl reaction, weak (R2), fossiliferous (casts/molds) with some cavities generally 3/8"x3/16", voids up to 1/16" over 25%-30% of rock surface, light olive gray intraclasts, suspended in fine grained matrix (intraclasts typically 3/8"x3/16" or less). | At 40.0' switched over to NQ rock coring |
| | | | 1 | 40.35' - Bedding plane or mechanical break, horizontal, rough, planar, loose | | | |
| | R1-NQ 5 ft 34% | 20 | | 41.35' - Fracture, horizontal to 40 deg, rough, stepped, loose | | | |
| | | | NR | | | **No Recovery 41.7-45.0'** | R1: 3 minutes |
| 45 -2.8 | 45.0 | | | | | | |
| | | | 4 | 45.1' - Fracture, 70 deg, rough, planar, tight | | **Limestone** 45.0-49.4' - Same as 40.0-41.7' except very weak (R1) | |
| | | | | 45.5' - Bedding plane, horizontal, undulating, loose | | | |
| | | | 0 | 45.65' - Fracture, 60 deg, rough, stepped, loose | | | Driller's Remark: 46.0-48.0' very soft |
| | R2-NQ 5 ft 88% | 69 | 2 | 45.9' - Fracture, 50 deg, rough, undulating, loose<br>47.2' - Bedding plane, horizontal to <5 deg, rough, stepped, loose | | | |
| | | | 1 | 47.5, 47.8' - Fractures (2), horizontal to >80 deg, rough, undulating, extending into incipient fracture trace that dies out | | | |
| | | | 0 | 48.75' - Bedding plane, <5 deg, rough, undulating, loose, intersected by incipient fracture that is nearly vertical and dies out at end of R2 | | | R2: 3 minutes |
| 50 -7.8 | 50.0 | | NR | | | **No Recovery 49.4-50.0'** | |
| | | | 2 | 50.35' - Fracture, 20 deg, rough, undulating, tight | | **Limestone** 50.0-53.5' - Same as 40.0-41.7' except cavities more common up to 3-5%, fossiliferous cast/molds becoming more fossiliferous with depth, extremely weak zone (R0) from 52.65 to 56.85', incipient fracture from 50.9-51.2', inclined 70 degrees. | |
| | | | 1 | 50.7' - Fracture, 70 deg, rough, stepped/undulating, tight, black organic staining on 1-3% surface | | | |
| | R3-NQ 5 ft 82% | 72 | 1 | 51.8' - Fracture or mechanical break, <5 deg, rough, stepped, loose | | | Driller's Remark: 52.5-53.0' soft |
| | | | 3 | 52.65' - Fracture or mechanical break, <5 deg, rough, stepped, tight<br>53.01' - Fracture, 40 deg, rough, undulating, tight | | 53.5-54.1' - yellowish gray, (5Y 7/2), fine to very fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), voids covering 10%-15%, cavities rare (<3/16"x3/16"). | Driller's Remark: 53.5-54.5' soft |
| | | | NR | 53.3-53.45' - Fracture zone, rough, stepped to undulating, 60-70 deg to horizontal, tight to loose | | | R3: 5 minutes |
| 55 -12.8 | 55.0 | | | | | **No Recovery 54.1-55.0'** | |
| | | | 1 | 55.95' - Bedding plane or mechanical break, horizontal to <5 deg, rough, stepped, loose | | **Limestone** 55.0-55.9' - Same as 53.5-54.1' 55.9-58.5' - dusky yellow to moderate olive brown, (5Y 6/4 to 5Y 5/6), mild HCl reaction, weak (R2), with thin wispy laminae of black organic (N1) material, fossiliferous (casts and molds), voids covering 35-40% of surface and cavities generally less than 3/16"x3/16". | |
| | | | >10 | 56.38-56.7' - Fracture zone, gravel-sized limestone rock fragments, various orientations | | | SC-1 collected at 55.0-55.95' |
| | R4-NQ 5 ft 70% | 18 | 10 | 56.9-57.05' - Fracture zone, various orientations | | | |
| | | | 2 | 57.4-57.6' - Fracture zone, same as 56.38-56.7' | | | |
| | | | NR | | | **No Recovery 58.5-60.0'** | R4: 5 minutes |
| 60 | 60.0 | | | | | | |

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# 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

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

WATER LEVELS : 2.0 ft bgs on 6/05/07 START : 6/5/2007 END : 6/6/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -17.8 | R5-NQ 5 ft 69% | 55 | 3 | 57.9-58.25' - Fracture zone, horizontal to 60 deg, rough, with bedding plane fractures at 58.15' and 58.25', inclined fracture from 57.9-58.15', rough, undulating to stepped, loose. | | **Limestone** 60.0-63.45' - dusky yellow to moderate olive brown, (5Y 6/4 to 5Y 4/4), fine to very fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), fossiliferous (casts/molds), voids up to 1/16" covering up to 50-60% surface, extremely weak rock (R0) from 60.1' to 62.5' with some silt and sand-sized limestone rock fragments, some voids up to 3/8-3/4" x 3/8-3/4". | |
| | | | 0 | 60.5, 60.6, 60.7' - Bedding plane (3), horizontal to <5 deg, rough, stepped, loose | | | |
| | | | 10 | 62.15-62.55' - Fracture zone, rough, extremely soft rock, some bedding plane fractures horizontal to vertical, undulating/stepped, tight to loose | | | Driller's Remark: 62.0-64.0' very soft |
| | | | 0 | | | | Driller's Remark: All fairly soft to 64.0' |
| | | | NR | | | | R5: 4 minutes |
| 65 | 65.0 | | | | | **No Recovery 63.45-65.0'** | |
| -22.8 | R6-NQ 5 ft 88% | 26 | 4 | 65.1, 65.2' - Bedding plane (2), horizontal to <5 deg, rough, stepped, loose | | **Limestone** 65.0-69.4' - Same as 60.0-63.45' except extremely weak rock (R0) (similar to 62.1-62.5') from 66.0-66.7' and 69.0-69.4'. | |
| | | | 2 | 65.5' - Bedding plane, <5 deg, rough, loose 65.8, 66.35' - Bedding plane (2), <5 deg, rough, loose | | | |
| | | | >10 | 66.7- 67.7' - Fracture zone, >80 deg to vertical, series of several fractures, rough, undulating to stepped, loose | | | |
| | | | 0 | | | | |
| | | | 1 | 69.0-69.1' - Fracture zone, horizontal to 60 deg, rough, undulating, tight | | | R6: 4 minutes |
| 70 | 70.0 | | NR | | | **No Recovery 69.4-70.0'** | Driller's Remark: 69.5-70.0' very soft |
| -27.8 | R7-NQ 5 ft 62% | 16 | 1 | 70.1-70.15' - Fracture zone, horizontal to 60 deg, rough, stepped, loose | | **Limestone** 70.0-73.1' - light olive gray, (5Y 5/2), moderate HCl reaction, weak to medium strong (R2 to R3), fossiliferous (casts and molds) with 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. | |
| | | | 3 | 71.15' - Fracture, horizontal to 40 deg, rough, stepped, loose 71.35' - Mechanical break or fracture, 50 deg, rough, undulating stepped, tight | | | SC-2 collected at 70.15-71.1' Driller's Remark: 71.5-72.0' soft |
| | | | 10 | 71.7-72.3' - Fracture zone, vertical to >80 deg, tapering from mid-point of core to one side | | | |
| | | | NR | 72.3, 72.5' - Fractures (2), horizontal, rough, stepped, loose 72.72' - Bedding plane or mechanical break, horizontal, rough, undulating, loose | | **No Recovery 73.1-75.0'** | Driller's Remark: 73.0-74.5' very soft R7: 4 minutes |
| 75 | 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. | End on 6/5/07, water approx. 2.0' below ground surface Start on 6/6/07, water approx. 2.0' below ground surface |
| -32.8 | R8-NQ 5 ft 64% | 30 | 2 | 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 | | | |
| | | | >10 | 75.7' - Fracture, 70 deg, rough, undulating/stepped, tight | | | |
| | | | 3 | 75.85' - Bedding plane, horizontal to 70 deg, rough, planar, loose 76.3' - Bedding plane, horizontal, rough, planar | | 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 to 10-15%; cavities rare, generally <3/8" in diameter. | Incipient fracture 75-75.6' |
| | | | 1 | 76.4-76.9' - Fracture zone, gravel (limestone) various orientations, generally planar to undulating, rough to smooth, loose | | | |
| | | | NR | 77.3' - Bedding plane, rough, undulating to stepped, tight | | 77.3-78.2' - Same as 75.0-76.5' **No Recovery 78.2-80.0'** | R8: 8 minutes |
| 80 | 80.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
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# 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

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

WATER LEVELS : 2.0 ft bgs on 6/05/07 START : 6/5/2007 END : 6/6/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -37.8 | R9-NQ 5 ft 96% | 82 | 0 | 77.78' - Bedding plane, <5 deg, rough to smooth, loose<br>77.9' - Bedding plane, <5 deg, rough, loose<br>78.05' - Fracture, 60 deg, rough, planar | | **Limestone**<br>80.0-81.2' - fine grained, moderate to strong HCl reaction, medium strong (R3), trace fossils becoming more common with depth (molds/casts), voids grading from 10% to 20% with depth, cavities becoming more common with depth up to 3/8"x3/8". | |
| | | | 3 | 81.2-81.3' - Fracture zone, <5 deg, rough, undulating, tight with 0.05' black carbonaceous (organic) clay lining, soft, wet | | | Driller's Remark: 81.5-82.5' soft |
| | | | 0 | 81.6' - Bedding plane, horizontal to <5 deg, smooth, stepped to planar, loose | | **Clay (CL)**<br>81.2-81.3' - black, wet, soft, rapid dilatancy, (carbonaceous, organic layer) | |
| | | | 0 | 81.9' - Bedding plane, <5 deg, rough, undulating, loose | | | SC-3 collected at 83.35-84.40' |
| | | | 0 | | | **Limestone**<br>81.3-81.9' - pale yellowish brown, (10YR 6/7), fine grained, mild HCl reaction, becoming thinly laminated with depth and variegated (mottled), voids (15-20%) decreasing with depth. | R9: 6 minutes |
| 85 | 85.0 | | NR | | | | |
| -42.8 | R10-5 ft 80% | 71 | 0 | | | 81.9-84.8' - Same as 80.0-81.2' except cavities up to 1" in diameter.<br>**No Recovery 84.8-85.0'**<br>**Limestone**<br>85.0-87.55' - Same as 81.9-84.8' | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 10 | 88.0' - Bedding plane or mechanical break, horizontal, rough, undulating, loose<br>88.55-88.75' - Fracture zone, horizontal, rough, undulating, gravel sized fragments, loose | | 87.55-89.0' - yellowish gray, (5Y 7/2), mild HCl reaction, medium strong (R3), fine grained with some medium to coarse grained interclasts, fossiliferous, (casts/molds) very common, cavities up to 1" in diameter, some cavities filled with black organic material, voids and cavities over 40-50% of surface. | Driller's Remark: 100% loss of water<br>Driller's Remark: 88.5-89.5' soft |
| | | | NR | | | | R10: 7 minutes |
| 90 | 90.0 | | | | | | |
| -47.8 | R11-NQ 5 ft 77% | 53 | >10 | 90.0-90.35' - Fracture zone, limestone rock fragments, various orientations<br>90.35' - Fracture, horizontal, smooth, planar to undulating, loose | | **No Recovery 89.0-90.0'**<br>**Limestone**<br>90.0-91.4' - Same as 87.55-89.0' | |
| | | | 1 | 90.5' - Bedding plane or mechanical break, horizontal, rough, undulating/stepped, loose | | | |
| | | | 1 | 91.4' - Bedding plane, horizontal to 50 deg, rough, undulating, loose<br>92.07' - Bedding plane or mechanical break, 10 deg, smooth, planar, tight | | 91.4-91.7' - white to very light gray, (N9 to N8), very fine grained, strong HCl reaction, extremely weak (R0), voids over 3%-5%, clayey. | Driller's Remark: 5% water returns |
| | | | 0 | | | **Silty Clay (CL-ML)**<br>91.7-91.85' - white, (N9), moist, soft, no to slow dilatancy, cohesive. | SC-4 collected at 92.0-92.87' |
| | | | NR | | | | R11: 9 minutes |
| 95 | 95.0 | | | | | **Limestone**<br>91.85-92.3' - Same as 91.4-91.7' except gradational with unit below. | |
| -52.8 | R12-NQ 5 ft 95% | 26 | 5 | 95.17' - Fracture, >80 deg, rough, stepped, loose | | 92.3-93.8' - white to very light gray, (N9 to N8), very fine grained, strong HCl reaction, medium strong (R3), fossils rare to absent, voids <1/16" over 1%-3%, rare cavities (3/8" x 3/8") with dark stain. | |
| | | | 10 | 95.4, 95.6, 95.72, 95.9' - Fractures (4), horizontal to 30 deg, rough, planar to undulating, loose to tight | | | |
| | | | 10 | 96.0' - Fracture, horizontal to <10 deg, rough, planar, loose<br>96.2-96.75' - Fracture zone, 70 to 80 deg, rough, undulating, loose | | | Driller's Remark: Medium hard run |
| | | | 3 | 97.0' - Fracture, horizontal, smooth, undulating, loose | | **Clay (CL)**<br>93.8-93.85' - dark brown, dry, no dilatancy, strong HCl reaction, friable.<br>**No Recovery 93.85-95.0'** | |
| | | | 1 | 97.05-97.5' - Fracture zone, vertical to 0 deg, rough, loose | | | R12: 7 minutes |
| 100 | 100.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-13 SHEET 6 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

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

WATER LEVELS : 2.0 ft bgs on 6/05/07 START : 6/5/2007 END : 6/6/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -57.8 | R13-NQ 5 ft 100% | 34 | NR | 97.6, 97.9' - Fractures (2), horizontal, rough, planar, loose | | **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 HCl 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'** | |
| | | | 4 | 98.0' - Fracture, 40 to 50 deg, rough, planar, loose | | | |
| | | | 10 | 98.2, 98.4' - Fractures (2), horizontal, rough, undulating to stepped, loose | | | |
| | | | 1 | 99.05' - Fracture, <10 deg, rough, stepped, loose | | | |
| | | | >10 | 100.25, 100.35, 100.6' - Bedding plane or mechanical break (3), <5 deg, rough to smooth, undulating | | | |
| | | | 10 | 100.6-100.95' - Fracture, 70 to 80 deg, smooth, undulating, tight | | | R13: 7 minutes |
| 105 | 105.0 | | | 101.1-101.57' - Fracture zone, horizontal to >80 deg, producing fine gravel limestone rock fragments | | **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 cavities over 10%-15% of surface. **No Recovery 105.0-107.5'** | |
| -62.8 | R14-NQ 5 ft 50% | 16 | NR | 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 tight | | | Suspect siliceous unconsolidated sand 105 - 107.5' |
| | | | 0 | | | **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 siliceous | |
| | | | >10 | 108.35-109.0' - Fracture zone, vertical and horizontal planes, tight | | | |
| | | | 10 | 109.5-109.6' - Fracture zone, horizontal to >80 deg | | | R14: 8 minutes |
| 110 | 110.0 | | | | | | |
| -67.8 | R15-NQ 5 ft 74% | 0 | 5 | 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. 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'** | |
| | | | 9 | | | | |
| | | | 10 | | | | R15: 4 minutes |
| | | | 10 | | | | |
| | | | NR | | | | |
| 115 | 115.0 | | | | | | |
| -72.8 | R16-NQ 5 ft 57% | 10 | 5 | 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 | | | |
| | | | 10 | | | | 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 |
| | | | NR | 118.5' - Bedding plane, <5 deg, rough, undulating, loose | | | |
| | | | 10 | | | | |
| | | | 4 | 119.17, 119.32, 119.6, 119.8' - Bedding plane (4), smooth to rough, planar to slightly undulating, loose | | | R16: 6 minutes |
| 120 | 120.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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

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

WATER LEVELS : 2.0 ft bgs on 6/05/07 START : 6/5/2007 END : 6/6/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -77.8 | R17-NQ 5 ft 78% | 32 | 4<br>3<br>4<br>5<br>NR | 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, rough, planar to undulating, loose<br>122.44' - Bedding plane, horizontal, smooth, within thin laminae, loose | | **Limestone**<br>118.5-120.0' - yellowish gray, (5Y 7/2), fine to very fine grained, strong HCl reaction, weak (R2), fossiliferous with numerous casts/molds (gastropods, pelecypods, echinoids); cavities and voids over 20%-30% of surface.<br>120.0-120.6' - yellowish gray, (5Y 7/2), fine to medium grained, strong HCl reaction, weak (R2), fossiliferous (casts/molds) unfilled burrowed cavities/voids over 70%-80%, cavities up to 3/8" x 3/8". | R17: 7 minutes |
| 125 | 125.0 | | | | | | |
| -82.8 | R18-NQ 5 ft 81% | 0 | 7<br>7<br>10<br>>10<br>10<br>NR | 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, 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), horizontal, rough to smooth, planar to undulating, generally loose; at 126.7' black carbonaceous coating on 40% of surface, fracture zone 127.35-127.5'<br>128.97, 128.99' - Bedding plane or mechanical break (2), horizontal, rough to smooth, planar to undulating, generally loose | | 120.6-123.2' - yellowish gray, (5Y 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 thinly laminated from 122.4 to 122.6'.<br>123.2-123.9' - Same as 120.0-120.6'<br>**No Recovery 123.9-125.0'**<br>**Limestone**<br>125.0-129.05' - Same as 120.6-123.2' except laminations absent.<br>**No Recovery 129.05-130.0'** | R18: 5 minutes |
| 130 | 130.0 | | | | | | |
| -87.8 | R19-NQ 5 ft 84% | 24 | 4<br>9<br>2<br>3<br>0<br>NR | 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' - Bedding plane or mechanical break (15), horizontal to <5 deg, smooth to rough, planar to undulating, loose<br>133.0-133.3' - Fracture, 80 deg, rough, undulating, loose<br>133.5' - Fracture, horizontal to 80 deg, rough, stepped, loose | | **Limestone**<br>130.0-131.3' - yellowish gray, (5Y 7/2), fine to medium grained, strong HCl reaction, very weak to weak (R1 to R2), fossiliferous with numerous casts/molds, echinoids, gastropods, cavities and voids up to 40% increasing in depth, some intraclasts present.<br>131.3-132.0' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl reaction, "grainy" appearance, thinly laminated, voids and cavities rare. | R19: 4 minutes |
| 135 | 135.0 | | | | | | |
| -92.8 | R20-NQ 5 ft 44% | 7 | >10<br>7<br>1<br>NR | 135.2-135.9' - Fracture zone, horizontal to 90 deg, smooth to rough, undulating to planar, loose<br>136.06, 136.13, 136.24, 136.42, 136.8, 136.93, 136.97, 137.2' - Bedding plane or mechanical break (8), horizontal, rough to smooth, undulating to planar, loose | | 132.0-133.6' - Same as 130.0-131.3' except very weak (R1), medium to coarse grained (coarse particularly at 132.0' to 132.3'), similar to coquina, very fossiliferous.<br>133.6-134.2' - Same as 131.3-132.0' except very thinly laminated, voids/cavities rare to absent.<br>**No Recovery 134.2-135.0'**<br>**Limestone**<br>135.0-135.2' - Same as 131.3-132.0'<br>135.2-137.03' - Same as 130.0-131.3' except fine grained, very weak (R1), fossiliferous, very thinly laminated at base with organics. | R20: 4 minutes |
| 140 | 140.0 | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: B-13 | SHEET 8 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

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

WATER LEVELS : 2.0 ft bgs on 6/05/07 START : 6/5/2007 END : 6/6/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -97.8 | R21-NQ 5 ft 89% | 31 | 4 | 140.4, 140.45, 140.62, 140.76, 141.02, 141.1' - Bedding plane or mechanical break (6), horizontal, smooth, planar, loose | | 137.03-137.2' - medium gray, (N5), very fine grained, strong HCl reaction, weak to medium strong (R2 to R3), few voids. **No Recovery 137.2-140.0'** **Limestone** 140.0-141.3' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, very weak to weak (R1 to R2), fossils rare to absent; "chalk-like" texture, cavity infilling or supported by interclasts in fine grained matrix, grains up to 3/16" in diameter and dark gray and white (N9) in color, voids <1%. | |
| | | | 10 | 141.25-141.6' - Fracture zone, various orientations, limestone gravel | | | |
| | | | 2 | 141.7, 141.85, 142.0, 142.25, 143.0, 143.15, 143.2, 143.28' - Mechanical break or fractures (8), horizontal to 60 deg, rough, stepped, tight | | | |
| | | | 5 | | | | |
| | | | >10 | 144.0-144.45' - Fracture zone, limestone gravels, orientations unknown | | | R21: 6 minutes |
| 145 | 145.0 | | NR | | | | |
| -102.8 | R22-NQ 5 ft 58% | 0 | 10 | 145.1' - Fracture, horizontal, smooth, undulating, loose | | 141.3-144.5' - yellowish gray, (5Y 7/2), very fine grained, strong HCl reaction, weak to medium strong (R2 to R3), bioturbated with some cavities >1" long and >1" deep, some cavities infilled, some cavities lined with dark gray (N3) coatings, mottled texture with area of void-free limestone and zones of limestone with up to 60%-70% voids, fossiliferous in casts/molds of pelecypods and gastropods. **No Recovery 144.5-145.0'** **Limestone** 145.0-146.15' - yellowish gray, (5Y 7/2), very fine grained, strong HCl reaction, weak to medium strong (R2 to R3), thinly laminated, fossils rare to absent, some voids up to 1/16" or 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 and loose (especially at 146.4' to 146.7'), with extremely weak (R0) rock at 146.4'-146.7', trace fossils, voids generally less than 1/16" over 60%-70% producing a grainy texture. **No Recovery 147.9-150.0'** | | |
| | | | >10 | 145.2' - Fracture, 60 deg, smooth, stepped, tight | | | |
| | | | 1 | 145.6-145.88' - Fracture zone, 85-90 deg along outside 1/5th of core, truncated at 145.88', split at 157.7' by <5 deg fracture | | | |
| | | | NR | 145.93' - Fracture, horizontal, smooth, undulating, loose | | | R22: 7 minutes |
| 150 | 150.0 | | | 146.05-146.45' - Fracture zone, vertical, rough, planar, tight, cross cut by horizontal fracture at 146.15' which propagates halfway through core | | | |
| -107.8 | | | | 146.45-146.7' - Fracture zone | | | |
| | | | | 146.7' - Fracture, <5 deg, rough, undulating, loose | | | |
| | | | | 146.85, 146.95, 147.05' - Bedding plane or mechanical break (3), horizontal to <5 deg, rough, undulating to stepped, loose | | | |
| | | | | | | Bottom of Boring at 150.0 ft bgs on 6/6/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-14 SHEET 1 OF 9 |

# SOIL BORING 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

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 bgs on 6/5/07 START : 6/5/2007 END : 6/6/2007 LOGGER : B. Ellis, D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 41.7 | 0.0 – 1.5 | 0.8 | SS-1 | 1-1-4 (5) | **Topsoil** 0.0-0.3' - grayish black to black, (N2 to N1), moist, organic fines and roots, wood chips<br>**Poorly Graded Sand With Silt (SP-SM)** 0.3-0.75' - yellowish gray, (5Y 7/2), moist, loose, very fine to fine grained, trace organics decreasing with depth, 5% nonplastic fines, sand is silica | | Start SPT at 08:15, 6/5/07 |
| 5 | 5.0 | | | | | | |
| 36.7 | 6.5 | 1.1 | SS-2 | 3-4-6 (10) | **Sandy Fat Clay (CH)** 5.0-5.4' - greenish gray, (5GY 6/1), moist, medium stiff, medium to high plasticity, slow dilatancy, 25-30% very fine to fine grained silica sand<br>**Silt (ML)** 5.4-6.1' - dark yellowish orange, (10YR 6/6), wet, stiff, nonplastic, very rapid dilatancy, moderate HCl reaction, trace very fine grained sand, all carbonate material | | Possible water table encountered at 7' |
| 10 | 10.0 | | | | | | |
| 31.7 | 11.5 | 1.3 | SS-3 | 5-5-2 (7) | **Sandy Silt (ML)** 10.0-11.3' - dark yellowish orange, (10YR 6/6), wet, nonplastic, very rapid dilatancy, moderate HCl reaction, 25-30% fine to medium grained sand, all carbonate material | | Driller's Remark: Lost circulation at 12'<br>Driller's Remark: Hard formation<br>Driller's Remark: Chatter throughout run from 10-15'<br>Driller's Remark: Soft drilling at 12.5'<br>Driller's Remark: Circulation loss at 13', hard drilling |
| 15 | 15.0 | | | | | | |
| 26.7 | 16.5 | 1.5 | SS-4 | 16-3-19 (22) | **Sandy Silt (ML)** 15.0-15.5' - Same as 10.0-11.3'<br>**Limestone Fragments** 15.5-16.5' - grayish orange, (10YR 7/4), mild to moderate HCl reaction, coarse sand-size to coarse gravel-size limestone fragments, fossiliferous | | 4-inch casing set at 15' |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-14 SHEET 2 OF 9 |

# SOIL BORING 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

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 bgs on 6/5/07 START : 6/5/2007 END : 6/6/2007 LOGGER : B. Ellis, D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 21.7 | 20.0 – 21.5 | 1.4 | SS-5 | 23-33-50/5.5 (83/11.5") | **Limestone Fragments** 20.0-21.4' - Same as 15.5-16.5' | | Advanced 4-inch (HW) casing to 20', decision made to begin rock coring |
| | | | | | Begin Rock Coring at 21.0 ft bgs<br>See the next sheet for the rock core log | | |
| 25 / 16.7 | | | | | | | |
| 30 / 11.7 | | | | | | | |
| 35 / 6.7 | | | | | | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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

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

WATER LEVELS : 7.0 ft bgs on 6/5/07 START : 6/5/2007 END : 6/6/2007 LOGGER : B. Ellis, D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | 21.0 | | 4 | 21.0-21.3' - Fracture zone, fine to coarse grained subangular gravel<br>21.3' - Fracture, 10 deg, rough, planar | | **Limestone**<br>21.0-21.3' - grayish orange, (10YR 7/4), mild to moderate HCl reaction<br>21.3-23.0' - dusky yellow, (5Y 6/4), mild to moderate HCl reaction, weak to medium strong (R2 to R3), voids (<1/16") over 25% of rock surface, numerous elongate to platy cavities/molds from 1/4" up to 3/4" long, trace inorganic inclusions<br>23.0-23.4' - grayish orange, (10YR 7/4), strong HCl reaction, very weak (R1), voids (1/16") over 20% of rock surface, numerous fossil cavities/molds 1" in diameter or larger | Cavities at 21.6', 21.9', 22.6' |
| | | | 1 | | | | |
| | R1-HQ<br>5 ft<br>48% | 35 | 3 | 23.0' - Fracture, 10 deg, rough, stepped, loose<br>23.0-23.1' - Fracture zone | | | |
| 25<br>16.7 | | | NR | | | | R1: Run time not reported |
| | 26.0 | | | | | **No Recovery 23.4-26.0'** | |
| | | | 1 | 26.7' - Fracture or mechanical break, horizontal, smooth, planar | | **Limestone**<br>26.0-26.7' - dusky yellow, (5Y 6/4), fine grained, strong HCl reaction, very weak (R1)<br>26.7-29.2' - dusky yellow to medium yellowish brown, (5Y 6/4 to 10YR 5/4), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids (1/16") over 5-25% of rock surface, some 1/4" round cavities | Cavity at 28.65' |
| | | | 1 | 27.7' - Fracture, 35 deg, rough, undulating, (almost smooth) | | | |
| | R2-HQ<br>5 ft<br>64% | 40 | 2 | 28.0' - Fracture, horizontal, rough, undulating<br>28.6' - Fracture or mechanical break, horizontal, smooth, planar | | | |
| | | | 1 | 29.05' - Fracture, 30 deg, smooth, planar | | | |
| 30<br>11.7 | | | NR | | | **No Recovery 29.2-31.0'** | R2: 3 minutes |
| | 31.0 | | | | | | |
| | | | 1 | | | **Limestone**<br>31.0-33.1' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, weak to strong (R2 to R4), voids (1/16") over 10% of rock surface, few elongate cavities up to 1/4", transitions from strong to weak rock with depth, accompanied by increase to voids over 20% of rock surface<br>33.1-33.6' - Same as 31.0-33.1' lower portion except weak (R2)<br>33.6-35.2' - Same as 31.0-33.1' upper portion except strong (R4), 10% voids | |
| | | | 2 | 31.9' - Fracture, 10 deg, smooth, planar<br>32.2' - Fracture, 45 deg, smooth, undulating | | | |
| | R3-HQ<br>5 ft<br>84% | 40 | 3 | 32.7' - Fracture, vertical, rough, undulating<br>33.0-33.85' - Fracture zone, fine- to coarse-grained gravel | | | |
| | | | 2 | 33.9' - Fracture, 70 deg, rough, undulating<br>34.2' - Fracture, 10 deg, rough, planar | | | |
| 35<br>6.7 | | | 0 | 34.8' - Fracture, 80 deg, rough, undulating | | | R3: 3 minutes |
| | | | NR | | | | |
| | 36.0 | | | | | **No Recovery 35.2-36.0'** | |
| | | | 2 | 36.4' - Fracture, 60 deg, rough, undulating | | **Limestone**<br>36.0-36.8' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, medium strong (R3), voids (1/16") over 10-20% of rock surface, few elongate cavities up to 1/4"<br>36.8-37.4' - Same as 36.0-36.8' except extremely weak to weak (R0 to R2)<br>37.4-38.8' - Same as 36.0-36.8' except medium strong (R3)<br>38.8-39.3' - Same as 36.8-37.4' | |
| | | | 2 | 36.8, 37.1' - Fractures (2), horizontal, smooth, planar<br>37.45' - Fracture, 70 deg, rough, undulating | | | Cavities at 37.2', 38.0' |
| | R4-HQ<br>5 ft<br>74% | 45 | 2 | 38.0' - Fracture, 10 deg, smooth, undulating | | | |
| | | | 1 | 38.8, 39.3' - Fractures (2), horizontal, smooth, planar | | | |
| 40<br>1.7 | | | NR | | | | R4: 2 minutes |
| | 41.0 | | | | | | |

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|---|---|
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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 ORIENTATION : Vertical

WATER LEVELS : 7.0 ft bgs on 6/5/07 START : 6/5/2007 END : 6/6/2007 LOGGER : B. Ellis, D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R5-HQ 5 ft 62% | 20 | >10 | 41.0-41.3' - Fracture zone<br>41.3' - Fracture zone, 5 deg, rough, planar, angular gravel (1/2 to 1 1/2") | | 39.3-39.7' - Same as 36.0-36.8' except weak (R2)<br>**No Recovery 39.7-41.0'**<br>**Limestone**<br>41.0-42.2' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, weak (R2), voids (1/16") over 20-25% of rock surface, elongate fossil molds up to 1/5" over 5% of rock surface, few cavities up to 1/4", some gray to black inclusions | |
| | | | 4 | 41.6' - Fracture zone, 20 deg, rough, planar, open | | | |
| | | | 2 | 41.7' - Fracture zone, 70 deg, rough, planar, fracture terminates at 41.6' and 41.85', open<br>41.85' - Fracture zone, 30 deg, rough, stepped, fracture with some fragmentation, open | | | |
| | | | 0 | 42.3-42.7' - Clay seam, non-indurated zone bounded by weakly indurated rock | | | |
| 45<br>-3.3 | | | NR | 42.9-43.15' - Clay seam, non-indurated zone bounded by weakly indurated rock<br>43.4, 43.9' - Fractures (2), horizontal, rough, undulating, open | | 42.2-43.4' - Same as 41.0-42.2' except very weak to extremely weak (R1 to R0)<br>43.4-44.1' - Same as 41.0-42.2' | R5: 2 minutes |
| 46.0 | | | | | | | |
| | R6-HQ 5 ft 78% | 62 | 1 | 46.4' - Fracture, 10 deg, rough, undulating, open to tight | | **No Recovery 44.1-46.0'**<br>**Limestone**<br>46.0-49.9' - moderate yellowish brown, (10YR 5/4), fine grained, mild to moderate HCl reaction, very weak to medium strong (R1 to R3), voids (1/16") over 20% of rock surface<br>46.4-47.45' - Same as 46.0-49.9' except very weak (R1)<br>47.45-48.6' - Same as 46.0-49.9' except medium strong (R3) | |
| | | | 3 | 47.15' - Fracture, 10 deg, smooth, planar<br>47.3' - Fracture, 50 deg, smooth, planar<br>47.4' - Fracture, 15 deg, rough, undulating | | | |
| | | | 1 | 48.65' - Fracture, 70 deg, rough, undulating | | | |
| | | | 1 | 49.6' - Fracture, horizontal, smooth, undulating | | | |
| 50<br>-8.3 | | | NR | | | 48.6-49.4' - Same as 46.0-49.9' except very weak (R1)<br>49.4-49.9' - Same as 46.0-49.9' except medium strong (R3) | R6: 2 minutes |
| 51.0 | | | | | | | |
| | R7-HQ 5 ft 86% | 57 | 0 | 51.0' - 1/4-inch infilling, strong HCl reaction | | **No Recovery 49.9-51.0'**<br>**Limestone**<br>51.0-52.3' - moderate yellowish brown, (10YR 5/4), fine grained, mild to moderate HCl reaction, medium strong to strong (R3 to R4), voids (1/16") over 10% of rock surface, trace voids up to 1/5", trace organic inclusions<br>52.3-52.8' - Same as 51.0-52.3' except transition with depth from weak (R2) to extremely weak (R0)<br>52.8-54.75' - Same as 51.0-52.3'<br>54.75-55.3' - Same as 52.3-52.8' except possibly grades to stronger rock at 55.3' | |
| | | | 3 | 52.3, 52.55, 52.7' - Fractures (3), horizontal, smooth, planar, open | | | |
| | | | 4 | 53.2' - Fracture, vertical, rough, planar<br>53.3' - Fracture, 10 deg, smooth, planar | | | |
| | | | 4 | 53.8, 53.9' - Fracture or fractures (2), 10 deg, rough, planar, open<br>54.1' - Fracture, 45 deg, smooth, undulating, tight | | | |
| 55<br>-13.3 | | | 1 | 54.4' - Fracture, horizontal, rough, planar to undulating | | | R7: 2 minutes |
| 56.0 | | | NR | | | | |
| | R8-HQ 5 ft 80% | 58 | 1 | 54.75' - Fracture, 10 deg, rough, stepped, open<br>54.9, 55.2' - Fractures (2), horizontal, rough, planar, tight | | **No Recovery 55.3-56.0'**<br>**Limestone**<br>56.0-60.0' - moderate yellowish brown, (10YR 5/4), fine grained, mild to moderate HCl reaction, medium strong to very weak (R3 to R1), voids (1/16") over 25-30% of rock surface, some cavities up to 1/4", organic inclusions; very similar to R7-HQ | |
| | | | 1 | 56.6' - Fracture, horizontal and 45 deg, rough, undulating | | | |
| | | | 3 | 57.3' - Fracture, 10 deg, rough, stepped, open<br>58.1' - Fracture, horizontal, rough, planar, open | | | |
| | | | 3 | 58.5' - Fracture, 15 deg, rough, undulating<br>58.8' - Fracture, 35 deg, smooth, undulating, tight to open | | | |
| 60<br>-18.3 | | | NR | 59.7-59.8' - Fracture zone, 1/2" limestone rock fragments | | **No Recovery 60.0-61.0'** | R8: 2 minutes |
| 61.0 | | | | | | | |

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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 ORIENTATION : Vertical

WATER LEVELS : 7.0 ft bgs on 6/5/07 START : 6/5/2007 END : 6/6/2007 LOGGER : B. Ellis, D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R9-HQ 5 ft 92% | 75 | 2 | 59.8' - Fracture, high angle fracture -- partially penetrating core<br>61.4-61.6' - Fracture zone, horizontal, smooth, planar | | **Limestone**<br>61.0-61.7' - moderate yellowish brown, (10YR 5/4), fine grained, moderate to strong HCl reaction, very weak to extremely weak (R1 to R0), voids (1/16") over 3% of rock surface, few cavities up to 1/4"<br>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<br>63.4-64.3' - Same as 61.0-61.7'<br>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<br>65.4-65.6' - dark yellowish orange, (10YR 6/6), moderate HCl reaction, extremely weak (R0), voids and cavities absent<br>**No Recovery 65.6-66.0'**<br>**Limestone**<br>66.0-66.6' - dark yellowish orange, (10YR 6/6), moderate HCl reaction, extremely weak to very weak (R0 to R1), voids and cavities absent<br>66.6-70.1' - dark yellowish brown, (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<br>**No Recovery 70.1-71.0'**<br>**Limestone**<br>71.0-72.9' - moderate yellowish 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 10% of rock surface, few cavities up to 1/4"<br>72.9-73.5' - olive gray, (5Y 3/2), fine grained, moderate HCl reaction, strong to very strong (R4 to R5), voids (1/16") over 3% of rock surface<br>73.5-75' - moderate yellowish brown, (10YR 5/4), fine grained, moderate to strong HCl reaction, strong (R4), voids (1/16") over 15% of rock surface, few cavities up to 1/4"<br>**No Recovery 75.0-76.0'**<br>**Limestone**<br>76.0-77.55' - moderate yellowish brown, (10YR 5/4), fine grained, 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 | |
| | | | 0 | | | | |
| | | | 1 | 63.45' - Fracture, horizontal, rough, planar | | | |
| | | | 1 | 64.0-64.1' - Fracture zone | | | |
| 65<br>-23.3 | | | 2 | 64.6' - Fracture, horizontal, smooth, planar, open | | | R9: 3 minutes |
| | 66.0 | | NR | 65.35, 65.45' - Fractures (2), 10 deg, smooth, planar | | | |
| | R10-HQ 5 ft 82% | 48 | 5 | 66.1, 66.15, 66.35, 66.55' - Fractures (4), horizontal, smooth, planar, tight<br>66.6' - Fracture, horizontal, smooth, planar, open | | | |
| | | | 2 | 67.6' - Fracture, horizontal, smooth, planar, tight to open | | | |
| | | | 2 | 67.75' - Fracture, 75 deg, smooth, undulating<br>68.2' - Fracture, 75 deg, rough, undulating | | | |
| | | | 4 | 68.5-69.1' - Fracture zone, vertical and horizontal, smooth, undulating, angular limestone rock fragments | | | |
| 70<br>-28.3 | | | 0 | 69.1' - Fracture, 20 deg, rough, undulating | | | R10: 3 minutes |
| | 71.0 | | NR | 69.3' - Fracture, 20 deg, smooth, undulating, infilled with sediment | | | |
| | R11-HQ 5 ft 80% | 38 | >10 | 69.75-70.1' - Fracture zone, vertical, rough, undulating, open<br>71.0-71.2' - Fracture zone, subrounded fragments (up to 1 3/4") | | | |
| | | | >10 | 71.25-71.35' - Fracture zone, horizontal, smooth, planar to undulating | | | |
| | | | 6 | 72.1' - Fracture, horizontal, smooth, planar, tight<br>72.3-72.5' - Fracture zone, subangular fragments up to 1/2" | | | Cavities at 73.9', 74.5' |
| | | | 2 | 72.5' - Fracture, 40 deg, rough, stepped<br>72.8' - Fracture, horizontal, rough, undulating | | | |
| 75<br>-33.3 | | | NR | 73.0' - Fracture, 30 deg, rough, stepped<br>73.0-73.2' - Fracture zone, angular fragments (up to 1/2") | | | R11: 3 minutes |
| | 76.0 | | | | | | |
| | R12-HQ 5 ft 88% | 45 | 0 | 73.4' - Fracture, 10 deg, rough, undulating, open<br>74.1' - Fracture, 10 deg, smooth, planar, tight | | | |
| | | | 1 | 74.9' - Fracture, 50 deg, rough, stepped, open<br>77.6' - Fracture, horizontal, rough, planar | | | |
| | | | 2 | 78.0' - Fracture, 10 deg, rough, undulating | | | |
| | | | 3 | 78.9' - Fracture, horizontal, smooth, planar<br>79.15, 79.35, 79.65' - Fractures (3), horizontal, rough, planar, open at 79.15' | | | |
| 80<br>-38.3 | | | 7 | 80.15-80.4' - Fracture zone, subangular fragments (up to 2") | | | R12: 3 minutes |
| | 81.0 | | NR | | | | |

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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 ORIENTATION : Vertical

WATER LEVELS : 7.0 ft bgs on 6/5/07 START : 6/5/2007 END : 6/6/2007 LOGGER : B. Ellis, D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R13-HQ 5 ft 84% | 78 | 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 very fine carbonate-derived sand and silt | SC-1 collected at 81.2-82.3' |
| | | | 0 | | | 78.9-80.4' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, weak (R2), voids (1/16") over 25% of rock surface, some cavities 1/4"-1/2", trace organic inclusions | |
| | | | 0 | | | | Cavities at 83.7', 84.0', 84.1', 84.4' (less than 1/4") |
| | | | 1 | 84.0' - Fracture, 40 deg, rough, stepped | | | |
| 85 -43.3 | | | 1 | 85.0' - Fracture, 45 deg, rough, undulating | | **No Recovery 80.4-81.0'** | R13: 3 minutes |
| | | | NR | | | **Limestone** 81.0-83.15' - dark yellowish orange to dusky yellow, (10YR 6/6 to 5Y 6/4), fine grained, moderate to strong HCl reaction, medium strong (R3), voids (1/16") over 15-20% of rock surface, few cavities up to 1/4" | |
| 86.0 | | | | | | | |
| | R14-HQ 5 ft 90% | 20 | 2 | 86.3' - Fracture, 10 deg, rough, planar<br>86.6' - Fracture, 10 deg, rough, stepped | | 83.15-85.2' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, weak (R2), voids (1/16") over 25-30% of rock surface with cavities up to 3/4", some cavities infilled with less strong, gray to brown, limestone | |
| | | | >10 | 87.1-87.5' - Fracture zone, angular fragments (3/4 to 2") | | | |
| | | | 3 | 88.0' - Fracture, 30 deg, rough, undulating, tight<br>88.65' - Fracture, 40 deg, rough, undulating, open | | | |
| | | | >10 | 88.85' - Fracture, vertical, rough, undulating, tight | | | |
| 90 -48.3 | | | 2 | 89.1' - Fracture, horizontal, rough, stepped, open | | **No Recovery 85.2-86.0'** | R14: 4 minutes |
| 91.0 | | | NR | 89.2-89.4' - Fracture zone, angular fragments (1/2 to 1"), terminated by rough-planar horizontal fracture | | **Limestone** 86.0-87.5' - dusky yellow, (5Y 6/4), fine grained, strong HCl reaction, extremely weak (R0), voids (1/16") over up to 3% of rock surface | |
| | R15-HQ 5 ft 18% | 0 | >10 | 89.7' - Fracture, 10 deg, rough, undulating to stepped, tight to open | | 87.5-88.7' - moderate yellowish brown, (10YR 5/4), strong HCl reaction, weak to medium strong (R2 to R3), voids (1/16"-1/8") over 20% of rock surface, few cavities 1/2"-3/4", cavities mostly elongate | Core barrel getting stuck in borehole, some casing withdrawn in order to retrieve core barrel |
| | | | NR | 90.0' - Fracture, 80 deg, rough, undulating, tight to open<br>90.3' - Fracture, horizontal, rough, planar, tight<br>91.0-91.6' - Fracture zone, angular to subrounded fragments 1/2" to 2"<br>91.6' - Fracture, 30 deg, rough, undulating, open | | 88.7-90.5' - yellowish gray, (5Y 8/1), fine to very fine grained, strong HCl reaction, very weak to very strong (R1 to R5), fossiliferous (less than 1/16"), rock strength gradually transitions from weak (R2) at 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' | |
| 95 -53.3 | | | | | | | R15: 18 minutes |
| 96.0 | | | 0 | | | **No Recovery 90.5-91.0'** | |
| | R16-HQ 5 ft 4% | 0 | NR | | | **Limestone** 91.0-91.6' - moderate yellowish brown to light olive gray, (10YR 5/4 to 5Y 5/2), angular to subangular limestone rock fragments (1/2"-2"), no fines<br>91.6-91.9' - Same as 88.7-90.5' except yellowish gray, (5Y 8/1) | |
| 100 -58.3 | | | | | | **No Recovery 91.9-96.0'** | R16: 3 minutes |
| 101.0 | | | | | | | |

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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 ORIENTATION : Vertical

WATER LEVELS : 7.0 ft bgs on 6/5/07 START : 6/5/2007 END : 6/6/2007 LOGGER : B. Ellis, D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | | | 2 | 101.3' - Fracture or mechanical break, 30 deg, rough, stepped | | **Limestone** 96.0-96.2' - light olive gray, (5Y 5/2), very fine grained, moderate to strong HCl reaction, very strong (R5), voids (1/16") over 5% of rock surface | |
| | | | 0 | 101.7' - Fracture, horizontal, smooth, planar, tight | | **No Recovery 96.2-101.0'** | SC-2 collected at 102.3-103.4' |
| | R17-HQ 5 ft 96% | 80 | 1 | 103.4' - Fracture, horizontal, rough, undulating | | **Limestone** 101.0-105.8' - yellowish gray, (5Y 8/1), very fine grained, strong HCl reaction, extremely weak (R0) from 101.0-101.5', very weak (R1) from 101.5-105.8', trace to 5% fine, gray speckles in matrix | |
| | | | 0 | | | | |
| 105 -63.3 | | | 4 | 105.3, 105.4, 105.5, 105.65' - Fractures (4), horizontal - 20 deg, smooth, planar, open | | | R17: 3 minutes |
| 106.0 | | | NR | | | **No Recovery 105.8-106.0'** | |
| | | | 2 | 106.1, 106.3' - Fractures (2), horizontal, smooth, planar, tight | | **Limestone** 106.0-111.0' - yellowish gray, (5Y 8/1), very fine grained, strong HCl reaction, very weak to extremely weak (R1 to R0), very small fossil fragments | |
| | | | 1 | 107.1' - Fracture, horizontal, smooth, undulating, open | | | |
| | R18-HQ 5 ft 100% | 78 | 1 | 108.3' - Fracture, 10 deg, smooth, planar, tight | | | |
| | | | 2 | 108.65, 109.2' - Fracture, horizontal, smooth, undulating, tight | | | |
| 110 -68.3 | | | 5 | 109.9' - Fracture, 10 deg, smooth, undulating, open | | | R18: 5 minutes |
| 111.0 | | | | 110.0, 110.05, 110.2, 110.35' - Fractures (4), horizontal, smooth, undulating | | | Drilling ends at 16:30 on 6/5/07 |
| | | | >10 | 110.6' - Fracture or mechanical break, horizontal, smooth, planar | | 111.0-115.7' - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, very weak to weak (R1 to R2), voids (1/16") over 3% of rock surface, few cavities up to 1/4", increase in voids to 10% with some cavities up to 1/2" below 115.3' | Core tends to break along bedding planes, very uniform lithology throughout core |
| | | | 2 | 111.0-111.2' - Fracture zone, subrounded fragments 1/2" to 2" | | | Start drilling on 6/6/07 at 08:30 |
| | R19-HQ 5 ft 94% | 85 | 1 | 111.2-111.4, 111.9, 112.3, 112.95' - Fractures (5), horizontal, smooth, planar to undulating, tight | | | |
| | | | 2 | 113.3, 114.4' - Fractures (2), horizontal, smooth, undulating | | | |
| 115 -73.3 | | | 0 | 114.9' - Fracture, 5 deg, rough, undulating | | | R19: 2 minutes |
| 116.0 | | | NR | | | **No Recovery 115.7-116.0'** | |
| | | | 1 | 116.25' - Fracture, horizontal, rough, undulating | | **Limestone** 116.0-118.5' - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, very weak (R1), voids (1/16") over 3% of rock surface, bioturbated | SC-3 collected at 116.3-117.5' |
| | | | 2 | 117.4, 117.6' - Fractures (2), 5 deg, rough, stepped | | | |
| | R20-HQ 5 ft 94% | 67 | 2 | 118.3, 118.6' - Fractures (2), horizontal, rough, undulating | | 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 | Cavities at 117.2', 120.2'; sample tends to break along bedding planes when handled, rock in core uniform throughout |
| | | | 4 | 119.3' - Fracture, 30 deg, rough, planar, tight | | | |
| 120 -78.3 | | | 2 | 119.5' - Fracture, 80 deg, rough, undulating, fracture extends from 119.3-119.75' | | 119.8-120.7' - Same as 116.0-118.5' | R20: Run time not recorded |
| 121.0 | | | NR | | | **No Recovery 120.7-121.0'** | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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

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

WATER LEVELS : 7.0 ft bgs on 6/5/07 START : 6/5/2007 END : 6/6/2007 LOGGER : B. Ellis, D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R21-HQ 5 ft 100% | 80 | 2 | 119.55, 119.75' - Fractures (2), horizontal, smooth to rough, planar to undulating, tight to open | | **Limestone** 121.0-126.0' - yellowish gray to very 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, few cavities (1/4"-1/2"), some cavities infilled with white calcareous limestone, some textural and color variations similar to 118.5-119.8' from 121.35-122.0', fossiliferous, inclusions at 122.6' | Fossiliferous inclusions at 122.6', cavity at 123.65' (1"), cavities at 125.1' and 125.8' (1/4"-1/2"), partial white infilling of cavities could also be actual fossil |
| | | | 0 | 120.4, 120.6, 121.3, 121.4' - Fractures (4), horizontal, smooth, planar | | | |
| | | | 4 | 123.1' - Fracture, horizontal, smooth, planar to undulating, open | | | |
| | | | 2 | 123.25' - Fracture, horizontal, smooth, stepped, open<br>123.35, 123.45' - Fractures (2), horizontal, smooth, planar to undulating, open | | | |
| 125 -83.3 | | | 1 | 124.5, 124.6' - Fractures (2), horizontal, smooth, planar | | | R21: 3 minutes |
| | 126.0 | | | | | | |
| | R22-HQ 5 ft 100% | 85 | 6 | 125.5' - Fracture, horizontal, smooth, planar, tight<br>126.1' - Fracture, horizontal, smooth, planar, open | | 126.0-131.0' - yellowish gray to very pale orange, (5Y 8/1 to 10YR 8/2), fine to medium grained, strong HCl reaction, very weak (R1), voids (1/16") over 3% of rock surface, few cavities up to 1/4" from 126.0-127.5', voids (1/16") over 30% of rock surface, many shallow cavities (1/4"-1/2"), fossiliferous, elongate molds and casts (1/2"-3/4") from 127.5-129.15' | Large bivalve shells at 127.4', 127.5', 126.7' |
| | | | 1 | 126.2' - Fracture, 30 deg, smooth, planar, open | | | |
| | | | 0 | 126.75' - Fracture, horizontal, smooth, planar, open<br>127.8' - Fracture, horizontal, rough, undulating, tight | | | |
| | | | 6 | 129.1-129.6' - Fracture zone or bedding plane, smooth, planar, some ridging | | | |
| 130 -88.3 | | | 2 | 130.0, 130.85' - Fractures (2), horizontal, smooth, planar | | | R22: Run time not recorded<br>SC-4 collected at 130.1-131.0' |
| | 131.0 | | | | | | |
| | R23-HQ 5 ft 94% | 47 | 3 | 131.2, 131.5, 131.6' - Fracture zone (3), horizontal, rough, undulating | | 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 laminae with bedding planes from 132.6-133.3'; thicker brown laminae (1/16"-1") from 134.7-135.1' | |
| | | | 3 | 132.5' - Fracture, 5 deg, smooth, undulating | | | |
| | | | 2 | 132.9, 132.95, 133.1, 133.9, 134.5, 134.7, 134.8' - Fractures (7), horizontal, smooth, planar | | | |
| | | | 3 | | | | |
| 135 -93.3 | | | 2 | 135.2, 135.35' - Fractures (2), horizontal, smooth, undulating | | | R23: 3 minutes |
| | 136.0 | | NR | | | **No Recovery 135.7-136.0'** | |
| | R24-HQ 5 ft 92% | 47 | 4 | 136.1' - Fracture, 80 deg, rough, planar<br>136.25-136.4' - Fracture zone, irregular subrounded fragments up to 2-1/2", bounded by horizontal, smooth planar fractures | | **Limestone** 136.0-139.6' - yellowish gray to very pale orange, (5Y 8/1 to 10YR 8/2), fine to medium grained, strong HCl reaction, very weak (R1), brown laminations from 137.3-137.8' | |
| | | | 2 | 136.95' - Fracture, 80 deg, smooth, planar, tight | | | |
| | | | 2 | 137.1' - Fracture, horizontal, smooth, undulating, tight<br>137.9' - Fracture, horizontal, smooth, planar, tight | | | |
| | | | 5 | 138.25, 138.8' - Fractures (2), horizontal, smooth, planar | | | |
| 140 -98.3 | | | 2 | 139.1' - Fracture, horizontal, rough, planar, open to tight | | | Cavities at 139.55', 139.5', 139.9', 140.0', 140.1', 140.2', 140.5', 140.6' (up to 1") |
| | 141.0 | | NR | | | | |

| PROJECT NUMBER: | 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

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

WATER LEVELS : 7.0 ft bgs on 6/5/07 START : 6/5/2007 END : 6/6/2007 LOGGER : B. Ellis, D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R25-HQ 5 ft 78% | 48 | 1 | 139.3' - Fracture, horizontal, rough to smooth, planar to undulating, open<br>139.45' - Fracture, 50 deg, rough, undulating | | 139.6-140.6' - yellowish gray to grayish orange, (5Y 8/1 to 10YR 7/4), fine grained, strong HCl reaction, strong (R4), voids (1/16") over 3% of rock surface, numerous deep cavities (1/2"-3/4") fully penetrating core | R24: 4 minutes<br>Cavities at 141.0', 141.35', 141.4', 141.75', 142.1', 142.7', 143.1' |
| | | | >10 | 139.7' - Fracture, 40 deg, rough, undulating<br>139.9' - Fracture, vertical, rough, planar<br>140.1' - Fracture, 70 deg, rough, undulating | | | |
| | | | >10 | 140.25' - Fracture, 50 deg, rough, undulating<br>141.6' - Fracture, 30 deg, rough, undulating to stepped, tight | | **No Recovery 140.6-141.0'**<br>**Limestone**<br>141.0-144.9' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine grained, strong HCl reaction, strong (R4), voids (1/16") over 5-10% of rock surface, many elongate cavities (1/4"x1/2") with some infilling from 141.0-143.4; voids (1/16") over 0-5% of rock surface, few to no cavities from 143.4-144.9' | SC-5 collected at 143.8-144.8' |
| 145<br>-103.3 | | | 0 | 142.3-142.5, 142.8-142.9, 143.2-143.3' - Fracture zone (3), subangular fragments (up to 1 1/2"), bounded by 10 deg, rough, planar fractures | | | |
| | 146.0 | | NR | 143.5' - Fracture, horizontal, smooth, undulating | | | R25: Run time not recorded |
| | R26-HQ 5 ft 98% | 75 | 1 | 143.9' - Fracture, horizontal, rough, undulating<br>146.3' - Fracture, 45 deg, smooth, planar | | | |
| | | | 0 | | | **No Recovery 144.9-146.0'**<br>**Limestone**<br>146.0-149.2' - dark yellowish orange, (10YR 6/6), fine to medium grained, strong HCl reaction, weak (R2), voids (1/16") over 30% of rock surface, some fine laminations | |
| | | | 1 | 148.35, 149.15, 149.2' - Fractures (3), horizontal, smooth, planar | | | |
| | | | 4 | 149.4' - Fracture, 80 deg, smooth, undulating<br>149.6' - Fracture, horizontal, smooth, planar | | 149.2-150.9' - moderate olive brown, (5Y 4/4), fine to very fine grained, moderate HCl reaction, strong to very strong (R4 to R5), voids (1/16") over 3% of rock surface, rare cavities (up to 1/4"), trace organic inclusions | |
| 150<br>-108.3 | | | 4 | 150.0' - Fracture, 80 deg, rough, undulating<br>150.3' - Fracture, vertical, rough, undulating | | | R26: 4 minutes |
| | 151.0 | | NR | 150.55' - Fracture, horizontal, rough, undulating | | **No Recovery 150.9-151.0'**<br>Bottom of Boring at 151.0 ft bgs on 6/6/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

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 : 4.0 ft bgs on 5/15/07 START : 5/15/2007 END : 5/17/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.3 | 0.0 | 1.0 | SS-1 | 1-1-1 (2) | **Silty Sand (SM)** 0.0-1.0' - moderate yellowish brown, (10YR 5/4), moist, very loose, very fine to fine grained, 15% fines, 15% nonplastic fines, organics and rootlets, decreasing with depth | | Sand is silica |
| | 1.5 | | | | | | |
| 5 | 5.0 | | | | | | Water level approximately 4.0' below ground surface |
| 37.3 | | 1.1 | SS-2 | 3-4-5 (9) | **Clayey Sand (SC)** 5.0-6.1' - greenish gray, (5GY 6/1), wet, loose, very fine to fine grained, medium to high plasticity, trace very fine grain black particles, trace rootlets, 35-40% plastic fines | | |
| | 6.5 | | | | | | |
| 10 | 10.0 | | | | | | |
| 32.3 | | 1.0 | SS-3 | 23-9-7 (16) | **Silt And Limestone Fragments (ML)** 10.0-11.0' - moderate yellow, (5Y 7/6), wet, stiff, nonplastic, very rapid dilatancy, moderate HCl reaction, interbedded with 1/8" thick limestone lenses and 1" limestone fragments | | Driller's Remark: Complete circulation loss at 10.5' below ground surface |
| | 11.5 | | | | | | |
| 15 | 15.0 | | | | | | |
| 27.3 | 15.2 | 0.2 | SS-4 | 50/2.5 (50/2.5") | **Silt And Limestone Fragments (ML)** 15.0-15.2' - Same as 10.0-11.0' | | |
| | | | | | | | Driller's Remark: Will install 4" HW casing to 19.0' below ground surface |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-15 SHEET 2 OF 9 |

# SOIL BORING 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

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 : 4.0 ft bgs on 5/15/07 START : 5/15/2007 END : 5/17/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.3 | 20.0–21.3 | 1.0 | SS-5 | 10-32-50/4 (82/10") | **Silty Sand And Limestone Fragments (SM)** 20.0-21.0' - moderate yellow, (5Y 7/6), wet, very dense, fine to coarse grained, nonplastic, moderate HCl reaction, 15-20% nonplastic fines, 20% fine to coarse gravel-sized limestone, all carbonate, trace very fine sand-sized white particles, trace brilliant green particles | | |
| 25 / 17.3 | 25.0–25.9 | 0.8 | SS-6 | 25-50/4.5 (75/10.5") | **Silty Sand And Limestone Fragments (SM)** 25.0-25.8' - Same as 20.0-21.0' except moderate HCl reaction, 50% silt and 50% limestone | | |
| 30 / 12.3 | 30.0–30.3 | 0.2 | SS-7 | 50/3.5 (50/3.5") | **Limestone Fragments** 30.0-30.2' - medium to coarse sand-sized and fine gravel-sized, poor recovery | | |
| 35 / 7.3 | 35.0–35.2 | 0.0 | SS-8 | 50/2 (50/2") | **No Recovery 35.0-35.2'** | | Driller's Remark: Will install 4" HW casing down to 35.0' below ground surface |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-15 SHEET 3 OF 9 |

# SOIL BORING 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

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 : 4.0 ft bgs on 5/15/07 START : 5/15/2007 END : 5/17/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.3 | 40.0<br>40.9 | 0.8 | SS-9 | 44-50/5<br>(94/11") | **Silt With Sand (ML)**<br>40.0-40.8' - light olive brown, (5Y 5/6), wet, hard, fine to coarse grained, 20-30% sand, nonplastic, rapid dilatancy, mild HCl reaction, 5-10% organics, all carbonate | | |
| 45<br>-2.7 | 45.0<br>45.3 | 0.1 | SS-10 | 50/3.5<br>(50/3.5") | **Limestone Fragments**<br>45.0-45.1' - moderate olive brown, (5Y 4/4), mild to moderate HCl reaction, 10% fine grain, black particles in rock matrix, poor recovery, highly fossiliferous | | |
| 50<br>-7.7 | 50.0<br>50.2 | 0.0 | SS-11 | 50/2<br>(50/2") | **No Recovery 50.0-50.2'** | | |
| 55<br>-12.7 | 55.0<br>55.3 | 0.1 | SS-12 | 50/4<br>(50/4") | **Limestone Fragments**<br>55.0-55.1' - medium olive brown, (5Y 4/4), medium grained, mild to moderate HCl reaction, trace medium grain-sized black particles, moderately fossiliferous (casts, molds up to 5/8") | | |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-15 SHEET 4 OF 9 |

# SOIL BORING 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

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 : 4.0 ft bgs on 5/15/07 START : 5/15/2007 END : 5/17/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -17.7 | 60.0<br>60.8 | 0.7 | SS-13 | 45-50/3.5<br>(95/9.5") | **Silty Sand And Limestone Fragments (SM)**<br>60.0-60.7' - moderate olive brown, (5Y 4/4), wet, very dense, fine to coarse grained, 20-25% fines, low plasticity, mild to moderate HCl reaction, 40% fine gravel-sized limestone, poorly fossiliferous<br>Begin Rock Coring at 61.0 ft bgs<br>See the next sheet for the rock core log | | Driller's Remark: Will install 4" HW casing down to 61.0' below ground surface |
| 65<br>-22.7 | | | | | | | |
| 70<br>-27.7 | | | | | | | |
| 75<br>-32.7 | | | | | | | |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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

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

WATER LEVELS : 4.0 ft bgs on 5/15/07 START : 5/15/2007 END : 5/17/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 61.0 | | | | | | |
| | R1-NQ 5 ft 54% | 35 | 3 | 61.35' - Mechanical break | | **Limestone** 61.0-63.7' - moderate olive brown to light olive gray, (5Y 4/4 to 5Y 5/2), moderate to strong HCl reaction, medium strong (R3), 15% voids <1/16", infilled cavities with dark gray material (N3) | |
| | | | 2 | 61.75, 61.9, 61.95' - Bedding plane (3), horizontal, rough, undulating, <1/16" gap, possible mechanical break | | | |
| | | | 2 | 63.0, 63.4' - Bedding plane (2), 5 deg and 10 deg, rough, undulating, open up to 3/16", fracture is through infilled cavity, possible mechanical break | | **No Recovery 63.7-66.0'** | |
| 65 -22.7 | | | NR | | | | R1: 16 minutes |
| | 66.0 | | | | | | |
| | R2-NQ 5 ft 74% | 53 | 2 | 66.1' - Bedding plane, horizontal, rough, undulating, open 1/16" | | **Limestone** 66.0-69.7' - Same as 61.0-63.7' except olive gray, (5Y 3/2), trace fossil casts, weak rock interval from 69.0-69.7' | |
| | | | 2 | 66.55, 68.75, 69.0' - Bedding plane (3), horizontal, rough, undulating, tight, possible mechanical break | | | |
| | | | 2 | 67.15, 67.9' - Bedding plane (2), 5 deg and 10 deg, rough, undulating, tight, possible mechanical break | | | SC-1 collected at 67.9-68.75' |
| | | | 3 | 68.75, 69.0' - Bedding plane (2), horizontal, rough, undulating, tight | | | |
| 70 -27.7 | | | NR | 69.25' - Fracture, 10 deg and 15 deg, rough, undulating, tight; 69.55, 69.65' - Fracture (2), horizontal and 5 deg, tight, fractures are in weak rock interval | | **No Recovery 69.7-71.0'** | Driller's Remark: Last 14" of run was very soft R2: 16 minutes |
| | 71.0 | | | | | | |
| | | | NR | | | **No Recovery 71.0-72.9'** | Assumed core loss from top 71.0-72.9' |
| | R3-NQ 5 ft 62% | 38 | >10 | 72.9-73.35' - Fracture zone, subangular and rounded fragments up to 1-3/8" in size; 73.35-74.1' - Joint, vertical | | **Limestone** 72.9-76.0' - moderate olive brown grading at 74.7' to light olive brown, (5Y 4/4 grading to 5Y 5/6), strong HCl reaction, medium strong to weak (R3 to R2), 15% voids <1/16" on surface in creasing to 30% from 74.7' with depth, poorly fossiliferous (casts), trace unfilled cavities to 3/8"x3/16" elongated, bioturbated areas 3% irregularly shaped cavities >1", trace dark gray infill fines | |
| | | | 1 | 74.1' - Fracture, horizontal, rough, undulating, open 1/16", broken across infilled void, black stain | | | |
| 75 -32.7 | | | 3 | 75.3, 75.5, 75.7' - Fractures (3), 10 deg and 15 deg, rough, undulating, tight, possible mechanical break | | | R3: 17 minutes |
| | 76.0 | | | | | | |
| | R4-NQ 5 ft 100% | 84 | 2 | 76.1' - Bedding plane, horizontal, smooth, stepped, tight, possible mechanical break | | 76.0-81.0' - yellowish gray to light olive brown, (5Y 8/1 to 5Y 5/6), fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), 30-35% voids <1/16", poorly fossiliferous (casts), 3-5% dark gray fine to medium grained particles | |
| | | | 0 | 76.9' - Fracture, 5 deg and 10 deg, rough, undulating, open 1/16" | | | SC-2 collected at 76.9-78.05' |
| | | | 3 | 78.05' - Fractures, 15 deg and 20 deg, rough, undulating, tight, possible mechanical break | | | |
| | | | 2 | 78.45' - Fracture, horizontal, rough, undulating, tight to 1/2" open; 78.7' - Fracture, horizontal, rough, undulating, up to 3/4" open | | | |
| 80 -37.7 | | | 1 | 79.4, 79.5' - Bedding plane (2), horizontal, rough, undulating, open 1/8", possible mechanical break | | | R4: 11 minutes |
| | 81.0 | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: B-15 | SHEET 6 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

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

WATER LEVELS : 4.0 ft bgs on 5/15/07 START : 5/15/2007 END : 5/17/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R5-NQ 5 ft 100% | 88 | 0 | 80.2' - Fracture, horizontal, rough, undulating, tight, possible mechanical break | | **Limestone** 81.0-86.0' - light olive brown, (5Y 6/6), strong HCl reaction, weak (R2), 10-15% mottled yellowish gray (5Y 8/1) with olive gray (5Y 5/2), moderately fossiliferous (casts/molds), carbonate fines (irregularly shaped fines possible bioturbation), trace organic lenses to 3/8" thick at 82.15' and 82.5', fossils to 9/16" predominately horizontally oriented and rice shaped with corrugated patterns | |
| | | | 3 | 82.15, 82.5' - Bedding plane (2), horizontal, rough, undulating, open 7/16", dry, fine laminations | | | |
| | | | 0 | 82.8' - Bedding plane, horizontal, rough, undulating, tight, possible mechanical break | | | |
| | | | 2 | 84.35' - Bedding plane, horizontal, rough, undulating, tight, in very weak rock, possible mechanical break | | | |
| 85 -42.7 | | | 0 | 84.6' - Bedding plane, horizontal, fracture in bioturbated zone, possible mechanical break | | | R5: 13 minutes |
| | 86.0 | | | | | | |
| | R6-NQ 5 ft 94% | 54 | 6 | 86.05, 86.2, 86.35, 86.45, 86.5, 86.7' - Bedding plane (6), 0 deg to 5 deg, rough, undulating, 1/16" gap, possible mechanical break | | 86.0-86.35' - Same as 81.0-86.0' 86.35-90.7' - white to yellowish gray with medium dark gray and moderate yellow, (5Y 8/1 with N4 and 5Y 7/6), very fine grained, strong HCl reaction, strong (R4), very fossiliferous (casts, microforams), trace spherical voids <1/16", bioturbated mottling 30-35% of surface with 15-20% voids <1/16" | |
| | | | 0 | | | | |
| | | | 2 | 88.1, 88.5' - Fracture (2), horizontal, rough, undulating, tight, possible mechanical break | | | |
| | | | 3 | 89.1' - Bedding plane, horizontal 89.4' - Bedding plane, horizontal, possible mechanical break | | | |
| 90 -47.7 | | | 2 | 89.55' - Fracture, vertical, rough, undulating, gray staining, tight, with bisecting mechanical breaks | | | R6: 21 minutes |
| | 91.0 | | NR | | | **No Recovery 90.7-91.0'** | |
| | R7-NQ 5 ft 98% | 60 | 4 | 90.0' - Fracture, horizontal, rough, undulating, 1/8" open 90.4' - Fracture, horizontal, rough, undulating, tight | | **Limestone** 91.0-95.9' - yellowish gray with dark gray and white, (5Y 7/2 with N3 and N9), strong HCl reaction, weak (R2), very fossiliferous (casts, molds, shells) fossils to 7/8", 94.0-95.9' apparent bedding and horizontal fossil alignment | |
| | | | 3 | 91.4, 91.5, 91.7, 91.95, 92.15, 92.4' - Fractures (6), horizontal, rough, undulating, tight, possible mechanical break | | | |
| | | | 3 | 92.95, 93.25, 93.5' - Fractures (3), 5 deg to 10 deg, rough, undulating, tight, possible mechanical break | | | |
| | | | 2 | 93.75' - Fracture, 30 deg, rough, undulating, tight | | | |
| 95 -52.7 | | | 2 | 94.4, 94.6, 95.2, 95.6' - Fractures (4), 0 deg to 5 deg, rough, undulating, tight, possible mechanical break | | | R7: 10 minutes |
| | 96.0 | | | | | **No Recovery 95.9-96.0'** | |
| | R8-NQ 5 ft 100% | 95 | 1 | 96.6' - Fracture, 45 deg, rough, undulating, tight | | **Limestone** 96.0-101.0' - Same as 91.0-95.9' except medium-sized white (N9) and dark gray (N3) grains | SC-3 collected at 98.65-99.6' |
| | | | 1 | | | | |
| | | | 2 | 97.95' - Fracture, horizontal, rough, undulating, open 3/4" 98.2' - Fracture, 55 deg, rough, undulating, tight | | | |
| | | | 1 | 98.5' - Mechanical break | | | |
| 100 -57.7 | | | | 98.65' - Bedding plane, horizontal, rough, undulating, tight, possible mechanical break | | | R8: 9 minutes |
| | 101.0 | | 1 | 99.6' - Bedding plane, horizontal, rough, undulating, tight, possible mechanical break | | | |

| PROJECT NUMBER: | BORING 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 ORIENTATION : Vertical

WATER LEVELS : 4.0 ft bgs on 5/15/07 START : 5/15/2007 END : 5/17/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R9-NQ 5 ft 100% | 84 | 2 | 100.5' - Bedding plane, horizontal, rough, undulating, tight, possible mechanical break<br>101.1' - Bedding plane, horizontal, rough, undulating, tight, possible mechanical break | | **Limestone**<br>101.0-106.0' - yellowish gray with medium gray, (5Y 7/2 with N9), fine to medium grained, strong HCl reaction, very weak to weak (R1 to R2), very fossiliferous (microforams, casts, molds >1/8") decreasing abundance with depth, white rounded elongated grains 25-35% increasing with depth, 5-10% medium gray grains, voids <1/16" 30-40% of surface from 101.0-103.2' | |
| | | | 3 | 101.9' - Fracture, 25 deg to 30 deg, rough, undulating, tight | | | |
| | | | 2 | 102.2, 102.8' - Fracture (2), horizontal, rough, undulating, tight, possible mechanical break<br>102.4' - Fracture, 70 deg to 80 deg, rough, undulating, 3-7% black stain, tight | | | |
| | | | 1 | 103.2, 103.5' - Fracture (2), 10 deg to 15 deg, rough, undulating, tight | | | |
| 105<br>-62.7 | | | 1 | 104.1' - Fracture, 30 deg, rough, undulating, tight, possible mechanical break | | | R9: 9 minutes |
| | 106.0 | | | 105.0' - Fracture, horizontal, rough, undulating, tight, possible mechanical break | | | |
| | R10-NQ 5 ft 100% | 65 | 3 | 106.15, 106.4, 106.9' - Bedding plane or mechanical break (3), horizontal, rough, planar, <1/16" gap | | 106.0-111.0' - yellowish gray with medium gray, (5Y 7/2 with N5), fine to medium grained, strong HCl reaction, very weak to weak (R1 to R2), very fossiliferous (predominantly microforams and molds), 3-5% medium gray grains, voids <1/16" 10-15% of surface, 1/4" bedded accumulation of fossils at 109.1' | |
| | | | 4 | 107.0, 107.15' - Bedding plane or mechanical break (2), horizontal, rough, undulating, 10-15% black staining | | | |
| | | | 3 | 107.2' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | | |
| | | | 1 | 107.8, 108.1, 108.4' - Mechanical break or bedding plane (3), 0 deg to 5 deg, smooth, planar, tight | | | |
| 110<br>-67.7 | | | 2 | 109.1' - Bedding plane, horizontal, bedded fossil casts and molds | | | R10: 8 minutes |
| | 111.0 | | | 110.5' - Bedding plane, horizontal, rough, undulating, tight, hard mineral surface | | | |
| | R11-NQ 5 ft 70% | 28 | 2 | 110.8' - Fracture, 55 deg to 60 deg, rough, undulating, tight | | 111.0-114.5' - yellowish gray, (5Y 7/2), medium grained, strong HCl reaction, very weak (R1), very fossiliferous (microforams, shells, molds) fossils >75% of rock to 1/16" trace to 1" | |
| | | | 5 | 111.2' - Fracture or mechanical break, horizontal, rough, undulating, tight<br>111.7, 112.0' - Bedding plane (2), 5 deg to 10 deg, rough, undulating, tight | | | |
| | | | 4 | 112.2, 112.3' - Bedding plane or mechanical break (2), 7 deg to 10 deg, rough, undulating, 1/8" open | | | |
| | | | 2 | 112.5' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | | |
| 115<br>-72.7 | | | NR | 112.85, 113.0, 113.2' - Bedding plane or mechanical break (3), 5 deg to 10 deg, rough, undulating, fossil casts/molds on fracture surface | | **No Recovery 114.5-116.0'** | R11: 9 minutes |
| | 116.0 | | | | | | |
| | R12-NQ 5 ft 100% | 46 | 3 | 113.5' - Mechanical break, rough, undulating, tight | | **Limestone**<br>116.0-121.0' - Same as 111.0-114.5' | |
| | | | 2 | 113.95' - Fracture, 70 deg, rough, undulating, tight<br>114.1, 114.2' - Fracture or mechanical break (2), horizontal, rough, undulating, tight | | | |
| | | | >10 | 116.15, 116.75, 116.9, 117.2, 117.3' - Fracture or mechanical break (5), 0 deg to 5 deg, rough, undulating, tight | | | |
| | | | 2 | 118.0' - Fracture or mechanical break, horizontal, tight, in friable rock | | | |
| 120<br>-77.7 | | | 3 | 118.3, 118.6' - Fracture, vertical, rough, undulating, tight<br>118.85-119.1' - Fracture zone | | | R12: 11 minutes |
| | 121.0 | | | | | | |

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|---|---|
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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 ORIENTATION : Vertical

WATER LEVELS : 4.0 ft bgs on 5/15/07 START : 5/15/2007 END : 5/17/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R13-NQ 5 ft 86% | 61 | 2 | 119.35' - Fracture or mechanical break, 5 deg to 10 deg, rough, undulating, tight | | **Limestone** 121.0-125.3' - yellowish gray, (5Y 8/1), strong HCl reaction, very weak (R1), voids <1/16" on 15-20% of surface, very fossiliferous (casts, microforams), trace black laminations possible organics, 5-7% medium dark gray grains (angular-subangular), 121.6-121.7', very strong HCl reaction, finely laminated slightly coarser grained infill with undulating bedding planes to 10 deg, possible trace fine quartz sand | |
| | | | 2 | 119.8' - Bedding plane, horizontal, smooth, undulating, tight | | | |
| | | | 2 | 120.2, 120.35, 120.55' - Mechanical break or bedding plane (3), horizontal, rough, planar, tight | | | |
| | | | 3 | 121.1' - Bedding plane or mechanical break, horizontal, rough, undulating, 1/8" open | | | |
| | | | 3 | 121.6' - discontinuity, nonplanar, undulating, tight, black staining on surface | | | |
| 125 -82.7 | | | 1 | 122.05, 122.7, 123.05, 123.4, 123.9, 124.6, 124.9, 125.2' - Bedding plane or mechanical break (8), horizontal, rough, undulating, tight, fractures through cavities at 125.2' and 123.05' | | | R13: 10 minutes |
| | 126.0 | | NR | | | **No Recovery 125.3-126.0'** | |
| | R14-NQ 5 ft 100% | 41 | 7 | 124.0' - Bedding plane or mechanical break, horizontal, rough, undulating, 3/16" gap | | **Limestone** 126.0-131.0' - yellow gray with medium dark gray and pale yellowish orange, (5Y 8/1 with N4 and 10YR 8/6), very fine to medium grained, strong HCl reaction, very weak (R1), thin bedding, grain size alternates 127.5-129.0' medium to coarse grained, very fossiliferous | |
| | | | 6 | 126.05-130.85' - Bedding plane (16), rough, planar, <1/16" gap | | | |
| | | | 2 | 127.7, 128.05' - Mechanical break or bedding plane (2), horizontal, rough, undulating, 1/8" gap at 127.7', tight at 128.05' | | | |
| | | | 2 | 128.2, 129.3' - Bedding plane or mechanical break (2), 5 deg to 10 deg, rough, undulating, tight | | | |
| 130 -87.7 | | | 5 | 129.55' - Bedding plane, horizontal, rough, undulating, tight | | | R14: Run time not recorded |
| | 131.0 | | | | | | |
| | R15-NQ 5 ft 96% | 88 | 0 | | | 131.0-135.8' - yellowish gray with light olive gray, olive gray and medium dark gray, (5Y 8/1 with 5Y 4/1, 5Y 6/1 and N4), fine to medium grained, strong HCl reaction, laminated bedding, very fossiliferous (microforams, shells, casts/molds), fossils to 5/8"x3/16", voids <1/16" 15-20% of surface, 3-5% cavities to 3/4"x1/2" from 134.5-135.3' infilled, mineralization subhorizontally aligned, 1" scour and fill structure at 134.4' | |
| | | | 3 | 132.0' - Bedding plane, 20 deg, rough, undulating, tight | | | SC-4 collected at 131.0-132.0' |
| | | | 0 | 132.45' - Fracture or mechanical break, horizontal, rough, undulating 132.95' - Bedding plane or mechanical break, 10 deg to 15 deg, rough, undulating, tight | | | |
| | | | 2 | 134.35' - Bedding plane, 5 deg, rough, undulating, 1/32" silt and/or clay sized infilling, open 1/16" | | | |
| 135 -92.7 | | | 1 | 134.4' - Fracture, undulating, tight | | | R15: 12 minutes |
| | 136.0 | | NR | 134.9' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | **No Recovery 135.8-136.0'** | |
| | R16-NQ 5 ft 96% | 62 | 3 | 135.45' - Bedding plane or mechanical break, horizontal, rough, undulating, tight, 3/4" hard medium gray infilled cavity on surface | | **Limestone** 136.0-136.5' - yellowish gray, (5Y 4/4), medium grained, strong HCl reaction, very weak (R1), thin bedding, 136.0-136.25' rounded clast to 1/4" with thin halo on edges, clasts strong rock (R4), strongly suggests possible fluvial deposition | |
| | | | 3 | 136.25, 136.4' - Bedding plane or mechanical break, horizontal, rough, planar, 1/16" open | | | |
| | | | 2 | 136.5' - Bedding plane or mechanical break, horizontal, rough, undulating, 1" open, through cavity/ bioturbated pockets | | | |
| | | | 3 | 137.2' - Bedding plane or mechanical break, horizontal, rough, undulating, tight, fracture in bioturbated cavity | | | |
| 140 -97.7 | | | 1 | 137.65' - Bedding plane or mechanical break, 20 deg, rough, undulating, tight | | | R16: 18 minutes |
| | 141.0 | | | | | | |

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|---|---|
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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 ORIENTATION : Vertical

WATER LEVELS : 4.0 ft bgs on 5/15/07 START : 5/15/2007 END : 5/17/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R17-NQ 5 ft 94% | 70 | 1 | 137.8' - Bedding plane or mechanical break, horizontal, rough, undulating, tight, fracture through bioturbated cavity | | **Limestone** 136.5-138.5' - light olive gray, (5Y 5/2), very fine grained, strong HCl 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 infill, poorly fossiliferous (casts, molds) | SC-5 collected at 141.0-141.8' |
| | | | 3 | 138.1' - Bedding plane or mechanical break, horizontal, rough, undulating, tight to 1" open<br>138.7' - Fracture zone, 2" wide with 1/2" to 1-1/2" fragments | | | |
| | | | 0 | 139.1' - Fracture or mechanical break, horizontal, rough, undulating, tight organics on 50% of surface | | | |
| | | | 2 | 139.7' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | 138.5-140.3' - light olive gray, (5Y 5/2), very fine grained, strong HCl 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" | |
| 145<br>-102.7 | | | 3 | 139.8' - Bedding plane or mechanical break, 20 deg, rough, undulating | | | R17: 11 minutes |
| | 146.0 | | NR | 140.3' - Bedding plane, rough, stepped, tight to 1/16" open, parting along wavy lamination | | | |
| | R18-NQ 5 ft 96% | 54 | 1 | 141.8-145.55' - Bedding plane or mechanical break (6), horizontal, rough, planar, tight | | | 13:12 water level in HW casing 6.7' below ground surface |
| | | | 0 | 142.0' - Fracture, 70 deg to 80 deg, rough, undulating, tight<br>142.25' - Bedding plane or mechanical break, horizontal, rough, undulating, 1/2"-1-3/8" open | | 140.3-140.8' - light olive gray, (5Y 5/2), very fine grained, strong HCl reaction, medium strong to strong (R3 to R4), black (<1/32" thick) microlaminations dipping 20-25 deg, trace voids <1/32" | End configuration 4" HW to 56.0' below ground surface<br>NQ from 61.0-151.0' below ground surface<br>Soil/split spoon from 0.0-60.0' |
| | | | 2 | 144.8' - Fracture, 60 deg, rough, undulating, tight | | **No Recovery 140.8-141.0'** | |
| | | | 8 | 146.1' - Bedding plane or mechanical break, horizontal, rough, undulating, <1/16" open | | **Limestone** | Abandonment:<br>16 bags of type I/II Portland cement<br>Mixed with 37 gallons of water |
| 150<br>-107.7 | | | | 146.5-147.4' - Fracture, healed | | 141.0-142.2' - Same as 140.3-140.8' | |
| | | | 2 | 148.3' - Bedding plane, horizontal, smooth, stepped, tight | | 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 HCl reaction, weak (R2), moderately fossiliferous (casts, shells), fossils horizontally aligned, grayish orange grains have a frosted to translucent luster | Plus 3 dry bags of Portland<br>R18: 16 minutes |
| | 151.0 | | NR | 148.65' - Bedding plane or mechanical break, horizontal, rough, undulating, 1/16" open<br>149.0, 149.15' - Bedding plane or mechanical break (2), horizontal, rough, undulating, 1/16" open<br>149.2-149.8' - Bedding plane (6), horizontal, rough, undulating, 1/16" open<br>150.1' - Fracture or mechanical break, 5 deg to 10 deg, rough, planar, tight<br>150.6' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | **No Recovery 145.7-146.0'**<br>**Limestone**<br>146.0-151.0' - light olive gray to moderate olive brown, (5Y 5/2 to 5Y 4/4), very fine to fine grained, strong HCl 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'<br>**No Recovery 150.8-151.0'**<br>Bottom of Boring at 151.0 ft bgs on 5/17/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

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 bgs on 6/14/07 START : 4/23/2007 END : 4/25/2007 LOGGER : A. Erickson

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.6 | 0.0 – 1.5 | 1.0 | SS-1 | 0-2-3 (5) | **Topsoil** 0.0-0.2' - wood chips<br>**Poorly Graded Sand (SP)** 0.2-1.0' - medium light gray, (N6), moist, loose, fine grained, nonplastic, no HCl reaction, trace fine organics, and rootlets, sand is silica | | "Water level is based on Ground Water Monitoring at LNP site (FSAR Table 2.4.12.08)" |
| 5 | 5.0 – 6.5 | 1.2 | SS-2 | 3-5-4 (9) | **Poorly Graded Sand (SP)** 5.0-6.2' - pale yellowish gray, (5Y 8/1), some mottling, moist to wet, loose, fine grained, nonplastic, no HCl reaction, trace organics and black mineral, trace pyrite nodules, sand is silica | | |
| 37.6 | | | | | | | |
| 10 | 10.0 – 11.5 | 1.3 | SS-3 | 0-1-2 (3) | **Silty Sand (SM)** 10.0-10.2' - light olive gray, (5Y 6/1), wet, very loose, fine grained, low plasticity, no HCl reaction, sand is silica<br>**Silty Sand With Gravel (SM)** 10.2-11.3' - yellowish gray, (5Y 8/1), wet, very loose, fine to coarse grained, strong HCl reaction, 15% sand-sized carbonate material, 15% gravel-sized carbonate material, fossil fragments | | 10.0-10.2' slough<br>Driller's Remark: Hard material at 11.5' below ground surface |
| 32.6 | | | | | | | |
| 15 | 15.0 – 16.5 | 0.8 | SS-4 | 11-15-11 (26) | **Limestone Fragments** 15.0-15.1' - mottled yellowish gray and dark yellowish orange, (5Y 7/2 and 10YR 6/6), dense, coarse grained, coarse gravel-sized limestone, strong HCl reaction<br>**Silt With Sand (ML)** 15.1-15.8' - grayish orange, (10YR 7/4), moist to wet, very stiff, nonplastic, very rapid dilatancy, mild to moderate HCl reaction, 15-20% very fine sand, carbonate materials | | |
| 27.6 | | | | | | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

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 bgs on 6/14/07 START : 4/23/2007 END : 4/25/2007 LOGGER : A. Erickson

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.6 | 20.0 – 21.5 | 1.2 | SS-5 | 13-17-20 (37) | **Silt With Sand (ML)** 20.0-21.2' - Same as 15.1-15.8' except 25% very fine sand, fine gravel-sized limestone at top of sample | | |
| 25 | 25.0 | | | | | | |
| 17.6 | 25.0 – 25.9 | 0.9 | SS-6 | 26-50/5 (76/11") | **Sandy Silt (ML)** 25.0-25.9' - grayish orange, (10YR 7/4), moist to wet, hard, fine to coarse grained, 30% fine to coarse sand-sized carbonate material, fine to coarse gravel-sized limestone from 25.0'-25.4' | | Gray silica sand and white carbonate fragments in sample, assume slough from upper material |
| 30 | 30.0 | | | | | | |
| 12.6 | 30.0 – 31.5 | 0.9 | SS-7 | 3-36-13 (49) | **Silt With Sand (ML)** 30.0-30.9' - grayish orange, (10YR 7/4), moist to wet, hard, fine to coarse grained, mild to moderate HCl reaction, 25% fine sand-sized, trace medium to coarse sand-sized, trace fine gravel-sized, all carbonate materials | | |
| 35 | 35.0 | | | | | | |
| 7.6 | 35.0 – 36.5 | 1.3 | SS-8 | 8-12-19 (31) | **Silty Sand (SM)** 35.0-36.3' - grayish orange, (10YR 7/4), moist to wet, dense, fine to coarse grained, 46% fines, all carbonate | | |
| 40 | | | | | | | |

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| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.6 | 40.0<br>41.0 | 0.7 | SS-9 | 43-50/6<br>(93/12") | **Silty Sand (SM)**<br>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 | | Driller's Remark: Hard material at 43.5' below ground surface |
| 45<br>-2.4 | 45.0<br>45.0 | 0.0 | SS-10 | 50/0.5<br>(50/0.5") | **No Recovery 45.0-45.04'** | | |
| | | | | | Begin Rock Coring at 46.0 ft bgs<br>See the next sheet for the rock core log | | |
| 50<br>-7.4 | | | | | | | |
| 55<br>-12.4 | | | | | | | |
| 60 | | | | | | | |

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# ROCK CORE LOG

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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 ORIENTATION : Vertical

WATER LEVELS : 1.6 ft bgs on 6/14/07 START : 4/23/2007 END : 4/25/2007 LOGGER : A. Erickson

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 46.0 | | | | | **Limestone** | |
| | | | 2 | 46.2' - 70 deg, smooth, undulating, up to 0.4" gap | | 46.0-48.5' - yellowish gray, (5Y 7/2), fine grained, moderate to strong HCl reaction, very weak to weak (R1 to R2), 25% surface void (1/16"), many cavities up to 9/16"x3/16", moderately fossiliferous with fossil molds | |
| | | | 0 | 46.65' - Bedding plane, horizontal, undulating, bedding plane fracture, smooth to rough, tight up to 0.1" gap | | | SC-1 collected at 47.5-48.4' |
| | R1-NQ 5 ft 100% | 95 | 1 | 48.5' - 20 deg, rough, undulating | | 48.5-51.0' - Same as 46.0'-48.5' except 40% surface voids (1/16"), very many cavities up to 3/4" diameter, highly fossiliferous with fossil molds, mostly oblong up to 9/16"x1/8" | |
| | | | 0 | | | | |
| 50 -7.4 | | | 0 | | | | R1: 8 minutes |
| | 51.0 | | | | | | |
| | | | 4 | | | 51.0-53.55' - yellowish gray, (5Y 7/2), fine to medium grained, strong HCl reaction, extremely weak (R0), very weakly cemented | |
| | | | 3 | 50.22, 54.05' - Mechanical break (10), 0 - 20 deg, rough, undulating, infilling, bedding plane fracture probably mechanical break, all have infill due to soft nature of rock fracture surfaces eroding, up to 0.04" gap due to rock surface eroding off/breaking | | | |
| | R2-NQ 5 ft 64% | 0 | 3 | | | 53.55-53.7' - Same as 51.0'-53.55' except 0-5% surface void up to 1/16", few cavities up to 9/16" diameter, poorly fossiliferous, trace black fine to medium grained material | |
| | | | >10 | | | | |
| 55 -12.4 | | | NR | | | 53.7-54.2' - Same as 51.0'-53.55' **No Recovery 54.2-56.0'** | R2: 3 minutes |
| | 56.0 | | | | | **Limestone** | |
| | | | 3 | 56.15, 56.7, 56.9, 57.0, 57.25, 57.5, 58.05, 58.15, 58.2, 58.3, 59.5, 59.8' - Mechanical break (12), 10 deg, smooth, undulating, infilling, bedding plane fracture or mechanical breaks, smooth to rough, planer to undulating, tight to 3/4" thick gap, infill from eroding fracture surface due to soft quality of rock | | 56.0-60.4' - yellowish gray, (5Y 7/8), strong HCl reaction, extremely weak (R0), up to 1/2" thick bands of recrystallization from 59.1-59.3' and 60.1-60.4' were very weak rock, weakly cemented, voids (<1/16") on surface, 0% from 56.0-58.6', 5-25% voids from 50.8-60.4', cavities (molds) up to 3/16"x3/8", black lineations up to 1/8" from 60.0-60.4', fine grained, trace medium grained | |
| | | | 3 | | | | |
| | R3-NQ 5 ft 88% | 30 | >10 | 58.1, 58.5' - very weakly cemented rock | | | |
| | | | >10 | | | | |
| 60 -17.4 | | | >10 | 59.9, 60.1' - Fractures, rock fragments zone, black staining at 60.1' fracture surface | | | R3: 5 minutes |
| | 61.0 | | NR | | | **No Recovery 60.4-61.0'** | |
| | | | >10 | 61.0-61.6' - Fracture zone | | **Limestone** | |
| | | | >10 | 61.7' - Bedding plane or mechanical break, horizontal, rough, undulating, undulating to stepped up to 1" gap | | 61.0-62.4' - yellowish gray, (5Y 7/2), fine to medium grained, strong HCl reaction, extremely weak (R0), small voids (1/16") cover 25% of core surface, many cavities up to 3/8" diameter and 9/16"x3/8", some cavities are fossil molds, black material up to 3/8" and black lineation up to 3/16" from 61.0-61.65' | |
| | R4-NQ 5 ft 76% | 8 | >10 | 62.15, 62.25, 62.4' - Bedding plane or mechanical break (3), horizontal, rough, undulating, up to 3/4" gaps on some fractures | | | |
| | | | >10 | 62.6' - Fracture or mechanical break, 80 deg, rough, undulating, half of fracture/one side of fracture's rock is missing | | | |
| 65 -22.4 | | | NR | 62.8-63.2' - Fracture zone 64.2, 64.35' - Bedding plane or mechanical break (2), horizontal, rough, undulating, up to 1/2" gap | | 62.4-64.8' - Same as 61.0'-62.4' except very weak (R1) **No Recovery 64.8-66.0'** | R4: 6 minutes |
| | 66.0 | | | | | | |

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# ROCK CORE LOG

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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 ORIENTATION : Vertical

WATER LEVELS : 1.6 ft bgs on 6/14/07 START : 4/23/2007 END : 4/25/2007 LOGGER : A. Erickson

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R5-NQ 5 ft 96% | 33 | 2 | 64.3' - Fractures, 80 deg, rough, undulating | | **Limestone** 66.0-68.9' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, very weak to weak (R1 to R2) | |
| | | | 2 | 66.8' - Fractures (2), 70 deg, smooth, undulating, tight 1/16" gaps 67.12, 67.4' - Fractures (2), 5 deg, smooth, undulating, 1/2" gap on same surface at 67.4' | | | |
| | | | 3 | 68.15' - Fracture, 5 deg, smooth, stepped, discontinuity fracture between hard and soft rock, large gap | | | |
| | | | 5 | 68.3' - Fracture, 75 deg, rough, undulating, vertical fracture, tight | | 68.9-70.8' - Same as 66.0'-68.9' except dark yellow, (5Y 4/2), extremely weak (R0), 25% voids (<1/16") over core surface from 66.0-67.8' and 70.5-70.6', no surface voids present due to softness of material, few cavities up to 5/16"x1/8", poorly fossiliferous 70.2-70.8' - Same as 66.0'-68.9' | |
| 70 -27.4 | | | 0 | 68.9' - Mechanical break 69.3, 70.8' - Mechanical break, due to rock softness | | | R5: 7 minutes |
| | 71.0 | | NR | | | | |
| | R6-NQ 5 ft 97% | 80 | 3 | 71.55, 71.85' - Fractures (2), horizontal and vertical, smooth, undulating, two horizontal fractures, gaps up to 1/2" | | **No Recovery 70.8-71.0'** **Limestone** 71.0-71.6' - Same as 66.0-68.9' except moderate olive brown, (5Y 4/4), fine grained, strong HCl reaction, extremely weak (R0) | SC-2 collected at 71.2-72.0' |
| | | | 0 | 71.7' - Fracture, vertical, rough, undulating, vertical fracture, gap up to 1/2" | | | |
| | | | 0 | | | 71.6-75.85' - Same as 66.0'-68.9' except very weak to weak (R1 to R2), voids (<1/16") cover 15% of core surface (variable) with depth, many cavities up to 3/16" | |
| | | | 0 | | | | |
| 75 -32.4 | | | 0 | | | | R6: 11 minutes |
| | 76.0 | | NR | | | **No Recovery 75.85-76.0'** | |
| | R7-NQ 5 ft 92% | 34 | 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, due to erosion of soft fracture surfaces | | **Limestone** 76.0-76.6' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, very weak (R1), 15% surface fractures (<1/16"), few cavities up to 2-3/4" | |
| | | | 0 | | | | |
| | | | 0 | | | 76.6-78.6' - Same as 76.0'-76.6' except extremely weak (R0) | |
| | | | 0 | | | 78.6-79.8' - Same as 76.0'-76.6' except weak (R2), 15-25% surface voids (<1/16"), cavities up to 1-3/8" diameter, trace black organics material up to 2" in diameter | |
| 80 -37.4 | | | 0 | 80.15-80.45' - Fracture zone | | 79.8-80.6' - Same as 76.0'-76.6' | R7: 9 minutes |
| | 81.0 | | NR | | | **No Recovery 80.6-81.0'** | |
| | R8-NQ 5 ft 92% | 8 | 0 | 81.2, 81.45, 81.72, 81.8, 82.75, 82.95, 83.4, 83.75, 83.8, 84.75, 85.5' - Mechanical break (11) | | **Limestone** 81.0-81.8' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, extremely weak to very weak (R0 to R1), 0-5% surface voids (<1/16") over core surface dependent on softness of rock, many shallow cavities up to 2" diameter | |
| | | | 0 | | | | |
| | | | 0 | | | 81.8-82.8' - Same as 81.0-81.8' except yellowish brown, (10YR 5/4) | |
| | | | 4 | 84.35, 84.4, 84.5' - Fractures (3), horizontal, rough, undulating, horizontal fractures, up to 1/4" | | 82.8-85.6' - Same as 81.0-81.8' | |
| 85 -42.4 | | | >10 | | | | R8: 7 minutes |
| | 86.0 | | NR | | | **No Recovery 85.6-86.0'** | |

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# ROCK CORE LOG

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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 ORIENTATION : Vertical

WATER LEVELS : 1.6 ft bgs on 6/14/07 START : 4/23/2007 END : 4/25/2007 LOGGER : A. Erickson

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R9-NQ 5 ft 57% | 30 | >10 | 84.4' - Fracture, vertical, rough, undulating, bounded by horizontal fractures at 84.35-84.4', half of core, other fracture surface not present | | **Limestone** 86.0-86.6' - moderate yellowish brown grading to yellowish gray, (10YR 5/4 to 5Y 7/2), fine grained, strong HCl reaction, extremely weak (R0), black carbon, organic material from 86.0-86.15' | |
| | | | >10 | 84.95-85.2' - Fracture zone | | | |
| | | | 0 | 86.0-87.05' - Fracture zone, rock CaCO3 silt<br>87.65-87.9' - Fracture zone<br>88.5' - Mechanical break, to fit in box | | 86.6-87.9' - Same as 86.0'-86.6' except extremely weak (R0), 40% surface voids (<1/16"), many cavities up to 9/16" diameter, trace black organic material up to 1/16" | SC-3 collected at 88.0-89.1' |
| 90<br>-47.4 | | | NR | | | 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 cavities up to 9/16", few fossil molds<br>**No Recovery 88.85-91.0'** | R9: 7 minutes |
| 91.0 | | | | | | **Limestone** 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 | 3 | 91.1' - Fracture, 75 deg, rough, undulating, vertical fracture 1/8" | | | |
| | | | 0 | 91.8' - Fracture, 60 deg, rough, undulating, vertical fracture<br>91.9' - Fracture, 40 deg, rough, undulating, diagonal fracture | | | |
| | | | 2 | 92.8' - Mechanical break, for hardness test<br>93.5' - Fracture, 60 deg, diagonal fracture, up to 3/4" gap | | | |
| | | | 1 | 93.8' - Fracture, horizontal, rough, undulating, horizontal fracture, fracture surfaces eroded, up to 3/4" gap | | | |
| 95<br>-52.4 | | | >10 | 94.1' - Mechanical break<br>94.25' - Fracture, 70 deg, rough, undulating, tight up to 1/4" gap | | 94.95-95.25' - Same as 91.0'-95.3' except 5% surface voids (<1/16"), few cavities up to 3/16" | R10: 8 minutes |
| 96.0 | | | | | | | |
| | R11-NQ 5 ft 34% | 17 | 3 | 94.7, 94.85' - Mechanical break<br>95.3-96.0' - Fracture zone | | 95.3-96.0' - Same as 91.0'-95.3' except fine grained, extremely weak (R0), 5% surface voids (<1/16"), black organic material up to 3/8" | |
| | | | >10 | 96.4-96.6' - Fracture zone, 45 deg, rough, undulating, fracture on either side | | | |
| | | | NR | 92.0-97.45' - Fracture zone, horizontal and 50 deg, rough, undulating | | 96.0-97.7' - moderate yellowish 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<br>**No Recovery 97.7-101.0'** | |
| 100<br>-57.4 | | | | | | | R11: 5 minutes |
| 101.0 | | | | | | **Limestone** 101.0-102.6' - Same as 96.0'-97.7' | |
| | R12-NQ 5 ft 60% | 52 | 2 | 101.15' - Fracture, 70 deg, rough, undulating, vertical fracture, large gap | | | |
| | | | >10 | 101.6' - Bedding plane, horizontal, rough, undulating, 1/8" gap<br>101.95- 102.1' - Fracture zone, rough, undulating, fracture on either side | | 102.6-103.2' - Same as 96.0'-97.7' except extremely weak (R0), 20% surface voids (<1/16"), many cavities up to 5/16" | |
| | | | 2 | 102.9' - Bedding plane, horizontal, rough, undulating, up to 1/4" gap<br>103.2' - 5 deg, rough, undulating | | 103.2-104.0' - Same as 96.0'-97.7'<br>**No Recovery 104.0-106.0'** | SC-4 collected at 103.2-104.0' |
| 105<br>-62.4 | | | NR | | | | R12: 8 minutes |
| 106.0 | | | | | | | |

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|---|---|---|---|---|---|---|---|
| | R13-NQ 5 ft 96% | 50 | 3 | 106.2' - Fracture zone<br>106.5' - Fractures, horizontal, rough, undulating, up to 1/4" gap | | **Limestone**<br>106.0-107.15' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine grained, strong HCl reaction, very weak (R1), voids (<1/16") over 20-40% of surface, silt infill in void spaces present, many cavities up to 1-3/16"x3/4", many fossil molds<br>107.15-110.8' - Same as 106.0'-107.15' except weak (R2) | |
| | | | 4 | 106.75' - Mechanical break<br>107.1' - Fracture, horizontal, rough, stepped, up to 1/2" gap | | | |
| | | | 1 | 107.3' - Fracture, 55 deg, rough, undulating, up to 1/4" gap<br>107.35' - Fracture, horizontal, rough, undulating | | | |
| | | | 1 | 107.9' - Fracture, horizontal, smooth, undulating, large gap with rock crush on part of fracture | | | |
| 110<br>-67.4 | | | 6 | | | | R13: 13 minutes |
| | 111.0 | | NR | 108.7' - Fracture, 80 deg, smooth, undulating, half of fracture is rock crush | | **No Recovery 110.8-111.0'** | |
| | R14-NQ 5 ft 66% | 25 | 2 | 111.2' - Mechanical break<br>111.4' - Fracture, 20 deg, rough, stepped, gap up to 1.5" | | **Limestone**<br>111.0-114.3' - Same as 107.15'-110.8' | |
| | | | 5 | 111.65' - Mechanical break, 50 deg, smooth, undulating, tight | | | |
| | | | 1 | 112.35' - Fracture, 80 deg, rough, undulating, black, half of fracture surface/side missing, little black staining | | | |
| | | | 1 | 112.35, 112.75' - Fractures, 20 deg, rough, undulating, gaps up to 3/4" thick with rock fragments | | **No Recovery 114.3-116.0'** | |
| 115<br>-72.4 | | | NR | 112.8' - Fracture, 70 deg, rough, undulating, half of fracture is rock fragments<br>112.95' - 60 deg, smooth, undulating, up to 1/2" gap | | | R14: 7 minutes |
| | 116.0 | | | | | | |
| | R15-NQ 5 ft 48% | 25 | >10 | 113.7' - Fracture, 30 deg, smooth, undulating, tight | | **Limestone**<br>116.0-118.4' - moderate yellowish brown, (10YR 5/4), fine grained, strong HCl reaction, very weak to weak (R1 to R2), voids (<1/16") over 15% of core surface, many small cavities up to 3/8"x1/16" | SC-5 collected at 116.0-117.2' |
| | | | >10 | 114' - Fracture, 80 deg, rough, undulating, fracture 113.5-114.3', half fracture is rock fragments | | | |
| | | | 2 | 116.0-116.3' - Fracture zone<br>117.3' - Mechanical break | | | |
| | | | NR | 117.45-117.9' - Fracture zone<br>118.05' - Fracture, horizontal, smooth, undulating, tight up to 1/8" gap<br>118.25' - 10 deg, rough, undulating | | **No Recovery 118.4-121.0'** | |
| 120<br>-77.4 | | | | | | | R15: 6 minutes |
| | 121.0 | | | | | | |
| | R16-NQ 5 ft 62% | 40 | 1 | 121.65, 122.6' - Fracture, rough, stepped, half of fracture is not present | | **Limestone**<br>121.0-124.1' - Same as 116.0'-118.4' except many cavities up to 3/8" diameter or 9/16"x3/16", few fossil molds with recrystalized surfaces | |
| | | | >10 | 121.9' - Fracture, vertical and 5 deg, rough, stepped, fracture pair runs from121.65-122.6', half of fracture is crushed or not present | | | |
| | | | 2 | 122.1, 122.25' - Fracture zone | | | |
| | | | 0 | 123.2' - Mechanical break, rough, stepped, up to 1/2" gap | | **No Recovery 124.1-126.0'** | |
| 125<br>-82.4 | | | NR | 123.5' - Mechanical break, horizontal, rough, stepped, tight up to 1/4" gap<br>123.75' - Mechanical break, horizontal, rough, up to 3/4" gap | | | R16: 8 minutes |
| | 126.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-16 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

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

WATER LEVELS : 1.6 ft bgs on 6/14/07 START : 4/23/2007 END : 4/25/2007 LOGGER : A. Erickson

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R17-NQ 5 ft 27% | 0 | >10<br>>10<br>NR | 126.0-126.3' - Fracture zone<br>126.5' - Fracture, horizontal, rough, undulating, up to 1/2" gaps<br>126.85' - Mechanical break, 5 deg, rough, undulating, up to 1/2" gaps<br>127.0-127.35' - Fracture zone | | **Limestone**<br>126.0-127.35' - moderate yellowish brown, (10YR 5/4), fine grained, strong HCl reaction, extremely weak to very weak (R0 to R1), surface voids (<1/16") up to 15%, many cavities up to 3/16"x3/8", little recrystallization<br>**No Recovery 127.35-131.0'** | |
| 130<br>-87.4 | | | | | | | R17: 6 minutes |
| 131.0 | | | | | | | |
| | R18-NQ 5 ft 26% | 0 | >10<br>>10<br>NR | 131.0-132.3' - Fracture zone | | **Limestone**<br>131.0-134.3' - Same as 126.0'-127.35' except light olive gray, (5Y 5/2), very weak to weak (R1 to R2), voids (<1/16") over 0-5% at surface, few fossil molds, cavities up to 3/8"<br>**No Recovery 134.3-136.0'** | |
| 135<br>-92.4 | | | | | | | R18: 9 minutes |
| 136.0 | | | | | | | |
| | R19-NQ 5 ft 50% | 15 | >10<br>>10<br>>10<br>NR | 136.35' - Fracture, 30 deg, rough, stepped, up to 1/4" gap<br>136.5' - Fracture, 80 deg, rough, undulating, up to 1/8" gap<br>136.6-136.85' - Fracture zone<br>136.85, 137.0' - Fracture, vertical, smooth, undulating, half of fracture missing<br>137.0-137.46' - Fracture zone<br>137.9' - Fracture, vertical, smooth, undulating, 1/4" gap<br>138.0-138.1' - Fracture zone<br>138.2, 138.35' - Mechanical break, horizontal | | **Limestone**<br>136.0-137.0' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine to medium grained, strong HCl reaction, extremely weak (R0), 25% surface voids (<1/16"), many cavities up to 1/4"x3/16", trace fossil casts<br>137.0-138.5' - light olive gray, (5Y 5/2), fine grained, strong HCl reaction, weak (R2), 5% surface voids (<1/16"), many cavities up to 3/8"x9/16", moderately fossiliferous with molds and casts<br>**No Recovery 138.5-141.0'** | |
| 140<br>-97.4 | | | | | | | R19: 8 minutes |
| 141.0 | | | | | | | |
| | R20-NQ 5 ft 47% | 7 | >10<br>>10<br>1<br>NR | 141.25-141.6' - Fracture zone<br>141.85, 141.95, 142.05' - Mechanical break (3), horizontal and 15 deg, rough, undulating, tight up to 1/4" gap<br>141.9' - Fracture, 80 deg, rough, undulating, black, rock fragments on one half of fracture<br>142.0-142.25' - Fracture zone<br>142.25, 142.4, 142.55, 142.8, 142.95' - Bedding plane (5), rough, undulating, up to 1/2" gap | | **Limestone**<br>141.0-141.3' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, weak (R2), 15% surface voids (<1/16"), many cavities and molds up to 3/16"x3/8"<br>141.3-143.35' - Same as 141.0'-141.3' except extremely weak to very weak (R0 to R1)<br>**No Recovery 143.35-146.0'** | |
| 145<br>-102.4 | | | | | | | R20: 8 minutes |
| 146.0 | | | | | | | |

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|---|---|
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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

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

WATER LEVELS : 1.6 ft bgs on 6/14/07 START : 4/23/2007 END : 4/25/2007 LOGGER : A. Erickson

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 150<br>-107.4 | R21-NQ<br>5 ft<br>100%<br>151.0 | 50 | 0<br>1<br>>10<br>>10<br>>10 | 147.2' - Fracture, 10 deg and 40 deg, rough, undulating, up to 1" gap<br>148.0, 148.12, 148.25, 148.4, 148.5, 148.6' - Fracture, 5 deg, rough, undulating<br>148.75' - Mechanical break, rough, undulating, 1/8"-1/4" gaps<br>148.9' - Fracture, 70 deg, rough, undulating, gray/black<br>148.75-149.3' - Fracture zone<br>149.5' - Fracture, horizontal and vertical, rough, undulating, tight to 1/2" gap<br>149.65-150.5' - Fracture zone | | **Limestone**<br>146.0-148.0' - yellowish gray, (5Y 7/2), fine to medium grained, strong HCl reaction, extremely weak to weak (R0 to R2), 5-15% surface voids (<1/16"), many cavities up to 3/16"<br>148.0-148.3' - Same as 146.0'-148.0' except 25% surface voids (<1/16"), many cavities up to 3/16"x3/8"<br>148.3-151.0' - Same as 146.0'-148.0' | R21: 9 minutes |
| | | | | | | Bottom of Boring at 151.0 ft bgs on 4/25/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-17 SHEET 1 OF 9 |

# SOIL BORING LOG

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 bgs on 3/28/07 START : 3/28/2007 END : 4/4/2007 LOGGER : A. Teal, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.2 | 0.0 | 0.3 | SS-1 | 0-1-2 (3) | **Topsoil** 0.0-0.3' - brownish black, (5YR 2/1) | | Drilling with 3-7/8" tri-cone bit |
| | 1.5 | | | | | | Driller's Remark: Water encountered at approximately 2.5' below ground surface |
| 5 37.2 | | | | | | | Medium to heavy chatter at 5.5-6.0' |
| | 6.5 | 0.6 | SS-2 | 2-2-1 (3) | **Clayey Sand (SC)** 6.5-7.1' - light olive gray, (5Y 6/1), wet, very loose, very fine to fine silica sand, 40% medium to high plastic fines, trace roots | | |
| | 8.0 | | | | | | |
| 10 32.2 | | | | | | | Moderate chatter at approximately 10' |
| | 13.0 | 0.8 | SS-3 | 5-5-3 (8) | **Limestone Fragments** 13.0-13.3' - moderate yellowish brown to grayish orange, (10YR 5/4 to 10YR 7/4), strong HCl reaction | | |
| | 14.5 | | | | **Silt (ML)** 13.3-13.8' - grayish yellow, (5Y 8/4), wet, medium stiff, nonplastic, rapid dilatancy, strong HCl reaction, 10% very fine sand-sized, carbonate | | |
| 15 27.2 | | | | | | | |
| | 19.5 | | | | | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING LOG

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 bgs on 3/28/07 START : 3/28/2007 END : 4/4/2007 LOGGER : A. Teal, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.2 | 21.0 | 1.2 | SS-4 | 12-11-6 (17) | **Silt (ML)** 19.5-20.7' - yellowish gray, (5Y 7/2), wet, very stiff, nonplastic, very rapid dilatancy, moderate to strong HCl reaction, 10% very fine to medium sand-sized, all carbonate | | |
| 25 17.2 | 26.0 | | | | | | |
| | 27.5 | 0.4 | SS-5 | 10-3-2 (5) | **Silt With Sand (ML)** 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 gravel-sized limestone fragments, all carbonate material | | |
| 30 12.2 | 32.5 | | | | | | |
| | 33.8 | 1.3 | SS-6 | 17-18-50/4 (68/10") | **Sandy Silt (ML)** 32.5-33.75' - dark yellowish orange, (10YR 6/6), moist to wet, hard, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 25-30% fine to coarse sand-sized, all carbonate | | |
| 35 7.2 | | | | | Begin Rock Coring at 34.5 ft bgs<br>See the next sheet for the rock core log | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-17 SHEET 3 OF 9 |

# ROCK CORE LOG

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 ORIENTATION : Vertical

WATER LEVELS : 2.5 ft bgs on 3/28/07 START : 3/28/2007 END : 4/4/2007 LOGGER : A. Teal, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 35<br>7.2 | 34.5<br>R1-NQ<br>2 ft<br>10%<br>36.5 | 0 | 0<br>NR | | | **Limestone**<br>34.5-34.7' - light olive gray, (5Y 5/2), fine grained, medium strong (R3), moderate HCl reaction on scratched/pulverized sample, no to very mild HCl reaction on fresh surface, 10-15% coverage of voids 1/16" or less on matrix, some casts/molds (poorly fossiliferous)<br>**No Recovery 34.7-36.5'** | Begin rock coring 3/28/07 at 16:14 at depth of 34.5'<br>Driller's Remark: Hard material, loud chatter<br>R1: 18 minutes |
| | R2-NQ<br>5 ft<br>80%<br>41.5 | 40 | 6<br>3<br>4<br>2<br>NR | 36.65' - Fracture, 50 deg, rough, undulating, fairly tight<br>36.7' - Fracture, 10 deg, rough, undulating, tight<br>36.75' - Fracture, 60 deg, rough, planar, tight<br>36.8' - Fracture, 75 deg, rough, undulating, open<br>37.0' - Fracture, 10 deg, rough, undulating, tight<br>37.4' - Mechanical break<br>37.7, 37.9, 38.4, 38.6, 38.8' - Fractures (5), 10-45 deg, rough, undulating, open<br>38.8-39' - crushed section, possibly due to drilling<br>39.2, 39.65, 40.25' - Fractures (3), 20-40 deg, rough, undulating, open | | **Limestone**<br>36.5-40.5' - pale yellowish brown, (10YR 6/2), fine to medium grained, very weak to weak (R1 to R2), mild HCL reaction on clean surface, moderate to fast HCl reaction on pulverized sample, 10-15% coverage of voids 1/16" or less, cavities are elongate and ovate with some up to 3/4" x 3/8", fossiliferous (casts and molds)<br>**No Recovery 40.5-46.5'** | Very hard material, set casing to 37.5'<br>R2: Run time not recorded |
| 40<br>2.2 | R3-NQ<br>5 ft<br>0%<br>46.5 | 0 | NR | | | | R3: 2 minutes |
| 45<br>-2.8 | R4-NQ<br>5 ft<br>57%<br>51.5 | 0 | 4<br>3<br>3<br>NR | 46.65' - Fracture, 40 deg, rough, stepped, tight<br>46.82' - Fracture, <5 deg, rough, undulating, tight<br>46.92' - Fracture, <5 deg, rough, stepped, tight<br>47.12' - Fracture, 10 deg, rough, stepped, tight<br>47.6' - Fracture, <5 deg, rough, stepped, open<br>47.92' - Fracture, <5 deg, rough, undulating, tight<br>48.4, 48.58' - Fractures (2), 10 deg, rough, stepped, open<br>48.72' - Fracture, <5 deg, rough, stepped, tight | | **Limestone**<br>46.5-49.35' - pale yellowish brown, (10YR 6/2), fine grained, mild HCl reaction, very weak (R1), 15-20% coverage of voids 1/16" or less, 5-10% organic material appears as thin black lines up to 1/32" thick, trace fossil casts/molds, cavities (generally subspherical 3/8" in diameter) over 1-2%<br>**No Recovery 49.35-51.5'** | R4: 2 minutes |
| 50<br>-7.8 | R5-NQ<br>5 ft<br>95% | 85 | 2<br>3<br>0 | 48.9' - Fracture, <5 deg, rough, stepped, open<br>51.6' - Fracture, 10 deg, rough, undulating, open, 50% coverage for clay infilling<br>52.1, 53.2, 53.3' - Fractures (3), 20-50 deg, rough, undulating, open<br>53.6' - Fracture, <5 deg, rough, undulating, open | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: B-17 | SHEET 4 OF 9 |
|---|---|---|

# ROCK CORE LOG

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 ORIENTATION : Vertical

WATER LEVELS : 2.5 ft bgs on 3/28/07 START : 3/28/2007 END : 4/4/2007 LOGGER : A. Teal, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 55<br>-12.8 | | | 0 | | | **Limestone**<br>51.5-56.25' - pale yellowish brown, (10YR 6/2), fine grained, mild HCl reaction, alternating zones of (R0) extremely weak rock material especially from 54.0-55.5' to (R3) medium strong rock, 10-15% coverage of voids 1/16" or less, cavities common up to 1" x 3", poorly fossiliferous (casts and molds), occasional thin black organic laminae | |
| | | | 1 | 55.7' - Fracture, 60 deg, rough, planar, very tight | | | R5: 2 minutes |
| | 56.5 | | NR | | | | |
| | R6-NQ<br>5 ft<br>100% | 85 | 0 | | | **No Recovery 56.25-56.5'** | |
| | | | 2 | 57.8' - Fracture, vertical, rough, planar, 15% coverage black staining, fracture trace from 57.0-58.35' | | **Limestone**<br>56.5-61.5' - pale yellowish brown, (10YR 6/2), fine grained, very weak to weak (R1 to R2), 10-15% coverage of voids 1/16" or less, few cavities, HCl reaction changes with hardness (harder material less reactive), sparsely fossiliferous casts and molds, occasional thin black organic laminae | |
| | | | 1 | 58.3' - Fracture, 60 deg, rough, undulating, very tight | | | SC-1 collected at 59.0-59.9'<br>Note: Core box indicates special core collected from 60.0-60.9', it also appears that up to 0.5 of core is missing from box |
| 60<br>-17.8 | | | 1 | 59.0' - Fracture, 10 deg, smooth, stepped, tight<br>59.9' - Fracture, 15 deg, smooth, undulating, tight | | | |
| | | | 1 | | | | |
| | 61.5 | | | 61.3' - Fracture, 20 deg, rough, undulating, open | | | R6: 4 minutes |
| | R7-NQ<br>5 ft<br>98% | 87 | 1 | 62.1' - Fracture, 10 deg, rough, undulating, open | | 61.5-62.3' - pale yellowish brown, (10YR 6/2), fine grained, mild HCl reaction, very weak (R1), 20-30% coverage of voids 1/16" or less on surface, cavities over 5-10% surface up to 3/8" in diameter, irregularly shaped, some cavities up to 3/8"-3/4" in length, trace cavity infilling, trace fossil molds/casts | |
| | | | 1 | 63.2' - Fracture, 10 deg, smooth, undulating, tight | | | |
| | | | 3 | 63.55, 64.1' - Fractures (2), 20 deg, rough, undulating, tight | | | |
| 65<br>-22.8 | | | 2 | 64.45, 65.0' - Fractures (2), 10-25 deg, smooth, undulating, tight | | 62.3-63.15' - Same as 61.5-62.3' except absent to rare cavities, <5% coverage of small (<1/16") voids | |
| | | | 2 | 65.2' - Fracture, 15 deg, rough, undulating, black carbonaceous coating over 30% of surface, open | | | R7: 3 minutes |
| | 66.5 | | NR | 65.8' - Fracture, 25 deg, rough, undulating, open | | 63.15-65.35' - Same as 61.5-62.3' except interval at 65.05-65.25' which is very fine grained (chalk like), very weak (R1), with mild HCl reaction and <1% voids/cavities, incipient fracture traces from 65.05 to 66.4 | |
| | R8-NQ<br>5 ft<br>100% | 100 | 1 | 66.2' - Fracture, 85 deg, rough, planar, very tight, incipient "hair line" fracture from 65.85-66.4' | | | |
| | | | 1 | 67.4' - Fracture, horizontal, smooth, planar, very tight | | 65.35-66.4' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), fine grained, mild HCl reaction, weak (R2), some very thin, black carbonaceous/organic laminae, trace coverage of voids 1/16" or less on surface, becoming more common (up to 10%) with depth, cavities generally <3/8" in diameter | |
| | | | 7 | 67.9' - Fracture, 5 deg, smooth, undulating, tight<br>68.65, 69.9' - Fractures (2), 15-20 deg, rough, undulating, tight | | | |
| 70<br>-27.8 | | | 1 | | | | |
| | | | 2 | 70.7, 71.2' - Fractures (2), 50 deg, rough, planar, tight | | | R8: 5 minutes |
| | 71.5 | | | | | **No Recovery 66.4-66.5'** | |
| | | | 0 | | | **Limestone**<br>66.5-67.4' - Same as 65.35-66.4' except strong HCl reaction, interbedding of light olive gray, very fine grained material that is harder than matrix, thin beds up to 1/2" thick, some cavity infilling, possible bioturbation | |
| | | | 4 | 72.5-72.6' - solution cavity<br>72.75' - Fracture, 15 deg, smooth, undulating, open | | | |
| | R9-NQ<br>5 ft<br>90% | 83 | 1 | 72.76-72.8' - limestone fragments<br>73.25' - Fracture, 20 deg, rough, undulating, open | | | |

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

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 ORIENTATION : Vertical

WATER LEVELS : 2.5 ft bgs on 3/28/07 START : 3/28/2007 END : 4/4/2007 LOGGER : A. Teal, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 75 -32.8 | | | 1 | 73.6, 74.8' - Fractures (2), 5-10 deg, smooth, undulating, open | | **Limestone** 67.4-69.4' - grayish orange, (10YR 7/4), very fine grained, extremely weak to very weak (R0 to R1), trace voids and cavities but increasing below 69.0', thinly laminated with wispy, black, carbonaceous material at top of interval, fossils rare to absent | |
| | | | 0 | | | | R9: 6 minutes |
| | 76.5 | | NR | | | | |
| | | | >10 | 76.5-77.9' - Fracture zone, limestone fragments from gravel to cobble sized | | | Stop drilling for day, 3/29/07 at 10:29 Resume drilling 4/3/07 at 09:54 |
| | | | >10 | | | 69.4-71.5' - Same as 65.35-66.4' except coverage of voids/cavities 10-15% | |
| | R10-NQ 5 ft 62% | 10 | >10 | 78.2, 78.45, 78.6' - Fractures (3), 20-30 deg, rough, undulating, open 79.1-79.6' - Fracture zone, limestone fragments from gravel to cobble size | | 71.5-72.5' - Same as 67.4-71.5' except rounded to irregularly shaped limestone clasts in a dark yellowish brown (10YR 4/2) limestone matrix, very fine grained, 50-60% coverage of voids 1/16" or less | |
| 80 -37.8 | | | NR | | | | R10: 3 minutes |
| | 81.5 | | | | | 72.5-75.0' - pale yellowish brown with yellowish gray mottling, (10YR 6/2 and 5Y 7/2), fine grained, mild HCl reaction, very weak to weak (R1 to R2), trace fossils, some irregularly shaped limestone (clast-like) features with 1-3% coverage of voids 1/16" or less on surface, remainder of limestone essentially void free, occasionally thinly laminated with trace black organic material | |
| | | | >10 | 81.5-82.0' - Fracture zone, limestone fragments from gravel to cobble size | | | |
| | | | 1 | 82.2' - Fracture, vertical, rough, planar, tight (incipient) 82.4, 82.95' - Fractures (2), 15 deg, rough, undulating, tight | | | |
| | R11-NQ 5 ft 84% | 68 | 1 | 83.6' - Fracture, 10 deg, rough, undulating, open | | 75.0-76.0' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, very weak (R1), 1-2% coverage of voids 1/16" or less, occasionally thinly laminated with white, discontinuous limestone, some intraclasts/cavity infilling, core surface irregular/indented | |
| 85 -42.8 | | | 0 | | | | |
| | | | 1 NR | 85.6' - Fracture, 30 deg, rough, undulating, open | | | R11: 5 minutes |
| | 86.5 | | | | | **No Recovery 76.0-76.5'** | |
| | | | 2 | 86.6' - Fracture, vertical, rough, planar, open 86.7' - Fracture, 25 deg, rough, undulating, open | | **Limestone** 76.5-79.6' - mild HCl reaction, very weak (R1), highly fossiliferous, 50-60% coverage of voids 1/16" or less (highly variable through sample), many cavities up to 3/8", 10-15% coverage of black organics, elongated cavity 1" wide by 1.5" long by 0.5" deep at 78.2-78.35' infilled with dark yellowish brown material in a radiating horizontal pattern, non calcareous, trace charcoal gray material at 79.0-79.5' | SC-2 collected at 86.7-87.65' |
| | | | 1 | 87.7' - Fracture, 10 deg, rough, undulating, tight | | | |
| | R12-NQ 5 ft 84% | 60 | 1 | 89.0' - Fracture, 60 deg, rough, undulating, tight | | | |
| 90 -47.8 | | | >10 | 89.75-90.7' - Fracture zone, limestone fragments from gravel to cobble size, some black carbonaceous coating on partings | | | R12: 7 minutes |
| | | | NR | | | | |
| | 91.5 | | | | | **No Recovery 79.6-81.5'** | |
| | | | >10 | 91.5-92.7' - Fracture zone, rough, stepped to undulating, various angles, tight to open | | **Limestone** 81.5-83.4' - yellowish gray mottled, (5Y 7/2 and 5Y 8/1), fine grained, mild HCl reaction, very weak to weak (R1 to R2), 35-40% coverage of 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 interval), trace fossils (casts/molds) | |
| | | | 4 | 93.15' - Fracture, 70 deg, rough, undulating, tight | | | |
| | R13-NQ 5 ft 90% | 6 | 6 | 93.3' - Fracture, horizontal, rough, undulating, 1/16" open | | | |

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|---|---|---|

# ROCK CORE LOG

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 ORIENTATION : Vertical

WATER LEVELS : 2.5 ft bgs on 3/28/07 START : 3/28/2007 END : 4/4/2007 LOGGER : A. Teal, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| 95<br>-52.8 | | | 3 | 93.55' - Fracture, horizontal, rough, undulating, brown clay coating over 20-30%, open | | **Limestone**<br>83.4-83.7' - grayish orange, (10YR 7/4), fine grained, mild HCl reaction, very weak (R1), thinly laminated, black carbonaceous laminae present, some voids (<1%) at top of interval, friable<br>83.7-85.7' - Same as 81.5-83.4' except circular to subcircular cavities common (3/8" or less in diameter), some cavity infilling<br>**No Recovery 85.7-86.5'**<br>**Limestone**<br>86.5-90.7' - Same as 81.3-83.4' except voids and cavities up to 10% coverage from 87.65-89.0' increasing to 20-30% coverage below 89.0', black carbonaceous coating on bedding plane at 90.5'<br>**No Recovery 90.7-91.5'**<br>**Limestone**<br>91.5-92.0' - Same as 81.5-83.4'<br>92.0-93.0' - yellowish gray, (5Y 8/1), very fine grained, strong HCl reaction, medium strong (R3), moderately fossiliferous, trace coverage of voids 1/16" or less on surface, trace cavities<br>93.0-93.6' - yellowish gray, (5Y 7/2), fine grained, very weak (R1), cavities numerous at contact of overlying interval, 1-2% coverage of voids 1/16" or less on surface<br>**Lignite**<br>93.6-94.1' - no HCl reaction, laminar bedding<br>**Limestone**<br>94.1-95.2' - medium grained, mild HCl reaction, extremely weak to very weak (R0 to R1)<br>95.2-96.0' - yellowish gray, (5Y 7/2), moderate HCl reaction, very weak to weak (R1 to R2), thinly laminated with white HCl reactive limestone, fossiliferous (molds/casts), 10-15% coverage of voids on surface, trace cavities (3/8" or less in diameter)<br>**No Recovery 96.0-96.5'**<br>**Limestone**<br>96.5-100.0' - Same as 92.0-93.0' except becoming pale yellowish brown (10YR 6/2) with depth, fossiliferous, with gastropods common (elongated spiral individuals), intermittently interbedded with medium grained limestone with 15-20% coverage of 1/16" or less voids on surface<br>**No Recovery 100.0-101.5'** | |
| | | | 1 | 93.8' - Fracture, horizontal, smooth, planar, tight, (clay contact) | | | R13: 7 minutes<br>R. McComb logged discontinuities for R13 |
| | 96.5 | | NR | 93.97' - Fracture, horizontal, smooth, planar, horizontal, tight | | | |
| | | | >10 | 94.25, 94.37' - Fractures (2), horizontal, rough, undulating, 1 3/16"-1 9/16" open | | | |
| | | | 4 | 94.50-94.60' - Fracture zone, rough, multiple orientation | | | |
| | R14-NQ<br>5 ft<br>70% | 42 | 10 | 94.9' - Fracture, horizontal, rough, undulating, up to 1/16" open<br>95.25' - Fracture, 0-70 deg, rough, undulating, open | | | SC-3 collected at 98.7-99.6' |
| 100<br>-57.8 | | | 5 | 95.5' - Fracture zone, 80 deg, rough, planar to undulating, several en echelon fracture planes | | | |
| | | | NR | 96.0' - Fracture, 50 deg, rough, undulating<br>96.5-97.0' - Fracture zone, low to high angle, rough, stepped to undulating, tight to open | | | R14: 6 minutes<br>Driller's Remark: Lost circulation at about 101.0' |
| | 101.5 | | | | | | |
| | | | 10 | 97.4-97.7' - Fracture zone, high angle, criss cross fractures intersecting at 45 degrees, rough, planar, tight | | | |
| | | | >10 | 97.85' - Fracture, 40 deg, rough, stepped, tight | | | |
| | | | 0 | 98.0' - Fracture, 15 deg, rough, undulating, open | | | |
| | R15-NQ<br>5 ft<br>46% | 20 | | 98.1' - Fracture, 45 deg, rough, planar, tight<br>98.7' - Fracture, 20 deg, rough, undulating, open | | | Driller's Remark: Regained circulation at about 104.0' |
| 105<br>-62.8 | | | NR | 99.6-100.1' - Fracture zone, various angles, rough, stepped to undulating, tight to open<br>101.6' - Fracture, 10 deg, smooth, undulating, open, possible mechanical break | | | R15: 4 minutes |
| | 106.5 | | | 101.7' - Fracture, 15 deg, smooth, undulating, open | | | |
| | | | >10 | 102.3-103.2' - Fracture zone, predominately horizontal to <5 deg, stepped to undulating, open, coarse gravel size rock fragments | | | |
| | | | 1 | 106.5-107.2' - Fracture zone, predominately horizontal to <5 deg, stepped to undulating, open, coarse gravel size rock fragments | | | |
| | R16-NQ<br>5 ft<br>90% | 40 | 1 | 107.2, 107.35' - Fractures (2), <5 deg, rough, stepped, open | | | |
| 110<br>-67.8 | | | >10 | 107.43, 107.57' - Fractures (2), <5 deg, rough, undulating, open<br>109.4' - Fracture, 30 deg, rough, undulating, tight | | | R16: 4 minutes |
| | | | >10 | 109.8-110.9' - Fracture zone, fragments up to gravel size, angular to subangular | | | |
| | 111.5 | | NR | | | | |
| | | | >10 | 111.5-111.85' - Fracture zone, limestone fragments from gravel to cobble size<br>112.0' - Fracture, 50 deg, rough, planar, tight | | | |
| | | | 1 | 112.7-113.8' - Fractures (2), 30 deg, rough, undulating, tight | | | SC-4 collected at 112.7-113.8' |
| | R17-NQ<br>5 ft<br>100% | 78 | 1 | | | | |

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

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 ORIENTATION : Vertical

WATER LEVELS : 2.5 ft bgs on 3/28/07 START : 3/28/2007 END : 4/4/2007 LOGGER : A. Teal, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 115<br>-72.8 | | | 2 | 114.75' - Fracture, 65 deg, rough, planar, tight | | **Limestone**<br>101.5-103.8' - pale yellowish brown, (10YR 6/2), fine grained, mild to moderate HCl reaction, weak to medium strong (R2 to R3), 10-15% coverage of voids 1/16" or less on surface, cavities 3/8"-3/4" in length (elongated), fossiliferous (casts/molds) | |
| | | | 3 | 115.4' - Fracture, 25 deg, rough, undulating, open<br>115.6' - Fracture, 30 deg, rough, stepped, (bidirectional), open | | | R17: 4 minutes |
| | 116.5 | | | | | | |
| | R18-NQ<br>5 ft<br>96% | 85 | 0 | 116.0' - Fracture, 30 deg, rough, undulating, open | | **No Recovery 103.8-106.5'**<br>**Limestone**<br>106.5-111.0' - Same as 101.5-103.8' except very weak (R1), 20-25% coverage of small cavities, fewer fossils, very friable | |
| | | | 2 | 116.25' - Fracture, vertical, smooth, planar, tight, secondary fracture at 90 degrees to above fracture | | | |
| | | | 3 | 117.5' - Fracture, 20 deg, rough, undulating, tight<br>117.9' - Mechanical break | | | |
| 120<br>-77.8 | | | 2 | 118.75' - Fracture, 10 deg, rough, undulating, tight, organic infilling (lignite)<br>119.1, 119.35' - Fractures (2), 10 deg and 15 deg, rough, undulating, tight | | **No Recovery 111.0-111.5'**<br>**Limestone**<br>111.5-116.5' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, weak (R2), no apparent bedding, 15-25% coverage of voids 1/16" or less, many cavities up to 3/8", trace very fine grained lenses, less fossiliferous<br>116.5-121.3' - Same as 111.5-116.5' except mild to moderate HCl reaction, except many cavities 1"-2", fossiliferous (molds and casts), intervals of very weak (R1) limestone with few voids/cavities with up to 1/8" thick wavy laminations | R18: 3 minutes |
| | | | 2 | 120.1' - Fracture, 10 deg, smooth, undulating, open | | | |
| | 121.5 | | NR | 120.5' - Fracture, 20 deg, rough, undulating, tight | | | |
| | | | >10 | 121.0' - Fracture, 30 deg, rough, undulating, open | | | |
| | | | 0 | 121.2' - Fracture, 10 deg, smooth, undulating, open | | | |
| | R19-NQ<br>5 ft<br>91% | 67 | 2 | 121.5-121.7' - Fracture zone, horizontal, rough, planar to undulating, open<br>121.9' - Fracture, 40 deg, rough, planar, open | | | |
| 125<br>-82.8 | | | 10 | 124.3' - Fracture, vertical, smooth, planar, tight<br>124.35-124.65' - Fracture zone, inclined to near vertical, rough, stepped to undulating, tight, several fracture planes | | **No Recovery 121.3-121.5'**<br>**Limestone**<br>121.5-126.05' - yellowish gray, (5Y 7/2), fine grained, medium strong to strong (R3 to R4), 15-20% coverage of voids 1/16" or less, few cavities to 1/4", fossiliferous (molds/casts of echinoids/gastropods), intervals of dusky yellow green (5GY 5/2), very fine grained limestone with strong HCl reaction at 121.7-122.3', 124.6-125.1' and 126.0-126.05' | |
| | | | 2 | 124.65-124.72' - Fracture zone, rough, planar, gravel size limestone fragments bounded by horizontal open bedding planes | | | R19: 6 minutes |
| | 126.5 | | NR | | | | |
| | | | 1 | 124.92' - Fracture, <5 deg, smooth, undulating, open | | | |
| | | | 1 | 125.85' - Fracture, 60 deg, rough, undulating, extends from 125.7-126.05', tight, secondary fracture off main fracture also at high angles | | | |
| | R20-NQ<br>5 ft<br>95% | 68 | 3 | 127.0' - Fracture, 75 deg, rough, undulating, tight, extends from 126.5-127.3'<br>128.1' - Fracture, 60 deg, smooth, planar, tight | | **No Recovery 126.05-126.5'**<br>**Limestone**<br>126.5-131.25' - Same as 111.5-116.5' except weak to medium strong (R2 to R3), with medium strong to strong (R3 to R4) interval at 130.0-130.4'<br><br>**No Recovery 131.25-131.5'**<br>**Limestone**<br>131.5-133.2' - Same as 126.5-131.25' | |
| 130<br>-87.8 | | | 4 | 128.8' - Fracture, 15 deg, rough, undulating, open | | | |
| | | | 2 | 129.0' - Fracture, 85 deg, rough, planar, silty sand infilling | | | R20: 5 minutes |
| | 131.5 | | NR | 129.2' - Fracture, <5 deg, rough, undulating, open | | | |
| | | | 0 | 129.9' - Fracture, 10 deg, rough, undulating, open | | | |
| | | | >10 | 130.0, 130.2, 130.3' - Fractures (3), 20 deg, smooth, undulating, tight | | | |
| | R21-NQ<br>5 ft<br>90% | 48 | 2 | 130.6' - Fracture, 35 deg, rough, undulating, tight<br>130.85' - Fracture, 30 deg, rough, undulating, open | | | |

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|---|---|
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# ROCK CORE LOG

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 ORIENTATION : Vertical

WATER LEVELS : 2.5 ft bgs on 3/28/07 START : 3/28/2007 END : 4/4/2007 LOGGER : A. Teal, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| 135<br>-92.8 | | | >10 | 132.8-133.2' - Fracture zone, 0-90 deg, rough to smooth, planar to undulating/stepped<br>133.45, 133.75, 134.3' - Fractures (3), 15-20 deg, smooth, planar, tight | | **Limestone**<br>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 on surface, fossil molds/casts trace to absent<br>135.25-136.0' - pale yellowish brown, (10YR 6/2), fine grained, mild HCl reaction, very weak (R1), 3-5% coverage of voids 1/16" or less on surface, cavities (up to 3/8") common<br>**No Recovery 136.0-136.5'**<br>**Limestone**<br>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 fossiliferous (molds/casts)<br>138.35-138.8' - Same as 135.25-136.0'<br>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<br>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"<br>**No Recovery 139.6-141.5'**<br>**Limestone**<br>141.5-143.7' - grayish yellow to pale yellowish brown, (10YR 7/4 to 10YR 6/2), very fine grained, mild to moderate HCl reaction, strong to very strong (R4 to R5) from 142.75-143.0', becoming less strong below 143.0', 1-2% coverage of voids 1/16" or less, trace cavities (<3/16"), fossils trace to absent<br>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 HCl reaction, very weak to weak (R1 to R2), thinly laminated, possible intraclasts 1/16" in diameter (light gray), cavities/voids trace to absent, fossils trace to absent, possible carbonaceous/organic material on thin laminae | R21: 4 minutes<br>R22: 12 minutes<br>SC-5 collected at 142.0-142.85<br>R23: 12 minutes<br>R24: 8 minutes<br>Drilling ended 16:04 on 4/3/07 at 151.5' |
| | | | 0 | 134.3-135.2' - Fracture zone, 0-90 deg, rough to smooth, planar to undulating/stepped, multiple high angle fracture planes | | | |
| | 136.5 | | NR | | | | |
| | R22-NQ<br>5 ft<br>62% | 25 | 2 | 136.6' - Fracture, <5-90 deg, rough, stepped, open | | | |
| | | | 4 | 137.3' - Fracture, 20 deg, smooth, planar, very tight<br>137.85' - Fracture, 30 deg, rough, undulating, open | | | |
| | | | >10 | 138.0' - Fracture, 70 deg, rough, undulating, tight<br>138.37' - Fracture, <5 deg, rough, stepped, tight | | | |
| 140<br>-97.8 | | | NR | 138.5' - Fracture, 0-60 deg, rough, stepped, tight<br>138.8-139.0' - Fracture zone, 0-90 deg, smooth, stepped | | | |
| | 141.5 | | | | | | |
| | | | >10 | 139.3' - Fracture, 0-70 deg, rough, stepped, open<br>139.3-139.6' - Fracture zone, 0-90 deg, smooth, stepped | | | |
| | | | 10 | 141.5-142' - Fracture zone, 0-90 deg, rough, stepped to undulating, open | | | |
| | R23-NQ<br>5 ft<br>82% | 45 | 10 | 142.85' - Fracture, 20 deg, rough, undulating, tight<br>143.1, 143.25, 143.4' - Fractures (3), 60 deg, smooth, planar, very tight | | | |
| 145<br>-102.8 | | | 2 | 143.5' - Fracture, 60 deg, rough, stepped, bidirectional, open | | | |
| | | | NR | 143.6' - Fracture, 60 deg, rough, stepped, (bidirectional-partial removal of rock core interval), open | | | |
| | 146.5 | | | | | | |
| | | | 0 | 143.75' - Fracture, 20 deg, smooth, undulating, tight<br>143.95' - Fracture, 40 deg, smooth, planar, open | | | |
| | | | 3 | 144.0-144.3' - Fracture zone, 0-50 deg, rough to smooth, planar to stepped | | | |
| | R24-NQ<br>5 ft<br>100% | 87 | 3 | 144.85' - Fracture, <5 deg, rough, undulating, open<br>145.3' - Fracture, 30 deg, rough, undulating, open | | | |
| 150<br>-107.8 | | | 2 | 147.65' - Fracture, 60 deg, rough, planar, open | | | |
| | | | 2 | 147.9' - Fracture, 50 deg, rough, undulating, open<br>148.0' - Fracture, horizontal, rough, planar, tight | | | |
| | 151.5 | | | 148.5, 148.55, 149.45' - Fractures (3), 5-10 deg, rough, undulating, tight<br>149.8' - Fracture, 30 deg, smooth, undulating, tight<br>150.0 , 150.6' - Fractures (2), 15 deg and 30 deg, rough, undulating, open<br>151.05' - Fracture, 20 deg, smooth, undulating, tight | | | |

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|---|---|
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# ROCK CORE LOG

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 ORIENTATION : Vertical

WATER LEVELS : 2.5 ft bgs on 3/28/07 START : 3/28/2007 END : 4/4/2007 LOGGER : A. Teal, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES | | | SYMBOLIC LOG | LITHOLOGY | COMMENTS |
|---|---|---|---|---|---|---|---|
| | | R Q D (%) | FRACTURES PER FOOT | DESCRIPTION<br>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. |
| | | | | | | 144.0-144.25' - Same as 141.5-143.7' except very weak to weak (R1 to R2)<br>144.25-145.6' - Same as 135.25-136.0'<br>**No Recovery 145.6-146.5'**<br>**Limestone**<br>146.5-151.5' - yellowish gray, (5Y 7/2), mild HCl reaction, weak to medium strong (R2 to R3), 3-5% coverage of voids 1/16" or less on surface, some cavities up to 1/8", poorly fossiliferous (molds/casts)<br>Bottom of Boring at 151.5 ft bgs on 4/3/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-18 SHEET 1 OF 8 |

# SOIL BORING 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

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 bgs on 4/22/07 START : 4/19/2007 END : 4/23/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.0 | 0.0 – 1.5 | 1.0 | SS-1 | 1-1-1 (2) | **Poorly Graded Sand With Organics (SP)** 0.0-1.0' - olive gray, (5Y 3/2), moist, very loose, very fine to fine silica sand, trace nonplastic fines, 20% organics decreasing with depth | | 14:49 Begin drilling, SPT sample, sand is silica |
| 5 | 5.0 – 6.5 | 1.2 | SS-2 | 1-2-1 (3) | **Clayey Sand (SC)** 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, medium plasticity, no dilatancy, 66% fine silica sand | | |
| 10 | 10.0 – 11.5 | 0.8 | SS-3 | 7-4-3 (7) | **Limestone Fragments** 10.0-10.4' - dusky yellow, (5Y 6/4), moderate HCl reaction; **Silt (ML)** 10.4-10.8' - grayish yellow, (5Y 8/4), wet, firm, nonplastic, rapid dilatancy, moderate to strong HCl reaction, 10 % very fine to medium sand, carbonate | | |
| 15 | 15.0 – 16.5 | 1.3 | SS-4 | 26-29-36 (65) | **Silt With Sand And Limestone Fragments (ML)** 15.0-16.3' - Same as 10.5-11.5' except 20% fine to coarse sand-sized, 10-15% coarse sand-sized to fine gravel-sized limestone fragments at top of sample | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-18 SHEET 2 OF 8 |

# SOIL BORING 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

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 bgs on 4/22/07 START : 4/19/2007 END : 4/23/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.0 | 20.0 – 21.5 | 1.2 | SS-5 | 31-14-12 (26) | **Sandy Silt (ML)** 20.0-21.2' - Same as 15.5-16.5' except grayish orange, (10Y 7/4), wet, very stiff, nonplastic, rapid dilatancy, moderate HCl reaction, 35-40% fine to coarse sand | | |
| 25 | 25.0 | | | | | | |
| 17.0 | 25.0 – 26.5 | 1.0 | SS-6 | 2-3-2 (5) | **Sandy Silt With Limestone Fragments (ML)** 25.0-26.0' - Same as 20.5-21.5' except firm and 20-25% fine gravel-sized limestone fragments | | |
| 30 | 30.0 | | | | | | |
| 12.0 | 30.0 – 30.5 | 0.5 | SS-7 | 50/5.5 (50/5.5") | **Sandy Silt (ML)** 30.0-30.5' - Same as 25.0-26.5' except hard, mild to moderate HCl reaction, 10% fine gravel-sized<br>Begin Rock Coring at 31.0 ft bgs<br>See the next sheet for the rock core log | | 16:15 Adding 15 more feet of casing to 30.0' below ground surface |
| 35 | | | | | | | |
| 7.0 | | | | | | | |
| 40 | | | | | | | |

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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 ORIENTATION : Vertical

WATER LEVELS : 2.4 ft bgs on 4/22/07 START : 4/19/2007 END : 4/23/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | 31.0 | | | | | **Limestone** | 16:57 Begin rock coring at 31.0' below ground surface |
| | | | 1 | | | 31.0-36.0' - moderate yellow to light olive gray, (5Y 7/6 to 5Y 5/2), with mottling of the two colors from 32.8-35.4', very fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), highly fossiliferous, fossil casts and molds, voids over 50-70% of surface up to 1/16", dissolution cavities up to 1/2"x2" on 10% of surface | SC-broke during movement |
| | | | 4 | 31.9' - Bedding plane, 10 deg, rough, undulating, open 1/8" | | | |
| | R1-NQ 5 ft 100% | 80 | 4 | 32.25' - Bedding plane, <5 deg, smooth, planar, tight<br>32.5' - Mechanical break, 5 deg, rough, undulating, highly fossiliferous | | | |
| | | | 0 | 32.6' - Bedding plane, 10 deg, smooth, planar, highly fossiliferous, tight | | | |
| 35<br>7.0 | | | 1 | 32.9' - Mechanical break, 15 deg, rough, undulating, highly fossiliferous, tight<br>33.1' - Bedding plane, 10 deg, smooth, planar, highly fossiliferous, tight | | | R1: 10 minutes |
| | 36.0 | | | | | | |
| | | | 0 | 33.5, 33.8' - Bedding plane (2), 30 deg, smooth, planar, tight | | 36.0-40.7' - dusky yellow to pale olive, (5Y 6/4 to 10Y 6/2), fine grained, moderate to strong HCl reaction, extremely weak (R0), fine grained silts, fossiliferous, voids up to 1/16" on 20% of surface, dissolution zones up to 10% of surface up to 1/2"x1" from 36.0-37.1' dusky yellow to pale olive (5Y 6/4 to 10Y 6/2), organic layers throughout | 17:07 Begin coring 36.0-41.0' |
| | | | 0 | 33.75, 35.5' - Fractures (2), rough, undulating, tight, high angle fractures | | | |
| | R2-NQ 5 ft 94% | 0 | 0 | | | | |
| | | | 0 | | | | |
| 40<br>2.0 | | | 0 | | | | R2: 10 minutes |
| | 41.0 | | NR | | | **No Recovery 40.7-41.0'** | |
| | | | 0 | | | 41.0-42.5, 44.45-45.9' - Same as 36.0-40.7' except 42.5-44.45 light olive gray to dusky yellow (5Y 5/2 to 5Y 6/4), highly fossiliferous, cavities over 30% of surface, up to 1/16", medium gray infill (N5) over 20% of surface, organics throughout, weak (R2) rock, moderate HCl reaction | 17:17 Begin coring 41.0-46.0' |
| | | | 0 | | | | |
| | R3-NQ 5 ft 98% | 0 | 1 | 43.4' - Bedding plane or mechanical break, silt and/or clay sized infilling, silt infill, open 1" | | | SC-1 collected at 42.5-43.3' |
| | | | 0 | | | | |
| 45<br>-3.0 | | | 0 | | | | R3: Run time not recorded |
| | 46.0 | | NR | | | **No Recovery 45.9-46.0'** | 17:27 Drilled 46.0-51.0' |
| | | | 1 | 46.7' - Bedding plane, 10 deg, rough, undulating, tight | | **Limestone**<br>46.0-51.0' - moderate yellowish brown, (10YR 5/4), fine to very fine grained, moderate to strong HCl reaction, extremely weak to weak (R0 to R2), voids up to 1/16" on 10-20% of surface, trace organics on surface | |
| | | | 3 | 47.1, 47.2, 47.6' - Bedding plane (3), 10 deg, rough to smooth, undulating, tight | | | |
| | R4-NQ 5 ft 100% | 40 | 2 | 48.55, 48.9, 49.6' - Bedding plane (3), 10 deg, rough, undulating, tight | | | R4: Run time not recorded |
| | | | 2 | 47.4, 48.15, 48.5, 49.4, 50.0' - Mechanical break (4) | | | 4/20/07 08:21 Retrieved R4 |
| 50<br>-8.0 | | | 0 | 49.45' - Bedding plane, 30 deg, rough, undulating, tight | | | 08:27 Water level at 2.7' below ground surface |
| | 51.0 | | | 50.0' - Mechanical break | | | |

| PROJECT NUMBER: | 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 ORIENTATION : Vertical

WATER LEVELS : 2.4 ft bgs on 4/22/07 START : 4/19/2007 END : 4/23/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R5-NQ 5 ft 92% | 28 | 2 | 50.2' - Bedding plane, 10 deg, rough, undulating, open 1/4"<br>50.48' - Mechanical break | | **Limestone**<br>51.0-51.2, 51.7-52.8, 53.3-54.0, 54.9-55.15' - moderate yellowish brown, (10YR 5/4), fine to very fine grained, moderate HCl reaction, weak (R2), fossiliferous, voids 1/16" over 10-20% of surface, trace organics<br>51.2-51.7, 52.8-53.3, 54.0-54.9, 55.15-55.6' - dusky yellow to pale olive, (5Y 6/4 to 10Y 6/2), fine grained, moderate HCl reaction, extremely weak (R0), fossiliferous (casts), voids to 1/16" over 20% of surface | 4/20/07 08:36 Driller's Remark: Core barrel locked<br>4/21/07 07:55 Core barrel unlocked-pulled out<br>08:14 Begin setting 6" casing<br>10:34 Water level 2.1' below ground surface<br>10:48 Cleared the hole<br>11:24 Begin coring 51.0-56.0' |
| | | | 1 | 50.5' - Fracture, 75 deg, smooth, undulating, tight<br>51.4' - Mechanical break | | | |
| | | | 0 | 51.7' - Fracture, <5 deg, rough, undulating, bedding plane fractures, open 1/4"<br>51.8, 52.6' - Fracture (2), 50-60 deg, rough, undulating, open 1/8" | | | |
| | | | 0 | 53.8, 54.4, 51.4' - Mechanical break (3) | | | |
| 55<br>-13.0 | | | 0 | | | | R5: 11 minutes |
| | 56.0 | | NR | | | **No Recovery 55.6-56.0'** | |
| | R6-NQ 5 ft 73% | 27 | 1 | | | **Limestone**<br>56.0-56.4, 57.0-57.15, 57.55-58.5' - Same as 51.2-51.7' | 13:12 Begin coring 56.0-61.0' |
| | | | 0 | 56.9' - Fracture, 80 deg, tight, not completely broken through | | **Limestone**<br>56.4-57.0, 57.15-57.55, 58.5-59.3' - moderate yellowish brown, (10YR 5/4), very fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids to 1/8" over 40% of surface, poorly fossiliferous, organic laminae throughout | 13:24 Core catcher is not retrieved, washing loose material and going back in with wireline |
| | | | 0 | 58.3, 58.45, 56.5' - Mechanical break (3) | | | |
| | | | 0 | | | | |
| 60<br>-18.0 | | | NR | | | 59.03-59.65' - Same as 51.0-51.2'<br>**No Recovery 59.7-61.0'** | R6: Run time not recorded |
| | 61.0 | | | | | | |
| | R7-NQ 5 ft 90% | 46 | 1 | 61.5' - Bedding plane, <5 deg, smooth, undulating, silt infill, open 5" | | | 13:30 Begin coring 61.0-66.0' |
| | | | 1 | 62.1, 64.9' - Fracture, 65 deg, rough, undulating, open 1/4" | | | |
| | | | 0 | 62.25' - Fracture, 10 deg, rough, undulating, associated bedding plane fractures, open 1/4" | | | SC-2 collected at 62.65-63.5' |
| | | | 1 | 62.9' - Fracture, 65 deg, rough, undulating, open 1/4"<br>64.2, 62.65, 63.5' - Mechanical break (3) | | | |
| 65<br>-23.0 | | | 2 | 65.1, 65.25' - Bedding plane (2), <10 deg, rough, undulating, open 1/4" | | | R7: Run time not recorded |
| | 66.0 | | NR | | | **No Recovery 65.5-66.0'** | |
| | R8-NQ 5 ft 100% | 37 | 0 | | | **Limestone**<br>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 | 13:45 Begin coring 66.0-71.0' |
| | | | 0 | 67.15, 69.55' - Mechanical break (2) | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| 70<br>-28.0 | | | 1 | | | | R8: 14 minutes |
| | 71.0 | | | | | | |

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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 ORIENTATION : Vertical

WATER LEVELS : 2.4 ft bgs on 4/22/07 START : 4/19/2007 END : 4/23/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R9-NQ 5 ft 84% | 60 | 2 | 70.1' - Bedding plane, <5 deg, silt and/or clay sized infilling, open 1/2", dusky yellow (5Y 6/4) silt infill | | 69.2-71.0' - moderate yellowish brown, (10YR 5/4), fine to very fine grained, moderate HCl reaction, weak (R2), laminated bedding, voids to 1/16" over 20% of surface, trace laminar bedding | 14:46 Begin coring 71.0-76.0' |
| | | | 0 | 71.2, 71.7' - Fractures (2), <5 deg and 15 deg, rough, undulating, open 1/4" | | **Limestone** 71.0-73.0' - dusky yellow to pale olive, (5Y 6/4 to 10Y 6/2), strong HCl reaction, weak (R2), voids to 1/16" over <10% of surface, fossiliferous (casts), dissolution along fractures, 5% cover infill of medium gray (N5) | |
| | | | 2 | 73.0' - Bedding plane, 5 deg, rough, undulating, open 1/4", tight<br>73.5, 74.9, 75.0' - Mechanical break (3) | | | |
| | | | 1 | 73.7, 74.0' - Bedding plane (2), 5 deg, rough, undulating, open 1/4", olive gray (5Y 3/2) clay infilling | | | |
| 75<br>-33.0 | | | 0 | | | | R9: 5 minutes |
| | | | NR | | | 73.0-73.7' - dusky yellow, (5Y 6/4), fine grained, moderate HCl reaction, extremely weak (R0), fossiliferous (casts), voids on 20% of surface to 1/16", mottling pale olive (10Y 6/2) | |
| | 76.0 | | | | | | |
| | R10-NQ 5 ft 96% | 64 | 0 | | | | 14:51 Begin coring 76.0-81.0'<br>SC-3 collected at 76-76.9' |
| | | | 1 | | | 73.7-75.2' - dusky yellow to pale olive, (5Y 6/4 to 10Y 6/2), moderate HCl reaction, weak (R2), voids up to 1/16" over 30% of surface, clay infill in some fractures | |
| | | | 1 | 77.8, 78.9' - Bedding plane (2), 20 deg, rough, undulating, silt zone open 1/4" | | **No Recovery 75.2-76.0'** | |
| | | | 1 | | | **Limestone** 76.0-77.8, 78.5-79.5, 79.9-80.8' - dusky yellow, (5Y 6/4), fine grained, moderate HCl reaction, extremely weak (R0), fossiliferous (casts), voids over 20-30% of surface to 1/16", mottled with light olive gray to yellowish gray (5Y 5/2 to 5Y 7/2) | |
| 80<br>-38.0 | | | | 79.6, 76.9, 80.0' - Mechanical break (3) | | | |
| | | | 1 | 80.2' - Fracture, 20 deg, rough, undulating, silt and/or clay sized infilling, silt zone open 1/2" | | | R10: Run time not recorded |
| | 81.0 | | NR | | | | |
| | R11-NQ 5 ft 90% | 83 | 1 | 81.3' - Bedding plane, <5 deg, rough, undulating, open 1/4" | | 77.8-78.5, 79.5-79.9' - dusky yellow to pale olive, (5Y 6/4 to 10Y 6/2), weak (R2), voids up to 1/16" over 30% of surface | 14:58 Begin coring 81.0-83.0' |
| | | | 0 | 82.25, 83.0, 83.5' - Mechanical break (3) | | | |
| | | | 0 | | | 79.6-79.7' - moderate HCl reaction, clay infill | |
| | | | | | | **No Recovery 80.8-81.0'** | |
| | | | 1 | 84.0' - Bedding plane, <5 deg, rough, undulating, open 1/4", associated with fossils and dissolution zones | | **Limestone** 81.0-85.5' - dusky yellow to yellowish gray, (5Y 6/4 to 5Y 7/8), very fine to fine grained, mild to moderate HCl reaction, weak (R2), voids up to 1/16" on 35-40% of surface, fossiliferous (casts, molds), dissolution cavities 83.9-84.4'. Largest dissolution zone is up to 1/2"x1", very weak (R1) to weak (R2) rock, low to moderate HCl reaction | |
| 85<br>-43.0 | | | 1 | 85.0' - Bedding plane, <15 deg, rough, undulating, open 1/4" | | | R11: 12 minutes |
| | 86.0 | | NR | | | | |
| | R12-NQ 5 ft 34% | 9 | >10 | 86.45-86.75' - Fracture zone, rough, undulating, intersecting fractures, open | | | 15:30 Begin coring 86.0-91.0' |
| | | | 3 | 87.1, 87.4' - Bedding plane, <5 deg, rough, undulating, open less than 1/4" | | | Driller's Remark: Slight circulation loss at 87.0' |
| | | | NR | 87.3' - Fracture, 75 deg, rough, undulating, tight | | **No Recovery 85.5-86.0'**<br>**Limestone** 86.0-87.7' - Same as 81.0-85.5'<br>**No Recovery 87.7-91.0'** | |
| 90<br>-48.0 | | | | | | | R12: Run time not recorded |
| | 91.0 | | | | | | |

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|---|---|
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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 ORIENTATION : Vertical

WATER LEVELS : 2.4 ft bgs on 4/22/07 START : 4/19/2007 END : 4/23/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | | | 1 | | | **Limestone**<br>91.0-95.0' - grayish orange, (10YR 7/4), fine grained, moderate HCl reaction, weak (R2), moderately fossiliferous (casts), voids up to 1/8" over 30% of surface | 16:44 Begin coring 91.0-96.0'<br>16:59 Core drilled to 93.5', drillers remark that core barrel is stuck<br>17:11 Retrieve core sample 91.0-93.5'<br>17:20 Set 4" casing<br>4/22/07 09:38 Water level 2.4' below ground surface<br>09:52 Begin to set 3" casing |
| | | | 0 | 92.3' - Bedding plane, <10 deg, rough, undulating, open 1/4" | | | |
| | R13-NQ<br>5 ft<br>80% | 50 | >10 | 93.0-93.9' - Fracture zone or mechanical break, smooth to rough, undulating, open up to 1/4", intersecting fractures | | | |
| | | | >10 | 93.5-94.4' - Fracture zone or mechanical break, smooth to rough, undulating, open 1/4" | | | |
| 95<br>-53.0 | | | NR | 94.55' - Bedding plane, 15 deg, rough, undulating, open 1/4" | | **No Recovery 95.0-96.0'** | 11:18 Core barrel freed (3" casing to 85.0')<br>13:40 NW casing pulled, setting HW casing to 90.0'<br>15:28 4" casing set<br>15:49 Begin coring 93.5-96.0'<br>R13: 23 minutes<br>4/23/07 08:00 Begin coring 96.0-101.0' |
| | 96.0 | | | | | | |
| | | | <10 | 96.0-96.2, 96.7-97.0' - Fracture zone (2), rough, undulating, open 1/4", intersecting fractures | | **Limestone**<br>96.0-96.7' - dusky yellow to yellowish gray, (5Y 6/4 to 5Y 7/2), very fine grained, moderate HCl reaction, very weak to weak (R1 to R2), voids to 1/8" over 35-40% of surface<br>96.7-97.15' - dusky yellow, (5Y 6/4), fine grained, moderate HCl 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)<br>97.15-98.9' - dusky yellow matrix with yellowish gray infill, (5Y 6/4 with 5Y 8/1), fine grained, moderate HCl 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)<br>**No Recovery 98.9-101.0'**<br>**Limestone**<br>101.0-102.7' - dusky yellow with light olive gray infill, (5Y 6/4 with 5Y 5/2), moderate HCl 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", infill over 10-20% of surface, fine grained<br>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<br>**No Recovery 105.9-106.0'** | |
| | | | 1 | 97.6, 98.6' - Bedding plane (2), 10 deg, rough, undulating, tight | | | |
| | R14-NQ<br>5 ft<br>58% | 17 | 4 | 97.7, 98.5' - Mechanical break (2)<br>98.2' - Bedding plane, 10 deg, rough, undulating, tight | | | |
| 100<br>-58.0 | | | NR | 98.25, 98.75' - Fracture (2), 50 deg, rough, undulating, with organics in vertical orientation | | | R14: Run time not recorded |
| | 101.0 | | | | | | |
| | | | 1 | 101.7, 104.9' - Mechanical break (2) | | | 08:09 Begin coring 101.0-106.0' |
| | | | 0 | 101.9' - Bedding plane, 10 deg, rough, undulating, open 1/2" | | | |
| | R15-NQ<br>5 ft<br>98% | 97 | 1 | 105.3, 102.4, 103.5, 104.2' - Mechanical break (4)<br>102.75' - Mechanical break | | | |
| | | | 0 | 103.8' - Bedding plane, 10 deg, rough, undulating, tight | | | |
| 105<br>-63.0 | | | 0 | 104.55' - Bedding plane, <5 deg, smooth, undulating | | | R15: Run time not recorded |
| | 106.0 | | NR | 105.05' - Bedding plane, <5 deg, smooth, undulating, very soft material, open 1/4"<br>105.2-105.8' - Fracture zone, smooth to rough, undulating, intersecting fractures, most are high angle, open 1/8" | | | 08:30 Begin coring 106.0-111.0' |
| | | | 0 | | | | SC-4 collected at 106.0-107.0' |
| | | | 0 | | | | |
| | R16-NQ<br>5 ft<br>100% | 90 | 0 | | | | |
| | | | 0 | | | | |
| 110<br>-68.0 | | | 2 | | | | R16: Run time not recorded |
| | 111.0 | | | | | | |

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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 ORIENTATION : Vertical

WATER LEVELS : 2.4 ft bgs on 4/22/07 START : 4/19/2007 END : 4/23/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R17-NQ 5 ft 96% | 80 | 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, extremely weak to weak (R0 to R2), voids to 1/16" over <20% of surface, highly fossiliferous, dissolution zones up to 1/2" diameter over < 5% of surface | 08:40 Begin coring 111.0-116.0' |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 1 | | | | |
| 115 -73.0 | | | >10 | | | 111.0-115.8' - dusky yellow, (5Y 6/4), fine grained, strong HCl reaction, extremely weak to medium strong (R0 to R3), increasing in hardness with depth until 105.2' below ground surface, voids to 1/16" over <20% of surface | R17: Run time not recorded |
| 116.0 | | | NR | | | **No Recovery 115.8-116.0'** | |
| | R18-NQ 5 ft 94% | 70 | 6 | 116.0-116.2' - Fracture zone, smooth to rough, undulating | | **Limestone** 116.0-120.7' - dusky yellow, (5Y 6/4), fine grained, strong HCl reaction, very weak to weak (R1 to R2), voids to 1/8" over <20% of surface, fossiliferous | 08:50 Begin drilling 116.0-121.0' |
| | | | 0 | 116.3' - Fracture, 55 deg, rough, undulating, tight<br>116.4' - Fracture, 80-85 deg, rough, undulating, tight | | | |
| | | | 0 | 116.6' - Bedding plane, 10 deg, rough, undulating | | **No Recovery 120.7-121.0'** | |
| | | | 1 | 118.8, 120.15' - Mechanical break (2) | | **Limestone** 121.0-124.5' - Same as 116.0-120.7' 124.5-126.0' - light olive brown with 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 throughout and yellowish gray (5Y 7/2) infill over 15% of surface. Matrix is highly fossiliferous, dissolution 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 < 5% voids | |
| 120 -78.0 | | | 0 | 119.9' - Fracture, 80 deg, smooth, undulating, open, end missing | | | R18: Run time not recorded |
| 121.0 | | | NR | | | | |
| | R19-NQ 5 ft 100% | 62 | 1 | 121.4' - Fracture, 80 deg, rough, undulating, open less than 1/8" | | | 09:09 Begin drilling 121.0-126.0' |
| | | | 0 | | | | |
| | | | 0 | 123.5, 125.8, 124.8' - Mechanical break (3) | | 126.0-126.4' - pale olive with light olive gray laminations, (10YR 6/2 with 5Y 5/2), very fine grained, mild HCl reaction, weak (R2), poorly fossiliferous, no voids | SC-5 collected at 123.5-124.45' |
| | | | 1 | 124.5' - Bedding plane, smooth, undulating, dissolution features along outer edges of fracture open 1/4" | | | |
| 125 -83.0 | | | 3 | 125.25' - Fracture, 85 deg, not open | | **Limestone** 126.4-129.6' - light olive brown, (5Y 5/6), same as limestone in 116.0-120.7' except voids over 25% of surface up to 1/16" and laminar feature at 127.15-127.0', no voids, poorly fossiliferous, weak (R2) to medium strong (R3) rock with exception of 127.2-127.4' which is strong (R4) rock, moderate to strong HCl reaction | R19: 10 minutes |
| 126.0 | | | | | | | |
| | R20-NQ 5 ft 72% | 40 | >10 | 125.85, 125.9' - Bedding plane (2), <5 deg, smooth, planar, tight<br>126.0-126.4' - Fracture zone, intersecting fractures, open 1/8", tight | | | 09:19 Begin drilling 136.0-131.0' |
| | | | >10 | 126.75, 127.3, 128.5, 128.7' - Mechanical break (4) | | | |
| | | | 0 | 127.4-127.55' - Fracture zone, intersecting fractures, open 1/4", softer material<br>127.8, 127.95' - Fracture (2), 60 deg, rough to smooth, undulating, open 1/4" | | | |
| | | | 2 | 129.35' - Fracture, 60 deg, rough to smooth, undulating, open 1/4" | | **No Recovery 129.6-131.0'** | |
| 130 -88.0 | | | NR | 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 ORIENTATION : Vertical

WATER LEVELS : 2.4 ft bgs on 4/22/07 START : 4/19/2007 END : 4/23/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R21-NQ 5 ft 64% | 10 | >10 | 131.15, 132.1, 132.8' - Bedding plane (3), <5 deg, smooth, planar, open <1/8" | | **Limestone** 131.0-132.2' - pale yellowish brown, (10YR 6/2), fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), voids to 1/8" over 20-25% of rock, fossil casts to 3/8"x3/4" over 5% of rock as casts (voids) | 09:34 Begin drilling 131.0-136.0' |
| | | | 4 | 131.4, 133.2, 134.0' - Mechanical break<br>131.7-132.0' - Fracture zone, smooth to rough, undulating, intersecting fractures, open 1/4" | | | |
| | | | 3 | 132.6' - Bedding plane, <5 deg, smooth, planar, open 1/4" | | | |
| | | | 1 | 133.45, 133.6' - Fracture zone (2), 60-70 deg, rough, undulating, open 1/4" on 133.45' | | 132.2-134.2' - grayish orange, (10YR 7/4), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids to 1/16" over <10% of surface | |
| 135 -93.0 | | | NR | 133.6' - Fracture, 60-70 deg, rough, undulating, open 1/4"<br>133.8' - Bedding plane, <5 deg, rough, undulating, tight | | **No Recovery 134.2-136.0'** | R21: Run time not recorded |
| | 136.0 | | | 133.9' - Fracture, <5 deg, rough, undulating, tight | | | |
| | R22-NQ 5 ft 74% | 53 | 3 | 134.0' - Fractures, <5 deg, smooth, planar, open 1/4" | | **Limestone** 136.0-139.7' - grayish orange, (10YR 7/4), fine to medium grained, moderate HCl reaction, weak (R2), voids to 1/8" over 30-40% of surface, fossil casts (voids) to 5/16" diameter over 5% of surface | 09:50 Begin drilling 136.0-141.0' |
| | | | 1 | 135.7' - Bedding plane, <30 deg, smooth, undulating, open 1/4" | | | |
| | | | 1 | 136.0-136.3' - Bedding plane, <5 deg, smooth, planar, tight<br>136.5, 136.6' - Bedding plane (2), 10 deg, rough, undulating, open 1/4" | | | |
| | | | 0 | 137.5' - Fracture, 50 deg, smooth, undulating, tight | | | |
| 140 -98.0 | | | NR | 138.4' - Mechanical break<br>138.5, 137.9' - Mechanical break (2)<br>138.7' - Bedding plane, <30 deg, smooth, undulating, open 1/4" | | **No Recovery 139.7-141.0'** | R22: Run time not recorded |
| | 141.0 | | | | | | |
| | R23-NQ 5 ft 84% | 55 | >10 | 141.2-141.35' - Fracture zone, pieces to 2"x1", open 1/4" | | **Limestone** 141.0-143.7' - light olive gray mottled with yellowish gray, (5Y 6/1 mottled with 5Y 7/2), fine to medium grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids up to 1/16" over 10-25% of surface, trace fossils up to 1/2"x1/4", cavities to 1"x1/2" over 5-20% of surface | 10:06 Begin drilling 141.0-146.0'<br>SC-6 collected at 141.4-142.3' |
| | | | >10 | 142.3-142.49' - Fracture zone, pieces to 1"x1/2", open 1/4" | | | |
| | | | >10 | 142.9-143.05' - Fracture zone, pieces to 1-1/2"x1/2", open 1/4" | | | |
| | | | 1 | 143.2' - Bedding plane or mechanical break, 20 deg, rough, undulating, organic dark stain, open 1", associated with cavities | | 143.7-145.2' - olive gray, fine grained, moderate HCl reaction, medium strong (R3), trace voids to 1/8", trace fossils to 3/16"x1/16", dark 1/16" laminations (wavy) over 5-10% of surface | |
| 145 -103.0 | | | 1 | 143.7-143.95' - Fracture zone, pieces to 1"x1/2", open 1/4" | | | R23: 34 minutes |
| | | | NR | 144.55' - Bedding plane, 50 deg, smooth, undulating, tight | | **No Recovery 145.2-146.0'** | |
| | 146.0 | | | | | | |
| | R24-NQ 5 ft 56% | 33 | 1 | 145.0' - Fracture, <5 deg, smooth, undulating, open 1/2" | | **Limestone** 146.0-147.9' - grayish orange, (10YR 7/4), fine to medium grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids to 1/8" over 0-40% of surface in interbedded nature interchanging every 3-1/8", trace fossil casts to 1/8"x9/16" | 10:40 Begin drilling 146.0-151.0' |
| | | | 2 | 146.95' - Fracture, 20 deg, smooth, undulating, tight | | | |
| | | | 2 | 147.65' - Bedding plane, 0-5 deg, smooth, planar, tight<br>147.9' - Bedding plane, smooth, undulating, open 1/4" | | | 10:51 Finish drilling |
| | | | NR | 148.3, 148.35' - Fractures (2), 50 deg, smooth, undulating, tight, open 1/2" | | | R24: Run time not recorded<br>Used 17 bags of quick cement for abandonment (47-lbs/bag) and about 60 gallons of water |
| 150 -108.0 | | | | | | | |
| | 151.0 | | | | | | |

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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 ORIENTATION : Vertical

WATER LEVELS : 2.4 ft bgs on 4/22/07 START : 4/19/2007 END : 4/23/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES | | | SYMBOLIC LOG | LITHOLOGY | COMMENTS |
|---|---|---|---|---|---|---|---|
| | | R Q D (%) | FRACTURES PER FOOT | DESCRIPTION<br>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. |
| | | | | | | 147.9-148.8' - moderate yellowish brown, (10YR 5/4), medium to coarse grained, moderate HCl reaction, weak (R2), voids to 1/16" over 40% of surface, trace fossils to 3/16"x1/16"<br>**No Recovery 148.8-151.0'**<br>Bottom of Boring at 151.0 ft bgs on 4/23/2007 | |

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# SOIL BORING 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

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 bgs on 5/22/07 START : 5/21/2007 END : 5/23/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 41.3 | 0.0 – 1.5 | 0.7 | SS-1 | 1-1-2 (3) | **Topsoil** 0.0-0.25' - brownish black, (5YR 2/1), wet, very loose, nonplastic, organics (root and plant debris) with <10% 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 | | | | | | |
| 36.3 | 6.5 | 1.2 | SS-2 | 5-5-4 (9) | **Silty Sand (SM)** 5.0-6.15' - grayish orange, (10YR 7/4), wet, loose, fine grained, 15% nonplastic fines, trace organics (roots), silica sand, soil grades to sandy fat clay with 30-40% fine sand at bottom of sample | | Driller's Remark: Set 5' HW surface casing |
| 10 | 10.0 | | | | | | |
| 31.3 | 11.5 | 0.8 | SS-3 | 14-17-14 (31) | **Silt (ML)** 10.0-10.75' - grayish orange, (10YR 7/4), wet, hard, nonplastic, rapid dilatancy, moderate HCl reaction, trace roots, carbonate derived | | Driller's Remark: Set 5' HW casing (10' below ground surface) |
| 15 | 15.0 | | | | | | |
| 26.3 | 16.5 | 1.2 | SS-4 | 22-47-42 (89) | **Silt (ML)** 15.0-16.2' - Same as 10.0-10.75' except strong HCl reaction, 10-15% coarse sand-sized to fine gravel-sized limestone, all carbonate | | |
| 20 | | | | | | | |

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# SOIL BORING 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

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 bgs on 5/22/07 START : 5/21/2007 END : 5/23/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 21.3 | 20.0–21.5 | 1.0 | SS-5 | 3-25-17 (42) | **Silt With Limestone Fragments (ML)** 20.0-21.0' - grayish orange and pale yellowish brown, (10YR 6/2 and 10YR 7/4), pale orange mottling, wet, hard, nonplastic, strong HCl reaction | | Driller's Remark: Hard at 24' below ground surface |
| 25 / 16.3 | 25.0–26.5 | 1.2 | SS-6 | 13-13-17 (30) | **Silt With Sand (ML)** 25.0-26.2' - grayish orange, (10YR 7/4), wet, hard, nonplastic, rapid dilatancy, moderate to strong HCl reaction, 15-20% fine to coarse sand-sized, all carbonate | | |
| 30 / 11.3 | 30.0–30.1 | 0.0 | SS-7 | 50/1.5 (50/1.5") | **No Recovery 30.0-30.1'** | | |
| 35 / 6.3 | 35.0–36.5 | 1.4 | SS-8 | 13-19-26 (45) | **Silt With Sand (ML)** 35.0-36.4' - moderate yellowish brown, (10YR 5/4), wet, hard, nonplastic, rapid dilatancy, moderate to strong HCl reaction, 20-25% fine to coarse sand, limestone fragments to 1/4" at top of sample, all carbonate | | |
| 40 | | | | | | | |

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# SOIL BORING 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

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 bgs on 5/22/07 START : 5/21/2007 END : 5/23/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 1.3 | 40.0<br>40.8 | 0.8 | SS-9 | 30-50/4<br>(80/10") | **Silt With Sand (ML)**<br>40.0-40.75' - dark yellowish orange, (10YR 6/6), wet, hard, low plasticity, rapid dilatancy, moderate to strong HCl reaction, 25% fine to coarse grained sand, all carbonate | | |
| 45<br>-3.7 | 45.0<br>46.5 | 1.4 | SS-10 | 27-29-50/5.5<br>(79/11.5") | **Silt With Sand (ML)**<br>45.0-46.4' - moderate yellowish brown, (10YR 5/4), wet, hard, nonplastic, rapid dilatancy, moderate to strong HCl reaction, 15% fine to coarse sand-sized, trace gravel-sized, all carbonate | | |
| 50<br>-8.7 | 50.0<br>50.7 | 0.5 | SS-11 | 41-50/2<br>(91/8") | **Silt (ML)**<br>50.0-50.5' - moderate yellowish brown, (10YR 5/4), wet, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 10% fine to coarse grained sand, all carbonate | | Driller's Remark: Hard rock 50.0-55.0', run time 15-20 minutes |
| 55<br>-13.7 | 55.0<br>55.3 | 0.3 | SS-12 | 50/4<br>(50/4") | **Silt (ML)**<br>55.0-55.25' - Same as 50.0-50.5' | | Finished drilling at 17:30 on 5/21/07 at 55.0' below ground surface<br><br>Resume drilling at 07:52 on 5/22/07<br><br>Water level at 07:35 is 4.25' below ground surface |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-19 SHEET 4 OF 10 |

# SOIL BORING 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

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 bgs on 5/22/07 START : 5/21/2007 END : 5/23/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -18.7 | 60.0 | 0.2 | SS-13 | 50/3.5 (50/3.5") | **Limestone Fragments And Silt (ML)** 60.0-60.2' - dark yellowish orange, (10YR 6/6), nonplastic, mild to moderate HCl reaction, all carbonate | | Driller's Remark: 10-15% loss in circulation at 60.5' Driller's Remark: Hard drilling at 61.0', will switch to rock coring |
| | | | | | Begin Rock Coring at 61.5 ft bgs See the next sheet for the rock core log | | |
| 65 -23.7 | | | | | | | |
| 70 -28.7 | | | | | | | |
| 75 -33.7 | | | | | | | |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
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| 338884.FL | B-19 SHEET 5 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 : 4.25 ft bgs on 5/22/07 START : 5/21/2007 END : 5/23/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | 61.5 | | | | | | |
| | R1-NQ 5 ft 91% | 88 | 1 | 62.1' - Mechanical break or bedding plane, horizontal, smooth, undulating, tight | | **Limestone** 61.5-66.05' - dark yellowish orange, (10YR 6/6), fine to medium grained, moderate HCl reaction, extremely weak to weak (R0 to R2), voids to 1/8" diameter over 0-30% of rock (mostly 25%), trace fossil casts to 3/16" diameter, no visible cavities, trace dark (possibly organic) inclusions and laminations | 5/22/07 start coring at 11:25 Driller's Remark: Cored fast (soft) at 62.0-63.0' |
| | | | 1 | | | | |
| | | | 1 | 63.4, 63.5' - Bedding plane or mechanical break (2), horizontal, smooth, undulating, tight to 1/2" open | | | |
| 65 -23.7 | | | 0 | | | | |
| | | | 0 | | | | R1: 5 minutes |
| | 66.5 | | NR | | | **No Recovery 66.05-66.5'** | |
| | R2-NQ 5 ft 85% | 83 | 1 | 66.9' - Mechanical break or bedding plane, horizontal, smooth, undulating, tight | | **Limestone** 66.5-68.9' - moderate yellowish brown, (10YR 5/4), fine to medium grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids to 1/8" over 5-20% of rock, trace fossil casts up to 5/16" diameter, no visible cavities, trace dark gray fine grained inclusions | |
| | | | 0 | | | | |
| | | | 0 | 69.05' - Mechanical break or bedding plane, horizontal, smooth, undulating, tight | | | Driller's Remark: Very soft at 69.0-70.5' |
| 70 -28.7 | | | 3 | 69.75' - Bedding plane, horizontal, smooth, undulating, tight to 1/2" open | | 68.9-69.75' - grayish orange, (10YR 7/4), fine to medium grained, strong HCl reaction, extremely weak to very weak (R0 to R1), voids to 1/8" over 20-30% of rock, trace fossil casts/molds to 3/16" diameter, no visible cavities, trace dark (possibly organic) particles | |
| | | | 0 | 70.25' - Fracture, 45 deg, smooth, undulating to planar, tight | | | R2: 7 minutes |
| | 71.5 | | NR | | | | |
| | R3-NQ 5 ft 74% | 70 | 0 | | | 69.75-70.75' - moderate yellowish brown, (10YR 5/4), fine to medium grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids to 1/8" over 15-20% of rock, fossil casts to 3/8" over 5-10% of rock, no visible cavities | |
| | | | 0 | | | | |
| | | | NR | | | | Driller's Remark: 25% circulation loss at 73.0-74.0', extremely soft, possible silt-filled cavity |
| | | | 0 | | | **No Recovery 70.75-71.5'** | |
| 75 -33.7 | | | 1 | 74.9' - Mechanical break, 0-80 deg, rough, undulating, tight, related to cavities | | **Limestone** 71.5-72.75' - grayish orange, (10YR 7/4), fine to medium grained, moderate HCl reaction, medium strong (R3), voids to 1/8" over 20-30% of rock, fossil casts to 9/16" over 10-15% of rock, no visible cavities | |
| | | | 1 | 75.65' - Fracture, 45 deg, rough, undulating, 2" thick silty gravely infill, tight | | | R3: 10 minutes |
| | 76.5 | | | | | | |
| | R4-NQ 5 ft 100% | 80 | 1 | | | **No Recovery 72.75-74.15'** | |
| | | | 0 | 77.35' - Bedding plane or mechanical break, horizontal, smooth, undulating, associated with cavity, tight to 1" open | | **Limestone** 74.15-75.6' - pale yellowish brown, (10YR 6/2), fine grained, strong HCl reaction, medium strong (R3), trace voids, cavities to 2" diameter most with infill, trace fossil casts to 3/8"x3/16", infill is moderate yellowish brown, (10YR 5/4), medium grained, weak (R2), voids up to 3/16" over 40% of infill | |
| | | | 1 | 78.75' - Bedding plane, 10 deg, smooth, undulating, tight | | | Driller's Remark: Soft rock 78.5-81.5' |
| 80 -38.7 | | | 0 | | | | |
| | | | 2 | | | | R4: 4 minutes |
| | 81.5 | | | | | | |

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|---|---|---|

# 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 : 4.25 ft bgs on 5/22/07 START : 5/21/2007 END : 5/23/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R5-NQ 5 ft 100% | 98 | 0 | 81.1' - Bedding plane or mechanical break, horizontal, rough, undulating, tight<br>81.3' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | **Silt With Limestone Fragments (ML)**<br>75.6-75.8' - moderate yellowish brown, (10YR 5/4), strong HCl reaction, compacted, carbonate | Driller's Remark: Lost 95% circulation at 81.5'<br>SC-1 collected at 81.5-82.8' |
| | | | 0 | | | **Limestone**<br>75.8-76.5' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, medium strong (R3), voids to 1/8" over 10-20% of rock, trace fossil casts to 3/16"x1/8", no visible cavities | |
| | | | 1 | 84.2' - Mechanical break, horizontal, rough, undulating, associated with cavities, tight to 1" open | | | Driller's Remark: Soft rock at 83.5-85.0' |
| 85<br>-43.7 | | | 0 | | | | |
| | | | 0 | | | 76.5-81.5' - moderate yellowish brown, (10YR 5/4), fine to medium grained, moderate to strong HCl reaction, weak (R2), very weak (R1) 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 fossil casts to 3/8" diameter, trace cavities to 3/8" x 1-9/16" increasing to cover 10-15% of rock at 80.4-81.1', trace dark laminations in very weak rock sections, dark fat clay layer 3/8" thick at 78.7' | R5: 7 minutes |
| 86.5 | | | | | | | |
| | R6-NQ 5 ft 70% | 70 | 0 | | | | Driller's Remark: 100% circulation lost at 86.5' |
| | | | 0 | | | | SC-2 collected at 87.5-88.55' |
| | | | 1 | 88.5' - Fracture, 10 deg, rough, undulating, dark stain, tight | | | Driller's Remark: Very soft at 88.5-90.0' |
| 90<br>-48.7 | | | 0 | | | | |
| | | | NR | | | 81.5-86.5' - moderate yellowish brown, (10YR 5/4), fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), voids to 1/8" over 10-20% of rock (decreasing in percent coverage with depth), cavities to 2" x 1-3/16" over 40% of rock at 83.5-84.5' (open cavities) otherwise trace cavities to 1-3/16" x 3/4" with light gray fine grained infill, fossil casts comprise most of cavities | R6: 11 minutes |
| 91.5 | | | | | | | |
| | R7-NQ 5 ft 56% | 9 | >10 | 91.5-91.9' - Fracture zone, rounded fragments to 1-1/2" diameter, compacted silts in zone | | | Driller's Remark: Very soft at 92.0-93.5' |
| | | | 10 | 92.4' - Fracture, 60 deg, smooth, undulating, tight<br>92.55' - Fracture, 75 deg, smooth, undulating, tight | | | |
| | | | 2 | 93.0' - Fracture, 30 deg, smooth, planar, tight<br>93.2-93.45' - Fracture zone, fragments to 1-1/2" x 1" | | 86.5-90.0' - very pale orange grading to moderate yellowish brown with depth, (10YR 8/2 to 10YR 5/4), fine grained, moderate to strong HCl 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', trace fossil casts to 3/8" diameter, trace dark (possibly organic) inclusions | |
| 95<br>-53.7 | | | NR | 93.75' - Fracture, <10 deg, smooth, undulating, tight<br>94.05' - Fracture, 15 deg, smooth, undulating, tight | | | Driller's Remark: Soft at 94.5-95.5'<br>R7: 6 minutes |
| 96.5 | | | | | | | Driller's Remark: Soft at 96.0-96.5' |
| | R8-NQ 5 ft 30% | 8 | >10 | 96.5-97.0' - Fracture zone, fragments to 1-1/2" diameter | | **No Recovery 90.0-91.5'** | |
| | | | 2 | 97.2' - Bedding plane, horizontal, smooth, undulating, tight to 1/4" open<br>97.5' - Bedding plane, horizontal, smooth, undulating, tight to 1/4" open | | **Silt (ML)**<br>91.5-91.9' - grayish orange, (10YR 7/4), very strong HCl reaction, compacted | |
| | | | NR | 97.65' - Bedding plane, horizontal, smooth, undulating, tight to 1/4"open | | | |
| 100<br>-58.7 | | | | | | | Driller's Remark: 99.5-100.0' only resistance in run<br>R8: 3 minutes |
| 101.5 | | | | | | | |

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# 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 : 4.25 ft bgs on 5/22/07 START : 5/21/2007 END : 5/23/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R9-NQ 5 ft 100% | 52 | 3 | 102.0' - Fracture, 60 deg, smooth, undulating, open (missing opposite face) | | **Limestone** 91.9-93.15' - pale yellowish brown, (10YR 6/2), fine grained, moderate HCl 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, with voids to 3/16" over 25-30% of infill area | |
| | | | >10 | 102.1' - Bedding plane, horizontal, smooth, undulating, open (missing opposite face) | | | SC-3 collected at 102.8-104.0' |
| | | | 0 | 102.4-102.8' - Fracture zone, fragments to 2" x 1-1/2" | | | |
| 105 -63.7 | | | >10 | 104.8' - Bedding plane or mechanical break, horizontal, smooth, undulating, tight | | | |
| | | | >10 | 105.1-105.8' - Fracture zone, fragments to 1" diameter | | 93.15-94.3' - moderate yellowish brown, (10YR 5/4), fine to medium grained, moderate to strong HCl reaction, weak to very weak (R2 to 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 | Driller's Remark: Soft to 105.5' R9: 7 minutes |
| 106.5 | | | | 106.05' - Fracture, 50 deg, smooth, undulating, tight to open 1/2" | | | |
| | R10-NQ 5 ft 85% | 66 | >10 | 106.3-106.5' - Fracture zone, fragments to 1/2" diameter | | | Driller's Remark: Fairly soft at 106.5-109.0' |
| | | | 2 | 106.5-106.6' - Fracture zone, fragments to 1-1/2" diameter | | | |
| | | | 0 | 107.2-107.55' - Fracture zone, fragments to 2" diameter | | **No Recovery 94.3-96.5'** | |
| 110 -68.7 | | | 1 | | | **Limestone** 96.5-98.0' - very pale orange, (10YR 8/2), fine to medium grained, strong HCl reaction, weak to very weak (R1 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 | |
| | | | 1 | 110.3' - Bedding plane, horizontal, smooth, undulating, tight to 1/2" open | | | R10: 5 minutes |
| 111.5 | | | NR | 110.55' - Fracture, 60 deg, smooth, undulating, tight | | **No Recovery 98.0-101.5'** | Driller's Remark: Soft at 111.0-111.5' |
| | R11-NQ 5 ft 98% | 98 | 1 | 112.0' - Bedding plane or mechanical break, horizontal, smooth, undulating, tight | | **Limestone** 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' |
| | | | 1 | 113.05' - Bedding plane, horizontal, smooth, undulating, tight | | | |
| | | | 0 | | | | |
| 115 -73.7 | | | 2 | 114.75' - Bedding plane, horizontal, rough, undulating, tight | | 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 | |
| | | | 1 | 115.15' - Bedding plane, horizontal, smooth, undulating, tight | | | R11: 4 minutes |
| 116.5 | | | | 116.3' - Fracture, 45 deg, smooth, undulating, tight | | 107.55-110.75' - moderate yellowish 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 cavities | |
| | R12-NQ 5 ft 99% | 78 | 1 | 117.05' - Bedding plane, horizontal, rough, undulating, tight | | | |
| | | | 0 | | | | |
| | | | 4 | 118.6, 118.75, 118.9, 119.15, 119.55, 119.65, 119.95' - Bedding plane (7), horizontal, smooth, undulating, tight | | **No Recovery 110.75-111.5'** | |
| 120 -78.7 | | | 3 | | | **Limestone** 111.5-113.05' - Same as 107.55-110.75' except trace cavities to 3/4"-1-3/16" | |
| | | | 0 | | | 113.05-114.35' - Same as 106.5-107.55' except trace fossil molds to 3/16"x3/8" from 113.05-113.3' | R12: 6 minutes |
| 121.5 | | | | | | | |

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# 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 : 4.25 ft bgs on 5/22/07 START : 5/21/2007 END : 5/23/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | NR | | | **Limestone** | Driller's Remark: Soft at 120.5-121.5' |
| | | | 6 | 121.9, 122.1, 122.25, 122.35, 122.4, 122.5' - Bedding plane (6), horizontal, smooth, planar to undulating, tight | | 114.35-115.5' - very pale orange, (10YR 8/2), fine to medium grained, strong HCl reaction, very weak (R1), voids to 3/16" over 25% of rock, no visible cavities, fossil casts and molds to 3/16"x9/16" over 0-10% of rock decreasing in coverage with depth | Driller's Remark: Soft at 122.0-123.0' |
| | | | 0 | | | | |
| | R13-NQ 5 ft 100% | 89 | 0 | | | | |
| 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 reaction, very weak to weak (R1 to R2), voids to 1/8" over 15% of rock, fossil casts and molds to 3/8" diameter over approximately 5% of rock, no visible cavities | |
| | 126.5 | | 0 | | | | R13: 6 minutes SC-4 collected at 125.65-126.5' |
| | | | 3 | 126.6' - Bedding plane, horizontal, smooth, undulating, tight to 1/4" open | | 116.2-116.7' - Same as 106.5-107.55' except trace fossil casts and molds to 3/16"x3/8" | |
| | | | 1 | 127.4' - Bedding plane, horizontal, smooth, planar to stepped, tight to 1/4" open<br>127.45' - Fracture, vertical, smooth, undulating, tight | | 116.5-117.3' - Same as 114.35-115.5' except cavities (fossil casts) to 3/4" diameter over approximately 30% of rock from 116.7-117.3' | |
| | R14-NQ 5 ft 77% | 45 | 10 | 127.5' - Bedding plane, horizontal, smooth, planar to stepped, tight to 1/4" open | | | |
| 130 -88.7 | | | 10 | 129.2' - Fracture, 20 deg, smooth, undulating, tight to 1/4" open<br>129.4-129.55' - Fracture zone, fragments to 1" diameter | | 117.3-119.55' - grayish orange, (10YR 7/4), fine grained, weak (R2), trace voids to 1/16", no visible cavities, trace fossil casts and molds to 3/16" diameter | Driller's Remark: Soft at 129.5-130.0' |
| | 131.5 | | NR | 129.55, 129.85' - Bedding plane (2), horizontal, smooth, planar to stepped, tight to 1/4" open | | | R14: 5 minutes<br>Driller's Remark: Soft at 130.5-131.0' |
| | | | 4 | 129.9-130.0' - Fracture zone, fragments to 1/2" x 1-1/2", horizontal bedding planes | | 119.55-120.3' - Same as 117.3-119.55' except increasing void coverage to 5-20% of rock and increase in fossil coverage to 5-10% | Stop coring for the day at 16:55 on 5/22/07<br>Begin coring for the day at 07:52 on 5/23/07 |
| | | | 1 | 129.9, 130.0, 130.1, 130.25' - Bedding plane (4), horizontal, smooth, planar to stepped, tight to 1/4" open | | 120.3-120.9' - Same as 115.5-116.2' except fossil coverage consistent 5-10% | |
| | R15-NQ 5 ft 80% | 54 | 10 | 131.6, 131.7, 132.1' - Bedding plane (3), horizontal, smooth, planar to undulating, tight<br>132.0' - Mechanical break | | 120.9-121.45' - Same as 107.55-110.75' | |
| 135 -93.7 | | | 2 | 133.3, 133.7' - Fracture or mechanical break (2), <10 deg, rough, undulating, tight<br>133.9-134.0' - Fracture zone, fragments to 1" diameter | | **No Recovery 121.45-121.5'**<br>**Limestone**<br>121.5-122.25' - pale yellowish brown, (10YR 6/2), fine grained, strong HCl reaction, medium strong (R3), interbedded with limestone that is the same as 107.55-110.75', no visible voids or fossils, cavities to 3/8" diameter with infill of 107.55-110.75' material, laminations, possible bioturbation | |
| | 136.5 | | NR | 133.9, 134.0' - Bedding plane (2), horizontal, smooth, planar to undulating, tight | | | R15: 9 minutes<br>Driller's Remark: Hard except 136.0-136.5' |
| | | | 2 | 134.05' - Mechanical break or fracture, vertical, rough, undulating, tight<br>134.5' - Bedding plane, horizontal, smooth, planar to undulating, tight | | | |
| | | | 1 | 134.65' - Mechanical break or bedding plane, 10 deg, smooth, undulating, tight to 1/2" open<br>136.65' - Fracture, 30 deg, smooth, undulating, tight | | | |
| | R16-NQ 5 ft 89% | 68 | 1 | 136.8' - Fracture, 80 deg, smooth, undulating, tight | | 122.5-123.5' - very pale orange grading to moderate yellowish brown with depth, (10YR 8/2 to 10YR 5/4), fine grained, strong HCl reaction, very weak to weak (R1 to R2), voids to 1/16" over 0-15% of surface increasing in coverage with depth, no visible cavities, trace fossil casts and molds to 3/16"x3/8" | Driller's Remark: All fairly hard this run (R16) |
| 140 -98.7 | | | 10 | 137.45' - Fracture or mechanical break, 60 deg, rough, undulating, associated with cavities | | | |
| | | | 1 | 138.15' - Fracture or mechanical break, 15 deg, rough, undulating, associated with cavities, tight to 1/2" open | | | R16: 9 minutes |
| | 141.5 | | NR | | | | |

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# 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 : 4.25 ft bgs on 5/22/07 START : 5/21/2007 END : 5/23/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 145<br>-103.7 | R17-NQ<br>5 ft<br>74%<br>146.5 | 54 | 0<br>1<br>10<br>2<br>NR | 139.1' - Fracture or mechanical break, <10 deg, rough, undulating, associated with cavity, tight to 1/4" open<br>139.6' - Fracture, horizontal, rough, undulating, dark stain, fracture associated with cavity, tight<br>139.63' - Fracture, vertical, smooth, undulating, tight<br>139.65-139.9' - Fracture zone, associated with cavities, fragments to 1" diameter<br>140.7' - Bedding plane, horizontal, smooth, undulating, tight to 1/4" open<br>142.7' - Bedding plane, horizontal, smooth, undulating, tight to 1/4" open<br>143.85-143.95' - Fracture zone, fragments to 1/2" diameter | | 123.5-124.0' - grayish orange, (10YR 7/4), fine grained, strong HCl reaction, very weak (R1), voids to 1/16" over 25% of rock, no visible cavities, trace fossil casts and molds to 3/16"x1/8"<br>126.5-127.4' - very pale orange to grayish orange, (10YR 8/2 to 10YR 7/4), fine to medium grained, strong HCl reaction, very weak to weak (R1 to R2), voids to 3/16" over 15-25% of rock, no visible cavities, fossil casts and molds to 3/16"x3/8" over 0-20% of rock (variable)<br>127.4-127.7' - Same as 121.5-122.25'<br>127.7-129.6' - Same as 126.5-127.4'<br>129.6-130.35' - Same as 121.5-122.25'<br>**No Recovery 130.35-131.5'**<br>**Limestone**<br>131.5-131.7' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, medium strong (R3), trace voids to 1/16", no visible cavities or fossils<br>131.7-134.35' - moderate yellowish brown, (10YR 5/4), fine to medium grained, moderate HCl reaction, extremely weak to medium strong (R0 to R3), voids to 1/16" over 5-15% of rock, no visible cavities, fossil casts to 3/4"x3/8" (trace), trace laminations<br>134.35-134.5' - Same as 131.5-131.7'<br>134.5-135.5' - pale yellowish brown, (10YR 6/2), fine to medium grained, moderate HCl reaction, weak (R2), voids to 1/8" over 15-25% of rock, no visible cavities, fossil casts to 9/16"x3/16"<br>**No Recovery 135.5-136.5'**<br>**Limestone**<br>136.5-139.9' - yellowish gray with light olive gray mottling, (5Y 8/1 with 5Y 6/1), fine grained, moderate to strong HCl reaction, medium strong (R3), voids to 1/16" over 5-10% of rock, fossil casts to 3/4" diameter over 5-10% of rock, cavities to 2-3/4" x 1-9/16" over 5% of rock, some with coating of dark mineral with sulfur scent (possibly pyrite), most cavities with infill that is grayish orange with voids to 1/8" over 30-40% of infill area | SC-5 collected at 142.7-143.85'<br>Driller's Remark: Soft at 144.5-145.0'<br>R17: 7 minutes |
| 150<br>-108.7 | R18-NQ<br>5 ft<br>80%<br>151.5 | 35 | 10<br>4<br>3<br>10<br>NR | 143.9, 143.95, 144.0, 144.1, 144.3, 144.4, 144.85, 145.05' - Bedding plane (8), horizontal, smooth, undulating, tight to 1/4" open<br>146.6' - Bedding plane, horizontal, smooth, planar, tight<br>146.75-146.8' - Fracture zone, fragments to 1/2" x 1-1/2"<br>146.8' - Bedding plane, horizontal, smooth, planar, tight<br>147.0' - Fracture, 70 deg, smooth, undulating, tight<br>147.4' - Fracture, 70-80 deg, smooth, undulating, tight<br>147.5' - Bedding plane, 10 deg, smooth, undulating, tight<br>147.7' - Fracture, 70-80 deg, smooth, undulating, tight<br>148.0' - Fracture, 70-80 deg, smooth, undulating, tight<br>148.4' - Bedding plane, horizontal, smooth, planar, tight<br>148.8' - Fracture, 75 deg, smooth, undulating, tight<br>149.0' - Fracture, 50 deg, smooth, undulating, tight<br>149.2' - Fracture, 75 deg, rough, undulating, tight<br>149.5' - Bedding plane, horizontal, rough, undulating, tight to 1/4" open<br>150.25-150.5' - Fracture zone, fragments to 2" diameter | | | Driller's Remark: Soft at 149.5-151.5'<br>R18: 7 minutes<br>Driller's Remark: 5/23/07 at 09:00, total depth at 151.5'<br>Driller's Remark: 5/23/07 at 14:40, water level is 3.25' |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-19 SHEET 10 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 : 4.25 ft bgs on 5/22/07 START : 5/21/2007 END : 5/23/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | | | 139.9-140.95' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, medium strong (R3), trace voids to 1/8", no visible cavities, trace fossil casts to 3/16"x3/8"<br>**No Recovery 140.95-141.5'**<br>**Limestone**<br>141.5-143.85' - pale yellowish brown, (10YR 6/2), fine to medium grained, moderate HCl reaction, medium strong (R3), voids to 1/16" over 0-20% of rock, one cavity 1-9/16" in diameter at 142.8' with medium to coarse grained infill, trace fossil casts to 1"x3/16", banding of fine to medium grained rock throughout<br>143.85-145.2' - moderate yellowish brown, (10YR 5/4), medium grained, moderate HCl reaction, weak (R2), voids to 1/8" over 30-40% of rock, trace fossil casts to 3/16"x3/8", no visible cavities<br>**No Recovery 145.2-146.5'**<br>**Limestone**<br>146.5-147.5' - Same as 143.85-145.2'<br>147.5-150.5' - Same as 141.5-143.85' except trace fossil casts to 3/16" diameter<br>**No Recovery 150.5-151.5'**<br>Bottom of Boring at 151.5 ft bgs on 5/23/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-20 SHEET 1 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 5/30/07 START : 5/30/2007 END : 6/3/2007 LOGGER : J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 40.4 | 0.0 – 2.0 | 0.0 | SS-1 | 1 (1/24") | **No Recovery 0.0-2.0'** | | 13:45 Start drilling<br>Surface consists of grassy wetland material that is 100% saturated. |
| 5 | 5.0 | | | | | | |
| 35.4 | 5.0 – 6.5 | 1.1 | SS-2 | 3-4-6 (10) | **Silty Sand (SM)**<br>5.0-6.1' - light olive gray, (5Y 5/2), wet, loose, 14% low plastic fines, very fine to fine silica sand | | Lean clay at bottom of split spoon sample |
| 10 | 10.0 | | | | | | |
| 30.4 | 10.0 – 11.5 | 0.8 | SS-3 | 0-0-1 (1) | **Silty Sand (SM)**<br>10.0-10.75' - light olive gray, (5Y 5/2), wet, very loose, 14% low plastic fines, organics in last 1" of sample, very fine to fine silica sand | | |
| 15 | 15.0 | | | | | | |
| 25.4 | 15.0 – 16.5 | 1.1 | SS-4 | 5-6-5 (11) | **Silt (ML)**<br>15.0-16.1' - grayish yellow, (5Y 8/4), wet, soft, nonplastic, rapid dilatancy, moderate to strong HCl reaction, all carbonate | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-20 SHEET 2 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 5/30/07 START : 5/30/2007 END : 6/3/2007 LOGGER : J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 20.4 | 20.0 – 21.5 | 1.1 | SS-5 | 5-6-13 (19) | **Silt (ML)** 20.0-21.1' - Same as 15.0-16.1' except very stiff | | |
| 25 / 15.4 | 25.0 – 26.5 | 1.2 | SS-6 | 14-15-10 (25) | **Silt (ML)** 25.0-26.2' - dusky yellow, (5Y 6/4), some mottling, wet, very stiff, nonplastic, rapid dilatancy, moderate to strong HCl reaction, all carbonate | | |
| 30 / 10.4 | 30.0 – 31.5 | 1.4 | SS-7 | 3-2-10 (12) | **Silt With Sand (ML)** 30.0-31.4' - dusky yellow, (5Y 6/4), wet, stiff, nonplastic, rapid dilatancy, moderate HCl reaction, 25% fine to coarse sand-sized, 2" organic lens at top of sample, all carbonate | | |
| 35 / 5.4 | 35.0 – 35.8 | 0.8 | SS-8 | 15-50/3 (65/9") | **Silt With Sand (ML)** 35.0-35.75' - yellowish gray, (5Y 7/2), moist, hard, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 20-25% fine to medium sand-sized, all carbonate | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-20 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 5/30/07 START : 5/30/2007 END : 6/3/2007 LOGGER : J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 0.4 | 40.0 – 41.5 | 1.5 | SS-9 | 20-18-22 (40) | **Silt With Sand (ML)** 40.0-41.5' - yellowish gray, (5Y 7/2), moist, hard, low plasticity, rapid dilatancy, moderate to strong HCl reaction, 15-20% fine to coarse sand-sized, all carbonate | | |
| 45 -4.6 | 45.0 – 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 plasticity, rapid dilatancy, moderate to strong HCl reaction, 20% fine to coarse sand-sized, one 1/8" limestone lens, thin organic layer, all carbonate | | |
| 50 -9.6 | 50.0 – 51.4 | 0.9 | SS-11 | 24-33-50/4.5 (83/10.5) | **Sandy Silt (ML)** 50.0-51.4' - moderate yellowish brown, (10YR 5/4), moist, hard, low plasticity, rapid dilatancy, moderate to strong HCl reaction, 25-30% fine to coarse sand-sized, trace organics, all carbonate | | |
| 55 -14.6 | 55.0 – 55.3 | 0.3 | SS-12 | 50/3 (50/3") | **Silt With Sand (ML)** 55.0-55.3' - moderate yellowish brown, (10YR 5/4), wet, hard, low plasticity, rapid dilatancy, moderate to strong HCl reaction, 20% fine to coarse sand-sized, trace organics, all carbonate | | End drilling for the day 05/30/07 |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-20 SHEET 4 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 5/30/07 START : 5/30/2007 END : 6/3/2007 LOGGER : J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -19.6 | 60.0<br>60.8 | 0.6 | SS-13 | 32-50/4<br>(82/10") | **Silt With Sand (ML)**<br>60.0-60.6' - Same as 55.0-55.3' | | 05/31/07 Start drilling at 07:35 |
| 65<br>-24.6 | 65.0<br>65.2 | 0.0 | SS-14 | 50/2<br>(50/2") | **No Recovery 65.0-65.2'** | | Driller's Remark: Rock at 64.5' |
| 70<br>-29.6 | 70.0 | 1.2 | SS-15 | 55-25-12<br>(37) | **Silty Gravel (GM)**<br>70.0-71.2' - dusky yellow, (5Y 6/4), moist to wet, dense, mild to moderate HCl reaction, fine to coarse sand-sized, 31% low plastic fines, 40% fine to coarse gravel-sized limestone, all carbonate<br>Begin Rock Coring at 71.5 ft bgs<br>See the next sheet for the rock core log | | |
| 75<br>-34.6 | | | | | | | |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-20 SHEET 5 OF 9 |

# ROCK CORE 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

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

WATER LEVELS : 0 ft bgs on 5/30/07 START : 5/30/2007 END : 6/3/2007 LOGGER : J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: 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 | | | **Silt (ML)** 71.5-72.3' - yellowish gray, (5Y 7/2), moist, soft, loose, moderate HCl reaction | 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 10:55 Start drilling on 06/01/07 |
| | | | NR | | | **No Recovery 72.3-75.2'** | |
| | R1B-NQ 3.5 ft 37% | 37 | NR | | | | |
| 75 -34.6 | | | 1 | 75.4' - Joint, 10 deg, rough, undulating | | **Limestone** 75.2-76.5' - pale olive, (10Y 6/2), medium grained, moderate HCl reaction, medium strong to strong (R3 to R4), 1/16-1/8" voids over 25-40% of surface, fossil casts and molds | R1B: 3 minutes |
| | 76.5 | | 0 | 75.6, 76.1' - Mechanical break (2), <75 deg | | | |
| | R2-NQ 5 ft 56% | 16 | 0 | 76.9, 77.2, 77.6, 77.9, 78.0, 78.2' - Mechanical break (6), 50-90 deg | | | 11:30 Driller's Remark: Drillers run out of water |
| | | | 1 | 77.5' - Joint, >5 deg, rough, undulating | | 76.5-79.3' - light olive gray, (5Y 5/2), medium grained, moderate to strong HCl reaction, medium strong (R3), 1/16" voids over 20-40% of surface, fossil casts and molds | |
| | | | 0 | 78.5-78.9' - Fracture zone, 50-90 deg | | | |
| 80 -39.6 | | | NR | | | **No Recovery 79.3-81.5'** | R2: 8 minutes |
| | 81.5 R3-NQ 5 ft 82% | 50 | >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 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 surface, several large surface cavities up to 1/2" in diameter, organic stains and thin lenses throughout section | |
| | | | 0 | 82.7, 83.2' - Mechanical break (2) | | | |
| | | | 0 | 83.9, 84.9' - Mechanical break (2) | | | |
| 85 -44.6 | | | 0 | 85.4' - Mechanical break | | | |
| | 86.5 | | NR | | | **No Recovery 85.6-86.5'** | R3: 4 minutes |
| | R4-NQ 5 ft 92% | 78 | 0 | | | **Limestone** 86.5-91.1' - light olive gray, (5Y 6/1), medium to fine grained, moderate to strong HCl reaction, medium strong (R3), small (1/16-1/8") voids over 25-30% of surface, highly fossiliferous with molds and casts 1/4-3/4" comprising up to 30% of rock | |
| | | | 0 | 88.0' - Mechanical break | | | SC-1 collected at 88.0-89.0' |
| | | | 0 | | | | |
| 90 -49.6 | | | <10 | 89.9-90.3' - Fracture zone, 1/2"-1-1/2" fragments, highly fossiliferous, large cavities and molds | | | |
| | | | 0 | 90.9' - Mechanical break | | | R4: 6 minutes |
| | 91.5 | | NR | | | **No Recovery 91.1-91.5'** | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-20 SHEET 6 OF 9 |

# ROCK CORE 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

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

WATER LEVELS : 0 ft bgs on 5/30/07 START : 5/30/2007 END : 6/3/2007 LOGGER : J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R5-NQ 5 ft 68% | 40 | 0 | 92.0-92.7' - Fracture zone, fragments 1/2-1" in diameter, few >1-1/2", highly fossiliferous 30-40% cavities/fossil molds | | **Limestone** 91.5-92.8' - Same as 76.5-79.3' | |
| | | | 0 | | | 92.8-93.9' - light olive gray, (5Y 5/2), fine grained, moderate to strong HCl reaction, medium strong to strong (R3 to R4), trace voids on surface | SC-2 collected at 92.8-93.8' |
| | | | 2 | 93.6' - Joint, >5 deg, smooth, undulating<br>93.8' - Joint, 10-20 deg, rough, undulating, calcareous silt | | **Calcareous Silt (ML)** 93.9-94.0' | |
| 95 -54.6 | | | 0 | 94.6-94.7' - Mechanical break or fracture zone | | **Limestone** 94.0-94.9' - dusky yellow, (5Y 6/4), medium grained, strong HCl reaction, medium strong to strong (R3 to R4) | |
| | | | NR | | | **No Recovery 94.9-96.5'** | R5: 5 minutes |
| | 96.5 | | | | | | |
| | R6-NQ 5 ft 46% | 0 | 0 | 96.7-98.2' - Fracture zone, many large fragments 3-4" with numerous smaller fragments 1/2-1" in diameter, larger fragments exhibit high angle (60-70 deg) fracture surfaces, many in conjugate pairs, rough and semi-planar | | **Limestone** 96.5-98.7' - dusky yellow to light olive gray, (5Y 6/4 to 5Y 5/2), medium grained, moderate to strong HCl reaction, weak to medium strong (R2 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 surface, 5-10% cavities are infilled with secondary material, fossil molds and casts | |
| | | | 0 | | | | |
| 100 -59.6 | | | NR | | | **No Recovery 98.7-101.5'** | R6: 3 minutes |
| | 101.5 | | | | | | |
| | R7-NQ 5 ft 16% | 0 | 1 | 101.6' - Fracture, 45 deg, rough, undulating to non-planar<br>101.9' - Fracture, 60 deg, rough, undulating to semi-planar, intersecting<br>102.0' - Parting surface, horizontal | | **Limestone** 101.5-102.3' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, very strong (R5), trace surface voids | |
| | | | NR | | | **No Recovery 102.3-108.0'** | |
| 105 -64.6 | | | | | | | R7: 4 minutes |
| | 106.5 | | | | | | |
| | R8-NQ 5 ft 24% | 10 | NR | | | | Driller's Remark: Driller noted a void space for 106.5' |
| | | | 0 | 108.0' - Fracture or mechanical break, horizontal, rough, undulating | | **Limestone** 108.0-109.2' - dusky yellow, (5Y 6/4), medium grained, strong HCl reaction, weak to medium strong (R2 to R3), 1/16-1/8" voids over 20-30% of surface | |
| | | | 0 | 108.5-109.2' - Fracture zone, fragments 1/2-1" with single fragment 3", irregular fracture surface, 3" fragment exhibits near vertical fracture surfaces | | | |
| 110 -69.6 | | | NR | | | **No Recovery 109.2-111.5'** | R8: 2 minutes |
| | 111.5 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-20 SHEET 7 OF 9 |

# ROCK CORE 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

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

WATER LEVELS : 0 ft bgs on 5/30/07 START : 5/30/2007 END : 6/3/2007 LOGGER : J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R9-NQ 5 ft 62% | 25 | <10 | 111.5-112.2' - Fracture zone, 3/4"-1-1/2" fragments | | **Limestone** 111.5-112.8' - dusky yellow, (5Y 6/4), moderate HCl reaction, very weak (R1), 1/16-1/8" voids over 25% of surface | |
| | | | 1 | 112.2, 112.4' - Fractures or mechanical break (2), 10-15 deg, rough, undulating to semi-planar | | 112.8-114.6' - grayish yellow, (5Y 8/4), medium grained, extremely strong HCl reaction, very weak (R1), 1/16-1/8" voids over 20% of surface, cavities/fossil molds and casts 1/8-1/2" in diameter over 5-10% of surface | |
| | | | 0 | 112.6' - Fracture, horizontal, rough, planar, open<br>112.65' - Mechanical break, non-planar, irregular | | | |
| 115 -74.6 | | | NR | 112.9, 113.1, 113.2, 113.7, 114.4' - Fractures (5), horizontal, rough, undulating | | **No Recovery 114.6-116.5'** | R9: 2 minutes |
| 116.5 | R10-NQ 5 ft 96% | 60 | 0 | | | **Limestone** 116.5-118.1' - Same as 112.8-114.6' | SC-3 collected at 116.5-117.5' |
| | | | 0 | 117.5, 118.1' - Fractures (2), horizontal, rough, undulating, open | | 118.1-120.0' - pale greenish yellow, (10Y 8/2), medium to fine grained, extremely strong HCl reaction, very weak (R1) | |
| | | | 0 | 118.4' - Fracture, 60 deg, non-planar<br>118.5' - Fracture, 5 deg, smooth, planar<br>118.9' - Fracture, 15 deg, rough, undulating<br>119.0' - Fracture, 15 deg, rough, undulating | | | |
| 120 -79.6 | | | <10 | 119.1' - Fracture, vertical, irregular, tight<br>119.2' - Fracture, 20 deg, rough, undulating | | 120.0-121.3' - Same as 118.1-120.0' except extremely weak to weak (R0 to R2) | R10: 1 minute |
| | | | 4 | 119.7' - Fracture or mechanical break, horizontal, rough, undulating | | | |
| 121.5 | R11-NQ 5 ft 98% | 43 | NR | 120.0-121.3' - Fracture zone, very soft, friable, 1-4" with rough, undulating, irregular fracture surfaces | | **No Recovery 121.3-121.5'** **Limestone** 121.5-122.5' - dusky yellow, (5Y 6/4), medium to fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), fossil casts and molds 1/2-1" in diameter over 10-15% of surface, trace voids | |
| | | | 0 | | | | |
| | | | >10 | 122.5-126.4' - Fracture zone, fragments 1-4", rough, undulating, irregular fracture surfaces, vertical fractures intersected by irregular, non-planar, low angle fracture, non-planar | | | |
| | | | 0 | | | 122.5-123.5' - dusky yellow, (5Y 6/4), medium grained, strong HCl reaction, very weak (R1), trace voids | |
| 125 -84.6 | | | 3 | | | 123.5-124.0' - Same as 121.5-122.5' except no fossil molds and casts | |
| | | | 5 | | | 124.0-126.4' - dusky yellow, (5Y 6/4), medium grained, strong HCl reaction, weak (R2), fossil casts and molds up to 1/2" in diameter over 5-10% of surface, 1/16-1/8" voids over 15-25% of surface | R11: 4 minutes |
| 126.5 | R12-NQ 5 ft 30% | 8 | NR | | | **No Recovery 126.4-126.5'** | |
| | | | 0 | 126.65' - Fracture, horizontal, rough | | **Limestone** 126.5-128.0' - dusky yellow, (5Y 6/4), medium to fine grained, strong HCl reaction, extremely weak to very weak (R0 to R1), fossil casts and molds, 1/16-1/8" voids over 50-70% of surface | |
| | | | <10 | 127.1' - Fracture, 15 deg, semi-planar to undulating<br>127.1-128.0' - Fracture zone, fragments 3/4-2", bedding plane | | | |
| 130 -89.6 | | | NR | | | **No Recovery 128.0-131.5'** | R12: 4 minutes |
| 131.5 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-20 SHEET 8 OF 9 |

# ROCK CORE 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

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

WATER LEVELS : 0 ft bgs on 5/30/07 START : 5/30/2007 END : 6/3/2007 LOGGER : J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | 0 | 131.5-132.0' - Disaggregated material<br>132.0' - Bedding plane, horizontal, smooth, planar | | **Silt (ML)**<br>131.5-132.0' - yellowish gray, (5Y 7/2), strong HCl reaction, with limestone fragments | Finish drilling for the day at 17:30 on 06/01/07<br>Start drilling at 07:55 on 06/03/07 |
| | | | 0 | 132.3, 132.6, 132.9' - Fractures or mechanical break (3), rough, undulating to non-planar | | **Limestone**<br>132.0-133.7' - dusky yellow, (5Y 6/4), medium to fine grained, strong HCl reaction, weak to medium strong (R2 to R3) | |
| | R13-NQ<br>5 ft<br>60% | 22 | <10 | 133.5' - Bedding plane, 10 deg, smooth, planar | | | |
| 135<br>-94.6 | | | NR | 133.6-134.4' - Fracture zone, fragments range from 1/2-2" | | 133.7-134.5' - dusky yellow, (5Y 6/4), medium grained, moderate HCl reaction, extremely weak (R0), 1/16-1/8" voids over 50% of surface<br>**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<br>137.2' - fine grained limestone, no voids | | **Limestone**<br>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 | | 137.2-139.0' - light olive gray, (5Y 6/1), fine grained, moderate to strong HCl reaction, strong to very strong (R4 to R5), trace 1/16" voids across surface, cavities/fossil molds up to 3/4" in diameter over 5% of rock concentrated in 1-2" zones (up to 30%), numerous fossil casts and molds | |
| | R14-NQ<br>5 ft<br>86% | 40 | 0 | 137.5, 138.4, 138.7, 139.0' - Fractures or mechanical break (4), 0-10 deg, rough, undulating to semi-planar | | | |
| 140<br>-99.6 | | | <10 | 139.0-140.8' - Fractures, rough, undulating to semi-planar, spaced 1-2" apart with zones of rock fragments ranging from 3/4"-1-1/2", dark black/brown staining on some fracture surfaces (more prevalent with depth) | | 139.0-140.8' - yellowish gray, (5Y 7/2), medium to fine grained, strong HCl reaction, weak to medium strong (R2 to R3), dark brown/black staining on fracture, 1/16-1/8" voids over 10% of surface<br>**No Recovery 140.8-141.5'** | R14: 7 minutes |
| | 141.5 | | NR | | | | |
| | | | 1 | 141.7' - Fracture, horizontal, rough, undulating | | **Limestone**<br>141.5-141.7' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, strong (R4), trace cavities on surface | SC-4 collected at 142.2-143.1' |
| | | | 0 | 142.2' - Bedding plane, 5 deg, smooth, planar | | | |
| | R15-NQ<br>5 ft<br>70% | 50 | 2 | 143.7' - voids<br>143.7, 143.8, 143.9' - Fractures (3), horizontal, rough, undulating | | 141.7-141.8' - Same as 141.5-141.7' except voids | |
| 145<br>-104.6 | | | 1 | 144.2' - Mechanical break, rough to stepped, undulating to non-planar | | 141.8-143.6' - Same as 141.5-141.7' | |
| | | | NR | 144.5, 144.7, 145.0' - Fractures or mechanical break (3), horizontal, rough, undulating | | 143.6-145.0' - moderate yellowish brown, (10YR 5/4), medium grained, mild HCl reaction, very weak to weak (R1 to R2), 1/16" voids over up to 50% of surface, cavities/fossil molds up to 1/2" in diameter over <5% of rock<br>**No Recovery 145.0-146.5'** | R15: 7 minutes |
| | 146.5 | | | | | | |
| | | | 0 | 145.1' - Bedding plane, horizontal, smooth, planar | | **Limestone**<br>146.5-147.3' - moderate yellowish brown, (10YR 5/4), medium grained, mild to strong HCl reaction, very weak (R1), finely laminated, wavy bedding planes, 1/16" voids over 10-20% of surface, one 1" surface cavity | |
| | | | 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 | | | 11:30 Driller's Remark: Drillers run out of water, go to refill water tank<br>13:30 Driller's Remark: Refill drill with water<br>SC-5 collected at 147.9-148.8' |
| | R16-NQ<br>5 ft<br>100% | 67 | 0 | | | | |
| 150<br>-109.6 | | | 0 | 150.2' - Fracture, 70 deg, rough, undulating, mostly planar | | | |
| | | | 0 | 150.8' - voids | | | R16: 4 minutes |
| | 151.5 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# ROCK CORE 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

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

WATER LEVELS : 0 ft bgs on 5/30/07 START : 5/30/2007 END : 6/3/2007 LOGGER : J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 151.0, 151.2, 151.25' - Fractures (3), <5 deg, rough, undulating, bedding plane partings | | 147.3-150.8' - light olive gray, (5Y 5/2), fine grained, moderate to strong HCl reaction, strong (R4), trace fossil molds and casts 1/2" on surface<br>150.8-151.5' - moderate yellowish brown, (10YR 5/4), medium grained, mild HCl reaction, very weak to weak (R1 to R2), 1/8-3/16" voids over 50% of surface<br>Bottom of Boring at 151.5 ft bgs on 6/3/2007 | 09:00 Finish drilling on 06/03/07<br><br>11:30 Driller's Remark: Drillers run out of water, go to refill water tank<br>13:30 Driller's Remark: Refill with water |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-21 SHEET 1 OF 8 |

# SOIL BORING 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

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 START : 5/30/2007 END : 6/4/2007 LOGGER : C. Dellaria, P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 41.8 | 0.0 – 1.5 | 1.5 | SS-1 | 0-2-3 (5) | **Top Soil** 0.0-0.5' - brownish black, (5YR 2/1), moist, organic roots | | Split spoon sampling begins at 15:13<br>Driller's Remark: Spade bit used to 15.0' |
| | 1.5 – 5.0 | | | | **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 | | |
| 5 / 36.8 | 5.0 – 6.5 | 0.7 | SS-2 | 1-2-1 (3) | **Silty Sand (SM)** 5.0-5.7' - moderate brown to pale yellowish brown, (5YR 4/4 to 10YR 6/2), moist, very loose, very fine to fine grained, 20% fines, low plasticity, sand is silica | | |
| 10 / 31.8 | 10.0 – 11.5 | 0.8 | SS-3 | 3-16-10 (26) | **Limestone Fragments** 10.0-10.3' - pale yellowish brown, (10YR 6/2), strong HCl reaction, angular limestone rock fragments to 3/8" | | |
| | 11.5 – 15.0 | | | | **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 / 26.8 | 15.0 – 15.8 | 0.8 | SS-4 | 30-50/3 (80/9") | **Limestone Fragments** 15.0-15.3' - Same as 10.0-10.3' except fragments up to 1/2" | | |
| | 15.8 – 20 | | | | **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 | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-21 SHEET 2 OF 8 |

# SOIL BORING 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

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 START : 5/30/2007 END : 6/4/2007 LOGGER : C. Dellaria, P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 21.8 | 20.0 – 21.5 | 1.3 | SS-5 | 36-30-8 (38) | **Silty Sand With Limestone Fragments (SM)** 20.0-21.25' - very pale orange, (10YR 8/2), moist, dense, fine to coarse grained, 37% fines, low plasticity, moderate HCl reaction, 30% fine gravel-sized limestone fragments, all carbonate derived | | End drilling on 5/30/07<br>Begin drilling on 5/31/07 at 07:45 |
| 25 | 25.0 – 26.5 | 0.9 | SS-6 | 15-22-18 (40) | **Silt With Sand (ML)** 25.0-25.9' - grayish orange, (10YR 7/4), moist, hard, trace% gravel, nonplastic, rapid dilatancy, moderate to strong HCl reaction, 15% fine to medium grained sand, trace fine grained gravel, all carbonate derived | | Driller's Remark: Harder material at 34.5', drill chatter |
| 16.8 | 30.0 – 31.5 | 1.0 | SS-7 | 10-19-20 (39) | **Silt With Sand (ML)** 30.0-31.0' - Same as 25.0-25.9' | | |
| 30 | 35.0 – 35.2 | 0.2 | SS-8 | 50/2 (50/2") | **Limestone Fragments** 35.0-35.2' - pale yellowish brown, (10YR 6/2), moderate to strong HCl reaction, angular fragments to 1/4" | | Driller's Remark: Hard material<br>Casing set to 35.0' |
| 11.8 | | | | | | | |
| 35 | | | | | | | |
| 6.8 | | | | | | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-21 SHEET 3 OF 8 |

# SOIL BORING 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

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 START : 5/30/2007 END : 6/4/2007 LOGGER : C. Dellaria, P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 1.8 | 40.0 – 41.5 | 1.4 | SS-9 | 21-21-21 (42) | **Silt (ML)** 40.0-41.4' - pale yellowish brown, (10YR 6/2), moist, hard, nonplastic, rapid dilatancy, moderate to strong HCl reaction, 10-15% fine to medium grained sand, all carbonate derived | | |
| 45 -3.2 | 45.0 – 45.8 | 0.8 | SS-10 | 61-50/3 (111/9") | **Silty Sand With Limestone Fragments (SM)** 45.0-45.8' - pale yellowish brown, (10YR 6/2), moist, very dense, fine to coarse grained, 35% fines, low plasticity, moderate HCl reaction, 15% fine to coarse grained gravel, all carbonate derived | | End drilling on 5/31/07<br>Begin drilling on 6/1/07 at 07:30 |
| 50 -8.2 | 50.0 – 51.3 | 1.2 | SS-11 | 1-2-50/4 (52/10") | **Sandy Silt With Limestone Fragments (ML)** 50.0-51.2' - pale yellowish brown, (10YR 6/2), moist, hard, nonplastic to low plasticity, rapid dilatancy, mild to moderate HCl reaction, 30% fine to coarse grained sand, 35% fine grained gravel, all carbonate derived | | |
| 55 -13.2 | 55.0 – 56.5 | 1.4 | SS-12 | 19-31-39 (70) | **Sandy Silt With Limestone Fragments (ML)** 55.0-56.4' - pale yellowish brown, (10YR 6/2), moist, hard, low plasticity, rapid dilatancy, 35% fine to coarse grained sand, laminated black organic layers at 55.3-55.5', fine to coarse gravel-sized limestone fragments in last 0.25', mild to moderate HCl reaction in all materials (except organics) | | |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-21 SHEET 4 OF 8 |

# SOIL BORING 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

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 START : 5/30/2007 END : 6/4/2007 LOGGER : C. Dellaria, P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -18.2 | 60.0 – 61.5 | 1.2 | SS-13 | 19-35-28 (63) | **Silty Sand (SM)** 60.0-61.2' - pale yellowish brown, (10YR 6/2), moist, hard, medium plasticity, rapid dilatancy, moderate to 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 | | Driller's Remark: Harder material at 62.0-63.0' |
| 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), moderate HCl reaction, 60% of sample is fine to coarse grained limestone gravel, 40% is carbonate derived sandy silt similar to previous samples | | |
| 70 | 70.0 | | | | | | |
| -28.2 | 71.5 | 0.8 | SS-15 | 17-6-9 (15) | **Sandy Silt (ML)** 70.0-70.4' - pale yellowish brown, (10YR 6/2), moist, hard, low plasticity, rapid dilatancy, moderate HCl reaction, 25-30% fine to coarse grained sand, all carbonate derived<br>**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 | | |
| 75 | 75 | | | | | | |
| -33.2 | 76.5 | 1.5 | SS-16 | 21-2-3 (5) | **Limestone Fragments And Silty Sand (SM)** 75.0-76.5' - Same as 70.0-70.8' except limestone fragments from coarse sand to coarse gravel mixed with carbonate derived silts and sands | | Driller's Remark: 100% water loss 75.0-76.5' at 6 blow count level, very soft material |
| | | | | | Begin Rock Coring at 75.0 ft bgs<br>See the next sheet for the rock core log | | |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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 ORIENTATION : Vertical

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -33.2 | 75.0 | | | | | **No Recovery 75.0-77.0'** | |
| | R1-NQ 2 ft 0% | 0 | NR | | | | R1: Run time not recorded |
| | 77.0 | | | | | | |
| | R2-NQ 5 ft 35% | 35 | >10 | 77.0-77.3' - Fracture zone, limestone rock fragments from 3/4"-1.5" | | **Limestone** 77.0-78.75' - pale yellowish brown, (10YR 6/2), fine to medium grained, mild HCl reaction, weak (R2), voids (3/16") over 15-20% of rock surface, trace cavities up to 9/16"x3/8" | |
| | | | >10 | 77.5-78.5' - Fracture zone, limestone rock fragments from 3/4"-1.5" | | | |
| | | | | 78.55-78.75' - Fracture, vertical, rough, undulating, moderately tight | | **No Recovery 78.75-82.0'** | |
| 80 -38.2 | | | NR | | | | R2: 9 minutes |
| | 82.0 | | | | | | |
| | R3-NQ 5 ft 64% | 51 | >10 | 82.0-82.4' - Fracture zone, limestone rock fragments from 3/4"-1.5" | | **Limestone** 82.0-85.2' - Same as 77.0-78.75' except moderate yellowish brown, (10YR 5/4), 5-10% partially infilled cavities 3/4" x 1-3/16" | |
| | | | 0 | 82.75-82.9' - Fracture zone, limestone rock fragments from 3/4"-2" 83.1, 83.7, 84.15' - Mechanical break (3) | | | |
| | | | 2 | 84.35-84.5' - Fracture, 30 deg, rough, undulating, open | | | |
| 85 -43.2 | | | 0 | 84.4-84.45' - Fracture, 30 deg, rough, undulating, open | | **No Recovery 85.2-87.0'** | Driller's Remark: Casing advanced to 85.0' Driller's Remark: Using polymer EZ mud (not bentonite quick gel) |
| | | | NR | | | | R3: 18 minutes |
| | 87.0 | | | | | | |
| | R4-NQ 5 ft 58% | 25 | >10 | 87-88' - Fracture zone, limestone rock fragments from 3/4"-2" | | **Limestone** 87.0-89.9' - pale yellowish brown, (10YR 6/2), fine grained, moderate HCl reaction, medium strong (R3), small voids (1/16"-1/8") over 5-15% of rock surface increasing with depth. At 87.0-88.0': 25% cavities/casts up to 1" x 1-3/16", highly fossiliferous. At 88.0-89.9 trace cavities up to 3/4"x3/8", partially infilled with recrystalized carbonate, some with black staining, moderate HCl reaction 88.0-89.9' - voids (1/16"-1/8") over 5-15% of rock surface (increasing with depth) | Drilling ends on 6/01/2007, no drilling on 6/02/07 due to rain Drilling begins on 6/03/07 at 07:35 SC-1 collected at 88.0-89.1' Driller's Remark: Circulation loss at 89.0' |
| | | | 1 | 88.0-88.2' - Fracture, 60 deg, rough, undulating, open | | | |
| | | | 2 | 89.3-89.4' - Fracture, 60 deg, rough, undulating, open | | | |
| 90 -48.2 | | | | 89.7' - Fracture, horizontal, rough, undulating, open | | | |
| | | | NR | | | | R4: 18 minutes |
| | 92.0 | | | | | | |
| | R5-NQ 5 ft 44% | 15 | >10 | 92.0-93.0' - Fracture zone, limestone rock fragments from 1/2"-3/4" | | **No Recovery 89.9-92.0'** **Limestone** 92.0-93.0' - pale yellowish brown, (10YR 6/2), fine grained, moderate HCl reaction, medium strong (R3), cavities (1" x 1-3/16") over 25% of rock surface, highly fossiliferous | |
| | | | 1 | 93.25' - Fracture, horizontal, rough, undulating, open | | | |
| | | | 2 | 94.0' - Fracture, 60 deg, rough, undulating, open | | | |
| 95 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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 ORIENTATION : Vertical

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -53.2 | | | NR | 94.1' - Fracture, horizontal, rough, undulating, open | | 93.0-93.2' - pale yellowish brown, (10YR 6/2), fine grained, medium strong (R3), voids over 0-3% of rock surface, no cavities<br>93.2-94.2' - voids (1/16-1/8") over 5-15% of rock surface (increasing with depth), trace cavities up to 3/4"x3/8", partially infilled with recrystallized carbonate, some with black staining, moderate HCl reaction<br>**No Recovery 94.2-97.0'** | Driller's Remark: No circulation<br>R5: 22 minutes |
| | 97.0 | | | | | | |
| | R6-NQ 5 ft 41% | 23 | >10 | 97.0-97.1' - Fracture zone, limestone rock fragments from 3/4"-1.5" | | **Limestone**<br>97.0-99.05' - Same as 88.0-88.9' except cavities 1-3/16" x 2" infilled with fine grained material, voids over 3% of rock surface, medium light gray (N6) to grayish orange (10YR 7/4) infilling increases with depth from 5% at 97.0' to 40% at 99.05'<br>**No Recovery 99.05-102.0'** | |
| | | | 2 | 97.8-97.95' - Fracture zone, limestone rock fragments from 1/2"-1"<br>98.4-98.5' - Fracture or mechanical break, 30 deg, rough, stepped | | | |
| 100<br>-58.2 | | | NR | 98.75' - Fracture, <10 deg, rough, undulating, open | | | Driller's Remark: Cavity at 100.5-104.0'<br>R6: 21 minutes |
| | 102.0 | | | | | **No Recovery 102.0-104.0'**<br>Cavity | |
| | R7-NQ 5 ft 2% | 0 | NR | | | | |
| | | | 0 | | | **Limestone**<br>104.0-104.1' - Same as 88.0-88.9' except no infilling, voids over 10% of rock surface, no cavities<br>**No Recovery 104.1-107.0'** | |
| 105<br>-63.2 | | | NR | | | | R7: 4 minutes |
| | 107.0 | | | | | | |
| | R8-NQ 5 ft 74% | 23 | >10 | 107.0-107.3' - Fracture zone | | **Limestone**<br>107.0-107.3' - pale yellowish brown, (10YR 6/2), fine grained, weak to medium strong (R2 to R3), voids over 10% of rock surface, 10% cavities 3/16"-3/4"<br>107.3-109.25' - pale yellowish brown, (10YR 6/2), fine grained, weak to medium strong (R2 to R3), voids over 10% of rock surface, no cavities<br>109.25-110.7' - pale yellowish brown, (10YR 6/2), fine grained, weak to medium strong (R2 to R3), voids over 10% of rock surface, 10% cavities 3/16"-3/4"<br>**No Recovery 110.7-112.0'** | |
| | | | 2 | 107.6' - Fracture or mechanical break, 45 deg, rough, undulating, open<br>107.85' - Fracture or mechanical break, horizontal, rough, undulating, 2 inch open | | | |
| | | | >10 | 108.0' - Fracture or mechanical break, 45 deg, rough, undulating, open | | | |
| 110<br>-68.2 | | | >10 | 108.4' - Fracture or mechanical break, horizontal, rough, undulating, open<br>108.5' - Fracture or mechanical break, 45 deg, rough, undulating, open | | | |
| | | | NR | 109.25-110.7' - Fracture zone, 60 deg and 80 deg, limestone rock fragments from 3/4"-2" | | | R8: 15 minutes<br>Driller's Remark: Water level at 3.5' |
| | 112.0 | | | | | | |
| | R9-NQ 5 ft 55% | 22 | >10 | 112.25,112.3' - Fracture (2), horizontal, rough, undulating, open | | **Limestone**<br>112.0-112.85' - pale yellowish brown, (10YR 6/2), fine to medium grained, mild HCl reaction, weak (R2), voids (1/16") over 5-10% of rock surface, no visible cavities | Driller's Remark: Hole collapse, advanced NW casing to 106.0', end drilling on 6/03/07 at 17:00<br>Driller's Remark: Circulation loss at 113.0', drilling soft, not like a cavity |
| | | | >10 | 112.4-113.0' - Fracture zone, limestone rock fragments from 1"-1.5" | | | |
| | | | 1 | 113.55' - Fracture, 60 deg, rough, planar, open, black staining<br>113.7-114.0' - Fracture zone, limestone rock fragments from 1.5"-3" | | | |
| 115 | | | | | | | |

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# 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 ORIENTATION : Vertical

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -73.2 | | | NR | 114.2' - Fracture, horizontal, rough, undulating, open<br>114.5' - Mechanical break | | 112.85-113.45' - Same as 112.0-112.85' except pale yellowish brown, (10YR 7/4), trace cavities up to 3/8"x3/8"<br>113.45-114.75' - medium gray to grayish orange, (N5 to 10YR 7/4), cavities (up to 3/8") over less than 5% of rock surface<br>**No Recovery 114.75-117.0'** | Drilling resumes on 6/04/07 at 07:20<br>R9: 15 minutes |
| 117.0 | R10-NQ 5 ft 31% | 8 | 4<br>3<br>NR | 117.1' - Fracture, horizontal, rough, undulating, open<br>117.5' - Fracture, horizontal, rough, undulating, open<br>117.9-117.9' - Fracture, horizontal and 60 deg, rough, undulating, open<br>118.1' - Fracture, 45 deg, rough, undulating, open<br>118.3, 118.4' - Fractures (2), horizontal, rough, undulating, open | | **Limestone**<br>117.0-117.7' - medium gray, (N5), fine to medium grained, mild HCl reaction, weak to medium strong (R2 to R3), voids (up to 3/16") over 10% of rock surface, trace cavities up to 3/8"<br>117.7-118.55' - Same as 112.0-112.85'<br>**No Recovery 118.55-122.0'** | Driller's Remark: Soft zones at 117.5-118.5, 119.0-120.0'<br>R10: 10 minutes |
| 120<br>-78.2<br>122.0 | R11-NQ 5 ft 22% | 14 | >10<br>NR | 122.0-122.15' - Fracture zone<br>122.3' - Mechanical break<br>122.85' - Fracture, horizontal, rough, undulating, open<br>123.0' - Mechanical break | | **Limestone**<br>122.0-123.1' - grayish orange, (10YR 7/4), fine to medium grained, mild HCl reaction, weak (R2), voids (up to 1/16") over 10% of rock surface, trace cavities up to 3/8"x3/16"<br>**No Recovery 123.1-127.0'** | Driller's Remark: Numerous 3"-6" soft zones in R11<br>Driller's Remark: Cavity from 125.5-128'<br>R11: 6 minutes |
| 125<br>-83.2<br>127.0 | R12-NQ 5 ft 27% | 7 | >10<br>2<br>NR | 127.0-127.45' - Fracture zone<br>127.6' - Fracture, horizontal, rough, undulating, open<br>127.8' - Mechanical break<br>128.0-128.1' - Fracture, horizontal, rough, undulating, open<br>128.3' - Mechanical break<br>130.3' - Mechanical break | | **Limestone**<br>127.0-127.1' - pale yellowish brown, (10YR 6/2), fine to medium grained, mild HCl reaction, weak (R2), voids (1/16") over 5-10% of rock surface<br>127.1-128.35' - grayish orange, (10YR 7/4), fine to medium grained, mild HCl reaction, weak (R2), voids (up to 1/16") over 10% of rock surface, trace cavities up to 3/8"x3/16"<br>**No Recovery 128.35-132.0'** | Driller's Remark: Several soft zones, probably not cavities<br>R12: 12 minutes |
| 130<br>-88.2<br>132.0 | R13-NQ 5 ft 12% | 8 | 1<br>NR | 132.2' - Mechanical break<br>132.4' - Fracture, horizontal, rough, undulating, open | | **Limestone**<br>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%<br>**No Recovery 132.6-137.0'** | Driller's Remark: Cavities from 133.5-135.0' and 135.5-136.0' |
| 135 | | | | | | | |

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|---|---|
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# 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 ORIENTATION : Vertical

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -93.2 | | | | | | | |
| | 137.0 | | | | | **Limestone** 137.0-138.8' - medium light gray, (N6), fine grained, strong HCl reaction, medium strong to strong (R3 to R4), trace voids (to 3/16") over rock surface, 15% cavities up to 1/4"x3/16" partly infilled with yellowish gray (5Y 7/2) mottling around cavities (similar to 132.0-132.6'), fossiliferous, some cavities extend through core 138.8-140.9' - very pale orange to medium light gray, (10YR 8/2 to N6), from 140.6-140.9', cavities (up to 3/16") over 20% of rock surface (same as 137.0-138.8'). 140.9-141.2' - cavities absent (same as 137.0-138.8'). 141.2-141.6' - pale yellowish brown, (10YR 6/2), fine grained, mild HCl reaction, medium strong (R3), trace voids (1/16") over surface of rock, no visible cavities | R13: 9 minutes |
| | R14-NQ 5 ft 92% | 44 | >10 | 137.0-137.15' - Fracture zone, limestone rock fragments up to 1" | | | |
| | | | 1 | 137.5' - Fracture, <10 deg, smooth, undulating | | | |
| | | | 4 | 137.65' - Fracture, horizontal, rough, undulating, open 3/4" likely due to large cavity | | | |
| 140 -98.2 | | | >10 | 138.7-138.95' - Fracture, 60 deg, rough, undulating, open | | | |
| | | | 0 | 138.75, 139.15, 140.4' - Mechanical break (3) | | | R14: 30 minutes |
| | 142.0 | | NR | 139.05, 139.4, 139.8' - Fractures (3), 15 deg, rough, undulating, open 139.9-140.8' - Fracture zone | | | |
| | R15-NQ 5 ft 66% | 48 | >10 | 142.0-142.15' - Fracture zone, fragments up to 1" | | | |
| | | | 0 | 142.7' - Fracture, horizontal, rough, undulating, open | | | SC-2 collected at 142.8-143.65' |
| 145 -103.2 | | | NR | | | **No Recovery 141.6-142.0'** **Limestone** 142.0-142.6' - pale yellowish brown to grayish orange, (10YR 6/2 to 10YR 7/4), fine to medium grained, moderate to strong HCl reaction, voids (up to 1/16") over 10% of rock surface, trace cavities up to 3/8"x1/16" | Driller's Remark: Possible cavity from 143.5-145.5' Light drill chatter to heavy drill chatter |
| | | | 1 | | | | |
| | | | 2 | 145.9' - Fracture, horizontal, rough, undulating, open | | | R15: 19 minutes |
| | 147.0 | | | 146.5, 146.7' - Fractures (2), horizontal, rough, undulating, open | | 142.6-143.65' - light brownish gray, (5YR 6/1), fine grained, moderate to strong HCl reaction, trace voids (up to 1/16") over rock surface | |
| | R16-NQ 5 ft 86% | 33 | >10 | 147.0-147.1' - Fracture, horizontal, rough, undulating, open | | **No Recovery 143.65-145.5'** **Limestone** 145.5-147.0' - Same as 132.0-132.6' except weak (R2), coarse gravel, voids (up to 1/16") over 20% of rock surface | |
| | | | 0 | 147.5-147.85' - Fracture zone, limestone rock fragments from 1/2"-1" | | | |
| | | | 3 | 149.15' - Fracture, horizontal, rough, undulating, open | | | |
| 150 -108.2 | | | >10 | 149.3-149.6' - Fractures or mechanical break, 30 deg and 20 deg, smooth, planar, open | | 147.0-147.85' - pale yellowish brown, (10YR 6/2), fine to medium grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), voids (up to 1/16") over 15% of rock surface, cavities (1/16"x3/16") trace | |
| | | | 0 | 150.2-150.6' - Fracture zone | | | R16: 33 minutes |
| | 152.0 | | NR | 150.9-151.1' - Fracture zone, limestone rock fragments from 3/4"-1.5" | | 147.85-150.2' - Same as 147.0-147.85' except light gray, (N7), medium strong (R3), trace voids, trace cavities up to 1/16" diameter 150.2-151.3' - Same as 147.0-147.85' except pale yellowish brown, (10YR 6/2), weak to medium strong (R2 to R3), voids (up to 1/16") over 15% of rock surface, cavities (3/16"x3/4") over 15-20% | |

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# 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 ORIENTATION : Vertical

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES | | | SYMBOLIC LOG | LITHOLOGY | COMMENTS |
|---|---|---|---|---|---|---|---|
| | | R Q D (%) | FRACTURES PER FOOT | DESCRIPTION<br>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. |
| | | | | | | **No Recovery 151.3-152.0'**<br>Bottom of Boring at 152.0 ft bgs on 6/4/2007 | |

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|---|---|
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# SOIL BORING 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

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 : 1.61 ft bgs on 6/14/07 START : 5/19/2007 END : 5/21/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 40.5 | 0.0 | 0.7 | SS-1 | 0-0-1 (1) | **Topsoil** 0 to 0.7' - dusky brown, (5YR 2/2), wet, very soft | | Boring drilled in wetlands area |
| | 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 | | 0.9 | SS-2 | 4-3-5 (8) | **Poorly Graded Sand (SP)** 5.0-5.9' - moderate brown to grayish orange pink, (5YR 4/4 to 5YR 7/2), mottled, wet, loose, fine grained, trace non-plastic fines, grading into clayey sand (SC) with 30% low to medium plasticity fines | | |
| | 6.5 | | | | | | |
| 10 | 10.0 | | | | | | 5/19/07, 15:00, set 6" casing to 9.5' |
| 30.5 | | 1.0 | SS-3 | 3-4-7 (11) | **Silt (ML)** 10.0-11.0' - grayish orange, (10YR 7/4), wet, stiff, very rapid dilatancy, strong HCl reaction, trace sand, carbonate, sands are fine to grained | | |
| | 11.5 | | | | | | |
| 15 | 15.0 | | | | | | |
| 25.5 | | 1.2 | SS-4 | 13-13-10 (23) | **Silt (ML)** 15.0-16.2' - very pale orange, (10YR 8/2), wet, very stiff, 10 to 15% sand, very rapid dilatancy, strong HCl reaction, carbonate, 10-15% fine gravel-sized limestone fragments | | |
| | 16.5 | | | | | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-22 SHEET 2 OF 9 |

# SOIL BORING 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

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 : 1.61 ft bgs on 6/14/07 START : 5/19/2007 END : 5/21/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 20.5 | 20.0 – 21.5 | 0.8 | SS-5 | 18-5-4 (9) | **Silt With Sand (ML)** 20.0-20.8' - very pale orange, (10YR 8/2), wet, stiff, 15 to 20% sand, nonplastic, very rapid dilatancy, strong HCl reaction, carbonate, sand is fine to medium grained | | |
| 25 | 25.0 | | | | | | |
| 15.5 | 26.5 | 1.0 | SS-6 | 6-6-4 (10) | **Silt With Sand (ML)** 25.0-26.0' - grayish orange, (10YR 7/4), wet, stiff, 10 to 15% gravel, 25% sand, nonplastic, rapid dilatancy, mild to moderate HCl reaction, carbonate, sand is fine to coarse grained, gravel is fine grained | | |
| 30 | 30.0 | | | | | | |
| 10.5 | 31.5 | 1.5 | SS-7 | 32-28-50 (78) | **Silt With Sand (ML)** 30.0-31.5' - grayish orange, (10YR 7/4), wet, hard, 27% sand, nonplastic, very rapid dilatancy, moderate HCl reaction, carbonate, sand is fine to medium grained | | Heavy chattering at 30.0' 15 minutes to drill to 35.0' |
| 35 | 35.0 | | | | | | |
| 5.5 | 36.0 | 0.5 | SS-8 | 15-50/6 (65/12") | **Sandy Silt With Limestone Fragments (ML)** 35.0-35.5' - pale yellowish orange, (10YR 6/2), gray mottling, moist, hard, 25 to 30% sand, low plasticity, rapid dilatancy, 40% moderate yellowish brown limestone fragments, HCl reaction strong for silt, mild for limestone fragments | | Hard and soft drilling 35- 40' |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-22 SHEET 3 OF 9 |

# SOIL BORING 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

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 : 1.61 ft bgs on 6/14/07 START : 5/19/2007 END : 5/21/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 0.5 | 40.0 – 41.5 | 1.3 | SS-9 | 5-4-6 (10) | **Silt With Sand (ML)** 40.0-41.3' - moderate yellowish brown, (10YR 5/4), wet, stiff, 26% sand, nonplastic, very rapid dilatancy, mild HCl reaction, carbonate, sand is fine grained | | |
| 45 -4.5 | 45.0 – 46.5 | 1.0 | SS-10 | 3-3-2 (5) | **Sandy Silt (ML)** 45.0-46.0' - moderate yellowish brown, (10YR 5/4), wet, medium stiff, 25 to 30% sand, nonplastic, very rapid dilatancy, mild HCl reaction, sand is fine to medium grained | | Medium chattering/grinding<br>Lost and regained 80-90% of circulation |
| 50 -9.5 | 50.0 – 51.5 | 1.4 | SS-11 | 7-3-3 (6) | **Silty Sand With Limestone Fragments (SM)** 50.0-51.4' - dark yellowish brown, (10YR 4/2), wet, loose, fine to coarse grained, 23% fines, moderate HCl reaction, 40% limestone fragments, limestone is moderate yellowish brown (10YR 5/4) with mild to moderate HCl reaction | | 5/20/07, 08:45 to 10:15, set HW casing to 50.0' |
| 55 -14.5 | 55.0 – 56.5 | 1.2 | SS-12 | 3-3-7 (10) | **Silty Sand With Limestone Fragments (SM)** 55.0-56.15' - dark yellowish brown to pale yellowish brown, (10YR 4/2 to 10YR 6/2), wet, medium dense, mild to moderate HCl reaction, fine to coarse grained, 25-30% fines, 35% limestone fragments | | Heavy grinding, lost 80-90% of circulation at 57' |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-22 SHEET 4 OF 9 |

# SOIL BORING 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

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 : 1.61 ft bgs on 6/14/07 START : 5/19/2007 END : 5/21/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -19.5 | 60.0 – 61.5 | 1.2 | SS-13 | 4-17-32 (49) | **Limestone Fragments** 60.0-61.2' - grayish orange and olive gray, (10YR 7/4 and 5Y 4/1), mild to moderate HCl reaction, fine to coarse gravel-sized fragments, 25% silt and sand similar to SS-12 | | 5/20/07, 11:15, begin to set casing to 60.0' |
| 65 -24.5 | 65.0 – 66.5 | 0.9 | SS-14 | 6-6-3 (9) | **Silty Sand With Limestone Fragments (SM)** 65.0-65.9' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), wet, loose, mild to moderate HCl reaction, fine to coarse grained, 28% fines, 40-50% limestone fragments | | |
| 70 -29.5 | 70.0 – 71.5 | 1.4 | SS-15 | 12-14-10 (24) | **Silty Sand With Limestone Fragments (SM)** 70.0-71.4' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), wet, medium dense, mild to moderate HCl reaction, fine to coarse grained, 30% fines, 40-50% limestone fragments | | 60% circulation loss |
| 75 -34.5 | 75.0 – 75.1 | 0.1 | SS-16 | 50/2 (50/2") | **Limestone Fragments** 75.0-75.1' - pale yellowish brown, (10YR 6/2), fragments up to 1-3/16 " Begin Rock Coring at 75.0 ft bgs See the next sheet for the rock core log | | 5/20/07, 15:30, begin to advance HW casing to 75' |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-22 SHEET 5 OF 9 |

# 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

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 : 5/19/2007 END : 5/21/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -34.5 | 75.0 | | | | | | |
| | | | >10 | 75.5-76.0' - Mechanical break, multiple irregular breaks | | **Limestone**<br>75.0-75.5' - very pale orange, (10YR 8/2), strong HCl reaction, medium strong (R3), moderately fossiliferous, voids up to 1/4" over 20-30% of surface | Begin rock coring on 5/21/07 at 08:02 |
| | | | 0 | | | | |
| | R1-HQ<br>5 ft<br>34% | 20 | | | | 75.5-76.7' - pale yellowish brown, (10YR 6/2), moderate to strong HCl reaction, weak to medium strong (R2 to R3), voids up to 3/8" over 20-30% of surface | |
| | | | NR | | | **No Recovery 76.7-80.0'** | R1: 5 minutes |
| 80 | 80.0 | | | | | | |
| -39.5 | | | >10 | 80.0-81.0' - Fracture zone, irregular breaks, some mechanical breaks | | **Limestone**<br>80.0-83.1' - pale yellowish brown, (10YR 6/2), strong HCl reaction, very weak to weak (R1 to R2), trace solution cavities up to 3/8", moderately fossiliferous, 10-20% voids up to 1/16", 5-10% silt | |
| | | | 1 | 81.1' - Fracture, 50-55 deg, rough, planar, dark grey staining | | | SC-1 collected at 81.1-81.95' |
| | R2-HQ<br>5 ft<br>62% | 23 | >10 | 82.0-82.6' - Fracture zone, irregular breaks<br>82.6' - Fracture, 50-60 deg, rough, planar | | | |
| | | | 1 | | | **No Recovery 83.1-85.0'** | |
| | | | NR | | | | R2: 5 minutes |
| 85 | 85.0 | | | | | | |
| -44.5 | | | 2 | | | **Limestone**<br>85.0-86.6' - Same as 80.0-83.1' except solution cavities up to 9/16"over 5-10% of surface | Driller's Remark: Drilling is soft 85.0-87.5' |
| | | | 2 | 85.7, 85.9' - Mechanical break (2), rough, planar<br>86.1' - Fracture, horizontal, rough, planar | | | |
| | R3-HQ<br>5 ft<br>32% | 20 | | | | **No Recovery 86.6-90.0'** | |
| | | | NR | | | | Driller's Remark: Core barrel has no resistance at 88.0-90.0'<br>R3: 5 minutes |
| 90 | 90.0 | | | | | | |
| -49.5 | | | 1 | | | **Limestone**<br>90.0-90.2' - Same as 80.0-83.1'<br>**No Recovery 90.2-95.0'** | Driller's Remark: No resistance to drilling 90.0-95.0' |
| | R4-HQ<br>5 ft<br>4% | 0 | NR | | | | R4: 2 minutes |
| 95 | 95.0 | | | | | | |

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|---|---|
| 338884.FL | B-22 SHEET 6 OF 9 |

# 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

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 : 5/19/2007 END : 5/21/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -54.5 | R5-HQ 5 ft 26% | 0 | >10<br>>10<br>NR | 95.0-96.3' - Fracture zone, multiple fractures and mechanical breaks, fragments range from 0.05' in length to 0.4' in length | | **Limestone**<br>95.0-96.3' - pale yellowish brown, (10YR 6/2), very strong HCl reaction, very weak to weak (R1 to R2), 30% voids up to 1/4", 20-30% silt<br>**No Recovery 96.3-100.0'** | R5: 3 minutes |
| 100 | 100.0 | | | | | | |
| -59.5 | R6-HQ 5 ft 30% | 0 | >10<br>1<br>NR | 100.0-101.0' - Fracture zone, irregular fragments<br>101.2' - Fracture, 50-60 deg, rough, planar, open | | **Silty Clay (CL)**<br>100.0-100.5' - pale yellowish brown, (10YR 6/2), stiff to very stiff, moderate plasticity, strong HCl reaction, carbonate<br>**Limestone**<br>100.5-101.5' - light brown, (5YR 6/4), strong HCl reaction, extremely weak to very weak (R0 to R1), 10-20% voids up to 1/16", poorly fossiliferous<br>**No Recovery 101.5-105.0'** | R6: 3 minutes |
| 105 | 105.0 | | | | | | |
| -64.5 | R7-HQ 5 ft 78% | 22 | >10<br>2<br>>10<br>>10<br>NR | 105.0-105.6' - Fracture zone, irregular pieces up to 3/4"<br>106.8' - Fracture, rough, stepped, 3/8" relief on face of fracture<br>106.9' - Fracture, smooth, stepped, 5/16" relief<br>107.0-108.0' - Fracture zone, rough, planar, less than 1/8" infilling<br>108.0-108.9' - Fracture zone, rough, planar, fractures and mechanical breaks | | **Limestone**<br>105.0-108.9' - grayish orange, (10YR 7/4), strong HCl reaction, extremely weak to very weak (R0 to R1), trace voids, poorly fossiliferous, silty<br>**No Recovery 108.9-110.0'** | SC-2 collected at 105.7-106.8'<br>Driller's Remark: Hard at 109.0'<br>R7: 5 minutes |
| 110 | 110.0 | | | | | | |
| -69.5 | R8-HQ 5 ft 28% | 7 | >10<br>0<br>NR | 110.0-110.2' - Fractures (2), horizontal and vertical, rough, undulating<br>110.8-111.0' - Fractures, multiple, irregular gravel-size pieces, 0.1' to 0.2' in size | | **Limestone**<br>110.0-110.2' - grayish orange, (10YR 7/4), strong HCl reaction, very weak to weak (R1 to R2), 10-15% voids up to 1/16", silty<br>110.2-111.0' - pale yellowish brown, (10YR 6/2), strong HCl reaction, weak (R2), 20-30% voids up to 3/16"<br>111.0-111.4' - pale yellowish brown, (10YR 6/2), strong HCl reaction, weak (R2), 30% voids up to 3/8"<br>**No Recovery 111.4-115.0'** | R8: 2 minutes |
| 115 | 115.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-22 SHEET 7 OF 9 |

# 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

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 : 5/19/2007 END : 5/21/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -74.5 | R9-HQ 5 ft 30% | 17 | >10 | 115.0-115.2' - Mechanical break, multiple irregular breaks, gravel-size pieces, 0.05'-0.15' in size | | **Limestone** 115.0-115.35' - pale yellowish brown, (10YR 6/2), strong HCl reaction, extremely weak (R0), 20-30% voids <1/16" 115.35-116.0' - Same as 115.0-115.35' except grayish orange, (10YR 7/4) | Disaggregated limestone |
| | | | 3 | 115.7, 116.0' - Fractures (2), horizontal, rough, planar, horizontal | | | |
| | | | NR | | | **Silt And Sand-Sized Carbonate Grains With Clay** 116.0-116.5' - medium gray, (N5), nonplastic to low plasticity, trace solution cavities up to 3/8", unconsolidated | R9: 2 minutes |
| 120 | 120.0 | | | | | **No Recovery 116.5-120.0'** | |
| -79.5 | R10-HQ 5 ft 42% | 20 | 2 | 120.45' - Fracture, 30 deg, rough, planar, lithologic contact | | **Silt And Sand-Sized Carbonate Grains With Clay** 120.0-120.4' - Same as 116.0-116.5' | Disaggregated limestone |
| | | | 6 | 120.6' - Fracture, 30 deg, rough, planar 121.0, 121.3, 121.45, 121.5, 121.55, 121.6,' - Fractures (6), horizontal, smooth, planar | | **Limestone** 120.4-121.0' - pale yellowish brown, (10YR 6/2), strong HCl reaction, extremely weak (R0), 20-30% voids up to 1/16" | |
| | | | 1 | | | 121.0-121.65' - pale yellowish brown, (10YR 6/2), medium grained, 10-20% fines, strong HCl reaction, very weak to weak (R1 to R2), 20-30% voids up to 1/16", poorly fossiliferous, cyclic bedding | |
| | | | NR | | | | R10: 3 minutes |
| 125 | 125.0 | | | | | 121.65-122.1' - coarse grained, weak HCl reaction, very weak (R1), 5-10% solution cavities, 20-30% voids, highly fossiliferous | |
| -84.5 | R11-HQ 5 ft 18% | 12 | 3 | 125.1' - Fracture, horizontal, rough, planar, 1/16" thick infilling, open | | **No Recovery 122.1-125.0'** | |
| | | | NR | 125.25' - Fracture, horizontal, rough, undulating, 1/16" thick infilling, open | | **Limestone** 125.0-125.25' - yellowish gray, (15Y 7/2), coarse grained, mild to moderate HCl reaction, very weak (R1), trace solution cavities up to 1/4", 10-20% voids up to 3/16" 125.25-125.5' - Same as 125.0-125.25' except pale yellowish brown, (10YR 6/2) 125.5-125.9' - Same as 125.0-125.25' | R11: 2 minutes |
| 130 | 130.0 | | | | | **No Recovery 125.9-130.0'** | |
| -89.5 | R12-HQ 5 ft 60% | 0 | >10 | 130.0-132.0' - Mechanical break, multiple | | **Silty Clay (CL)** 130.0-103.3' - dark yellowish orange, (10YR 6/6), stiff, mild to moderate HCl reaction | |
| | | | >10 | | | | |
| | | | >10 | 132.1' - Fracture, horizontal, rough, undulating 132.5-132.8' - Fracture zone, multiple breaks, infilling | | **Poorly Graded Sand (SP)** 130.3-131.6' - grayish orange to moderate yellowish brown, (10YR 7/4 to 10YR 5/4), fine to coarse grained, slow HCl reaction | |
| | | | NR | | | | R12: 5 minutes |
| 135 | 135.0 | | | | | | |

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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

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 : 5/19/2007 END : 5/21/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -94.5 | R13-HQ 5 ft 66% | 0 | >10 | 135.0-138.3' - Mechanical break, multiple | | **Limestone** 131.6-133.0' - grayish orange, (10YR 7/4), moderate to strong HCl reaction, very weak to weak (R1 to R2), trace solution cavities up to 5/16", 20-30% voids up to 1/16", poorly to moderately fossiliferous, 20-30% silt **No Recovery 133.0-135.0'** **Limestone** 135.0-135.3' - grayish orange, (10YR 7/4), moderate to strong HCl reaction, very weak to weak (R1 to R2), trace solution cavities up to 5/16", 20-30% voids up to 1/16", poorly to moderately fossiliferous, 20-30% silt 135.3-137.5' - very light gray, (N8), very fine grained, strong HCl reaction, weak to medium strong (R2 to R3), solution cavities up to 3/4" in diameter, 5-10% voids, moderately fossiliferous 137.5-138.3' - pale yellowish brown, (10YR 6/2), medium to coarse grained, moderate HCl reaction, very weak to weak (R1 to R2), solution cavities up to 3/16", 10-15% voids <1/16", silt, moderately fossiliferous **No Recovery 138.3-140.0'** **Limestone** 140.0-140.5' - grayish orange and pale yellowish brown, (10YR7/4 and 10YR 6/2), fine grained, strong HCl reaction, very weak to weak (R1 to R2), laminated bedding 140.5-140.8' - dark yellowish brown, (10YR 4/2), no HCl reaction, extremely weak to very weak (R0 to R1), laminated bedding, 10-15% small (<1/16") voids, 30-40% cavities (<3/8"), moderately fossiliferous, silty 140.8-143.0' - Same as 140-140.5' 143.0-144.7' - dark yellowish brown, (10YR 4/2), mild to moderate HCl reaction, extremely weak to very weak (R0 to R1), 20-30% voids <1/16", moderately fossiliferous, silty **No Recovery 144.7-145.0'** **Limestone** 145.0-146.05' - moderate yellowish brown, (10YR 5/4), medium to coarse grained, moderate HCl 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 | R13: 8 minutes R14: 5 minutes SC-3 collected at 148.15-149.05' (SC-3 depth adjusted from 148.5-149.05' due to change in accounting for core loss) R15: 5 minutes Total depth of boring 150.0' |
| | | | >10 | | | | |
| | | | >10 | | | | |
| | | | 1 | | | | |
| | | | NR | | | | |
| 140 | 140.0 | | | | | | |
| -99.5 | R14-HQ 5 ft 94% | 28 | 3 | 140.2, 140.4, 140.75' - Fractures (3), rough, planar, along weak contact | | | |
| | | | 1 | 141.2' - Fracture, 60-70 deg, smooth, planar | | | |
| | | | 2 | 141.8' - Fracture, horizontal, rough, planar, infilling 142.6' - Fracture, 60-70 deg, smooth, planar | | | |
| | | | >10 | 142.9' - Mechanical break, rough, along weak contact 143.1-144.7' - Fracture zone, possible mechanical breaks | | | |
| | | | 5 | | | | |
| 145 | 145.0 | | NR | | | | |
| -104.5 | R15-HQ 5 ft 84% | 53 | >10 | 145.2-145.4' - Fractures, gravel-sized pieces | | | |
| | | | 0 | 145.85-145.95' - Fractures, horizontal, rough, planar, open 146.4-146.5' - Mechanical break, multiple 147.15' - Mechanical break | | | |
| | | | 0 | | | | |
| | | | >10 | 148.4-148.75' - Mechanical break | | | |
| | | | 0 | 148.9' - Fracture, horizontal, rough, planar, open, fragments don't fit together | | | |
| | | | NR | | | | |
| 150 | 150.0 | | | | | | |
| -109.5 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-22 SHEET 9 OF 9 |

# 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

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 : 5/19/2007 END : 5/21/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES | | | SYMBOLIC LOG | LITHOLOGY | COMMENTS |
|---|---|---|---|---|---|---|---|
| | | R Q D (%) | FRACTURES PER FOOT | DESCRIPTION<br>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. |
| | | | | | | 148.8-149.2' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, weak (R2), laminated bedding, 5% cavities up to 1-1/2"x1/2"<br>**No Recovery 149.2-150.0'**<br>Bottom of Boring at 150.0 ft bgs on 5/21/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-23 SHEET 1 OF 9 |

# SOIL BORING LOG

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 LOGGER : J. Schaeffer, D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 40.7 | 0.0 – 1.5 | 1.0 | SS-1 | 2-2-5 (7) | **Fill** 0.0-0.3' - Fill material, road import fill 0.3-0.5' wood fragments<br>**Poorly Graded Sand With Silt (SP-SM)** 0.5-1.0' - brownish black, (5YR 2/1), moist, loose, fine grained, no HCl reaction, lighter color with depth, 5-10% nonplastic fines, some fines may be organics, silica sand | | Driller use 10' section of NWJ rod then AWJ rods for SPT sampling.<br>S. Hutchinson performed cathead hammer work for all samples drilling with 3-15/16" tricone bit. |
| 5 | 5.0 – 6.5 | 1.5 | SS-2 | 4-4-3 (7) | **Poorly Graded Sand With Sand (SP-SM)** 5.0-6.5' - moderate yellowish brown, (10YR 5/4), wet, loose, fine grained, no HCl reaction, 5% nonplastic fines, trace organics, silica sand | | |
| 35.7 | | | | | | | |
| 10 | 10.0 – 11.5 | 1.2 | SS-3 | 6-13-14 (27) | **Silty Sand (SM)** 10.0-11.2' - light olive gray, (5Y 6/1), wet, medium dense, fine grained, no HCl reaction, 25-30% low to nonplastic fines, silica sand | | Material in shoe was more fines with higher plasticity |
| 30.7 | | | | | | | |
| 15 | 15.0 – 16.5 | 0.7 | SS-4 | 5-14-16 (30) | **Interbedded Silty Sands And Sandy Clay (SM-CL)** 15.0-15.3' - white to medium light gray to greenish gray, (N9 to N7 to 5G 6/1), wet, medium dense, fine grained, moderate to strong HCl reaction, low to nonplastic fines in silty sands, medium to high plastic fines in sandy clay, beds 1/4" thick, (2) 1"-2" limestone pieces embedded in material, both carbonate material<br>**Silt (ML)** 15.3-15.5' - yellowish gray, (5Y 6/1), wet, hard to stiff, low plasticity, moderate HCl reaction, carbonate material<br>**Limestone Fragments** 15.5-15.7' - moderate to strong HCl reaction, mottled appearance | | |
| 25.7 | | | | | | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-23 SHEET 2 OF 9 |

# SOIL BORING LOG

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 LOGGER : J. Schaeffer, D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 20.7 | 20.0 – 21.5 | 0.7 | SS-5 | 14-41-35 (76) | **Silt With Sand (ML)** 20.0-20.7' - yellowish gray, (5Y 8/1), wet, hard, low plasticity, mild to moderate HCl reaction, 15-20% sand size particles, carbonate materials | | |
| 25 / 15.7 | 25.0 – 26.4 | 1.0 | SS-6 | 27-40-50/5 (90/11) | **Silt With Sand (ML)** 25.0-26.0' - grayish orange, (10YR 7/4), wet, hard, nonplastic, mild to moderate HCl reaction, 26% fine to medium sand size material, carbonate materials | | |
| 30 / 10.7 | 30.0 – 31.5 | 1.0 | SS-7 | 10-19-22 (41) | **Silt With Sand (ML)** 30.0-31.0' - Same as 25.0-26.0' | | Driller's Remark: 20'-35' drills hard but not rock, just fairly dense |
| 35 / 5.7 | 35.0 – 35.3 | 0.1 | SS-8 | 50/4 (50/4") | **Limestone Fragments** 35.0-35.1' - moderate yellowish brown, (10YR 5/4), fragments up to 1"x1/4", very poor recovery | | Driller's Remark: Rock pieces are falling into hole at approximately 12-13', can't get bit 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 20-35' |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-23 SHEET 3 OF 9 |

# SOIL BORING LOG

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 LOGGER : J. Schaeffer, D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 0.7 | 40.0–41.0 | 0.7 | SS-9 | 44-50/6 (94/12") | **Sandy Silt (ML)** 40.0-40.7' - moderate yellowish brown, (10YR 5/4), wet, hard, low plasticity, mild to moderate HCl reaction, 25-30% sand-sized particles to 1/8", carbonate materials | | |
| 45 -4.3 | 45.0–45.9 | 0.9 | SS-10 | 42-50/5 (92/11") | **Silt With Sand (ML)** 45.0-45.9' - Same as 40.0-40.7' except 29% sand; trace black particles and streaks; trace green streaks | | Driller's Remark: Chatter on and off from approximately 40' on, layers with chatter are thin, only a few inches thick |
| 50 -9.3 | 50.0–50.2 | 0.1 | SS-11 | 50/2.5 (50/2.5") | **Limestone Fragments** 50.0-50.05' - pale yellowish brown, (10YR 6/2), mild to moderate HCl reaction, fragments to 1/2", poor recovery | | |
| 55 -14.3 | 55.0–55.4 | 0.4 | SS-12 | 50/5 (50/5") | **Silt With Sand (ML)** 55.0-55.4' - moderate yellowish brown, (10YR 5/4), wet, hard, nonplastic, mild to moderate HCl reaction, 10-15% sand-sized particles to 1/16", carbonate materials, trace black organic lenses | | |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-23 SHEET 4 OF 9 |

# SOIL BORING LOG

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 LOGGER : J. Schaeffer, D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -19.3 | 60.0<br>60.2 | 0.0 | SS-13 | 50/2<br>(50/2") | **Limestone Fragments With Silt And Sand**<br>60.0-60.2' - limestone fragments, silt and sand-sized particles, poor recovery | | More chatter from 60'-65' |
| 65<br>-24.3 | 65.0<br>66.0 | 0.9 | SS-14 | 50-50<br>(100/12") | **Silt (ML)**<br>65.0-65.9' - moderate yellowish brown, (10YR 5/4), moist to wet, hard, nonplastic to low plasticity, moderate to strong HCl reaction, 5-10% fine sand size particles, carbonate materials | | Driller's Remark: 65.0'-70.0' drilled similar to 60.0'-65.0', more rock chips in cuttings<br>Driller's Remark: Bouncing on SPT, will switch to rock coring at 70.0' |
| 70<br>-29.3 | 70.0<br>70.1 | 0.0 | SS-15 | 50/1<br>(50/1") | **Limestone Fragments**<br>70.0-70.1' - 3 fragments to 1/2x1/8", mild to moderate HCl reaction, poor recovery<br>Begin Rock Coring at 70.0 ft bgs<br>See the next sheet for the rock core log | | Finish soil drilling at 17:00 on 4/11/07; setting HW casing to 70'<br>End day at 18:00 on 4/11/07, set 35.0' of HW casing<br>Start at 8:00 on 4/12/07, set remainder of casing and clean out hole<br>Cannot take water levels due to tooling in hole<br>Finish setting casing to 70', clean and flush hole at 11:00 on 4/12/07 |
| 75<br>-34.3 | | | | | | | |
| 80 | | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: B-23 | SHEET 5 OF 9 |
|---|---|---|

# ROCK CORE LOG

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 on 4/18/07 START : 4/11/2007 END : 4/19/2007 LOGGER : J. Schaeffer, D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -29.3 | 70.0 70.5 R1-NQ 0.5 ft 0% | | NR | | | **No Recovery 70.0-70.5'** | R1: 1 minute |
| | R2-NQ 5 ft 94% | 65 | 3 | 70.7, 70.85, 71.4, 71.6, 72.0' - Fractures (5), 0-10 deg, rough, undulating, tight to open with some fragmenting at fractures | | **Limestone** 70.5-75.2' - moderate yellowish brown, (10YR 5/4), mild to moderate HCl 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' | |
| | | | 3 | | | | |
| | | | 0 | 72.35' - Fracture, horizontal, rough, undulating<br>72.95' - Mechanical break | | | |
| | | | 3 | 73.9, 74.0' - Fractures (2), horizontal, rough, undulating, tight, join a vertical rough undulating fracture at 73.95' | | | |
| 75 -34.3 | | | 1 | 74.4, 74.6' - Fractures (2), horizontal, rough, undulating, two horizontal fractures bound a vertical fracture at 74.5' | | | R2: 13 minutes |
| | 75.5 | | NR | | | **No Recovery 75.2-75.5'** | |
| | R3-NQ 5 ft 62% | 23 | 4 | 75.5-75.6' - Fracture zone, subangular 3/4" to 1" fragments | | **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' | |
| | | | 3 | 75.6' - Fracture, termination of fracture zone at a stepped 30 deg face | | | |
| | | | 4 | 76.2' - Fracture, 70 deg, rough, undulating, 0.4' long cleave<br>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 | | | |
| | | | NR | 76.6' - Fracture, 70 deg, rough, undulating, missing side of core, fracture terminated above horizontal fracture | | **No Recovery 78.6-80.5'** | |
| 80 -39.3 | | | | | | | R3: 14 minutes |
| | 80.5 | | | | | | |
| | R4-NQ 5 ft 90% | 52 | 1 | 77.1, 77.2' - Fractures (2), horizontal, rough, undulating, open, friable, voids decrease with depth<br>77.8' - Fracture, horizontal, rough, stepped | | **Limestone** 80.5-85.0' - moderate yellowish brown to dark yellowish orange, (10YR 5/4 to 10YR 6/6), fine grained, moderate HCl 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 | Fractures tend to occur at weaker (R2) sections that are friable |
| | | | 3 | 77.8-77.9' - Fracture zone, rock crush<br>78.4' - Fracture, horizontal, rough, undulating, open | | | |
| | | | >10 | 78.5' - Fracture, 15 deg, rough, planar<br>81.1' - Fracture, horizontal, with fragmentation | | | |
| | | | 1 | 81.8-81.95' - Fracture, vertical, rough, undulating, bonded by horizontal to 10 deg rough, undulating fracture | | | |
| 85 -44.3 | | | 5 | 82.6' - Fracture, 70 deg, rough, undulating, leading to underlying fracture zone | | | R4: 12 minutes |
| | 85.5 | | NR | 82.8-83.0' - Fracture zone, rock crush leading to a 10 deg rough stepped fracture at 83.0' | | **No Recovery 85.0-85.5'** | |
| | R5-NQ 5 ft 100% | 48 | 2 | 83.4' - Fracture, 60 deg, rough, undulating, with fragmentation, friable | | **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 | |
| | | | 2 | 84.2' - Fracture, 80 deg, rough, undulating, with fragmentation, friable | | | |
| | | | 5 | 84.7' - Fracture, 70-90 deg, rough, undulating, leading into fracture zone with organics<br>85.5' - Fracture, 30 deg, smooth, planar | | | |
| | | | 2 | 86.2' - Fracture, horizontal, rough, stepped, fracture terminates underlying vertical fracture | | | |
| 90 | | | | | | | SC-1 collected at 89.3-90.5' |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: B-23 | SHEET 6 OF 9 |
|---|---|---|

# ROCK CORE LOG

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 on 4/18/07 START : 4/11/2007 END : 4/19/2007 LOGGER : J. Schaeffer, D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -49.3 | | | 0 | 86.7' - Fracture, 70 deg and vertical, rough, undulating, tight to open, 5/16" relief, extends 86.2-87.4' | | | R5: 14 minutes |
| 90.5 | | | | | | | |
| | R6-NQ 5 ft 50% | 28 | 3 | 87.15' - Fracture, 40 deg, rough, undulating, extends through half core joining vertical fracture | | **Limestone** 90.5-91.7' - Same as 85.5-90.5' except moderate yellowish brown, (10YR 5/4), medium strong (R3), fossiliferous, many cavities up to 1/2" | Based on overlying and underlying rock in the rock crush zone; picked 91.7' as contact |
| | | | >10 | 88.0-88.7' - Fracture zone, several horizontal fractures with a 70 deg fracture crossing all horizontal fractures, clean large (2"-3") fragments, bounded by 30 deg fractures rough to undulating on top and bottom | | 91.7-92.1' - light olive gray, (5Y 5/2), fine grained, moderate to strong HCl reaction, strong (R4), increasing voids with depth from 5-15%, elongated cavities near 94.8', large 1"x1"x1/2" cavity at 95.1' | End of core from R6-NQ matches top of R7-NQ core, therefore core loss interpreted to be from middle of core run |
| | | | NR | 89.0, 89.25' - Fractures (2), horizontal, rough, undulating | | **No Recovery 92.1-94.6'** | Core loss assumed to be from 92.1-94.6' |
| | | | | 91.0' - Fracture, 70 deg, rough, undulating, 4" long, weathered edges, tight | | | |
| 95 -54.3 | | | 2 | 91.4-92.1' - Fracture zone | | **Limestone** 94.6-95.5' - Same as 91.7-92.1' | R6: 14 minutes |
| 95.5 | | | | 94.8' - Fracture, 80 deg, rough, undulating, tight, 4" long | | | |
| | R7-NQ 5 ft 92% | 42 | 0 | 95.5' - Fracture, 45 deg, rough, planar, tight to healed, joints with R7 core | | 95.5-99.3' - Same as 94.6-95.5' except voids increasing to 20-25%, weak (R2) at 97.9-98.85' | |
| | | | 0 | | | | |
| | | | >10 | 97.7, 97.9' - Fractures (2), 20 deg, rough, undulating, open, fragmented beneath 97.9' | | | |
| | | | 8 | 98.25, 98.55, 98.65' - Fractures (3), 10 deg, somewhat fragmented | | | |
| | | | 8 | 98.4' - Fracture, vertical, rough, undulating, open and somewhat fragmented, bounded by 10 deg fractures at 98.25' and 98.55' | | 99.3-100.1' - yellowish gray, (5Y 7/2), moderate HCl reaction, strong (R4), voids decreasing to 5-10%, transition from above is irregular with infilling of cavities, 1/2"x3/4" deep spiral fossil at 99.5' | R7: 14 minutes |
| 100 -59.3 | | | NR | 99.1' - Fracture or mechanical break, 10 deg, rough, undulating, tight to healed | | | |
| 100.5 | | | | | | | |
| | R8-NQ 5 ft 70% | 52 | 5 | 99.3' - Fracture, horizontal, rough, undulating, open at contact | | | Water level at 2.3 below ground surface |
| | | | 2 | 99.5' - Fracture, vertical, rough, undulating, bounded at 99.3' and 99.75' | | **No Recovery 100.1-100.5'** | |
| | | | 1 | 99.75-100.1' - Fracture zone, angular block with horizontal and vertical breaks 1"-2" in size | | **Limestone** 100.5-104.0' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, strong (R4), 1/16" voids varying from 5-30%, few 1/2" elongated fossils, few cavities, mostly shallow and <1/2", trace organics laminations and inclusions | |
| | | | 1 | 101.15' - Fracture, rough, undulating to planar, open | | | SC-2 collected at 103.25-103.95' |
| | | | NR | 101.4-101.5' - Fracture zone, bounded by <5 deg, rough, undulating, very open fracture | | **No Recovery 104.0-105.5'** | |
| 105 -64.3 | | | | 101.8, 102.1' - Fractures (2), 50 deg, rough, undulating | | | R8: 20 minutes |
| 105.5 | | | | 103.25' - Mechanical break | | | |
| | | | >10 | 103.9' - Mechanical break | | **Limestone** 105.5-108.0' - Same as 100.5-104.0' except light olive gray to moderate olive brown, (5Y 5/2 to 5Y 4/4), 10-20% voids, fragmented at 105.5-106.2' | |
| | | | 0 | 105.5-106.2' - Fracture zone, angular rock fragments and nearly fractures at 106.0' | | | |
| | | | 0 | 106.2' - Fracture, 10 deg, rough, stepped | | | |
| | R9-NQ 5 ft 50% | 33 | NR | 107.9' - Mechanical break | | **No Recovery 108.0-110.5'** | |
| 110 | | | | | | | R9: 19 minutes |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-23 SHEET 7 OF 9 |

# ROCK CORE LOG

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 on 4/18/07 START : 4/11/2007 END : 4/19/2007 LOGGER : J. Schaeffer, D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -69.3 | 110.5 | | | | | | |
| | R10-NQ 5 ft 100% | 53 | 0 | | | **Limestone** 110.5-115.5' - moderate yellowish brown, (10YR 5/4), moderate HCl reaction, very weak to strong (R1 to R4), small (1/16") voids 10-20%, minimal cavities, strong (R4) rock at 110.5-113.0', medium strong (R3) rock 113.0-113.5', intermingled zones of very weak and weak (R1 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 112.25-115.5' | |
| | | | 8 | 111.7, 111.9' - Fractures (2), 50 deg, rough, undulating, tight | | | |
| | | | 8 | 112.25' - Fracture zone, horizontal, stepped, 1"-2" angular fragments | | | |
| | | | 3 | 113.1' - Fractures, vertical, rough, moderately open, bounded by similar horizontal fractures at 113.0' and 113.25' | | | |
| 115 -74.3 | 115.5 | | >10 | 113.5' - Fracture, vertical, rough, undulating, open, bounded at 113.1' by horizontal fracture | | | R10: 17 minutes |
| | R11-NQ 5 ft 40% | 14 | 2 | 114.25, 114.6' - Fractures (2), 40 deg, rough, undulating, between fractures are columnar vertical fragments and fractures that are rough, undulating, tight to open | | 115.5-117.5' - Same as 110.5-115.5' except moderate yellowish brown, (10YR 5/4), medium strong to strong (R3 to R4), with intermittent core and fracture zones similar to 112.25-115.5' | Sand on outside of core from 115.5'-116.0', chatter started about 6-7 minutes into run |
| | | | >10 | 115.1-115.5' - Fracture zone, angular, columnar | | **No Recovery 117.5-120.5'** | |
| | | | NR | 115.5-116.1' - Fracture, vertical, rough, undulating, half core intact, the other half multiple fragments<br>116.1' - Fracture, horizontal, rough, undulating, open<br>116.7' - Fracture, horizontal, rough, undulating to stepped, open<br>116.7-117.5' - Fracture zone, angular 1-3" fragments | | | |
| 120 -79.3 | 120.5 | | | | | | R11: 12 minutes |
| | R12-NQ 5 ft 46% | 8 | >10 | 120.8' - Fracture or bedding plane, horizontal, planar, open, weathered with rounded face on lower side, less rounded on upper side | | **Limestone** 120.5-120.8' - Same as 115.5-117.5' except moderate HCl reaction, medium strong to strong (R3 to R4), fine grained, slighty banded with beige and gray | |
| | | | 3 | 121.1-121.5' - Fracture zone, larger angular to subangular 1-2" fragments of both over-and underlying rock | | | |
| | | | >10 | 121.5, 121.75, 122.15' - Fractures (3), horizontal and 10 deg, rough, undulating, open | | 120.8-121.3' - Same as 120.5-120.8' except mild HCl reaction, very weak (R1), end of weaker rock in fracture zone | |
| | | | NR | 121.6' - Fracture, 70-90 deg, rough, undulating, small vertical terminated by horizontal fracture and fracture zone | | **No Recovery 122.8-125.5'** | |
| 125 -84.3 | 125.5 | | | 122.15-122.25, 122.5-122.8' - Fracture zone (2), 1/4" to 1" subangular to rounded fragments | | | R12: 12 minutes |
| | R13-NQ 5 ft 46% | 28 | >10 | 122.25, 122.5' - Fractures (2), horizontal, rough, stepped | | **Limestone** 125.5-125.8' - Same as 120.5-122.8' 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 3/4" to 1-1/2" spherical fragments | SC-3 collected at 125.8-126.6' |
| | | | 2 | 125.5-125.8' - Fracture zone, rounded 3/4" to 1-1/2" fragments | | | |
| | | | 2 | 125.8' - Fracture, horizontal, rough, undulating | | | |
| | | | NR | 126.9' - Fracture, 60 deg, rough, undulating<br>127.7' - Fracture, horizontal, rough, undulating | | 125.8-126.9' - Same as 125.5-125.8' except very weak to weak (R1 to R2), intact core<br>126.9-127.8' - Same as 125.5-125.8' except very weak (R1), friable<br>**No Recovery 127.8-130.5'** | |
| 130 | | | | | | | R13: 19 minutes |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-23 SHEET 8 OF 9 |

# ROCK CORE LOG

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 on 4/18/07 START : 4/11/2007 END : 4/19/2007 LOGGER : J. Schaeffer, D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -89.3 | 130.5 | | | | | | |
| | R14-NQ 5 ft 36% | 0 | >10 | 130.5' - Fracture, horizontal, rough, planar<br>130.65-131.25' - Fracture zone, subangular 1/2" to 1-1/2" | | **Limestone**<br>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 to 30% voids at 130.6' followed by a fracture | |
| | | | >10 | 130.65' - Fracture, horizontal, rough, planar<br>131.25, 131.35, 131.40, 131.55, 131.65' - Fractures (5), planar fractures along bedding planes, open | | 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 | |
| | | | NR | 131.65-132.1' - Fracture zone, angular, broken along horizontal planes and small 1/4" to 3/4" fragments<br>132.2' - Fracture, horizontal, smooth, planar<br>132.25' - Fracture, beginning of vertical fracture with strong black to gray staining | | 131.25-132.3' - Same as 130.5-130.65' except strong (R4), <3% voids, horizontal planes visible (<1/16") | R14: 17 minutes |
| 135<br>-94.3 | 135.5 | | | | | **No Recovery 132.3-135.5'** | |
| | R15-NQ 5 ft 48% | 25 | >10 | 135.5-136.25' - Fracture zone, numerous 3/4" to 2" fragments, subangular to subrounded, contains lithology transition at 136.1' | | **Limestone**<br>135.5-136.1' - moderate yellowish brown to light olive gray, (10YR 5/4 to 5Y 5/2), moderate HCl reaction, weak (R2), 10% 1/16" voids, few 1/4" elongated cavities | |
| | | | 1 | 136.7' - Fracture, 10 deg, smooth, stepped, fracture steps at cavity, tight | | | |
| | | | 1 | 137.6' - Fracture, 0-45 deg, stepped, tight | | | |
| | | | NR | | | 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, several 1/4" to 1/2" elongated and deep (3/4") cavities. Cavities infilled in places with porous appearance, moderately HCl reaction | R15: 22 minutes |
| 140<br>-99.3 | 140.5 | | | | | **No Recovery 137.9-140.5'** | Driller's Remark: Water level = 4.79' below ground surface<br>Bit clogged, pulled casing, rocks in clay matrix, stopped at 143.0' to check bit (mechanical break) |
| | R16-NQ 5 ft 50% | 10 | <10 | 140.5-141.2' - Fracture zone, angular to subangular fragments 1/4" to 1-1/2" | | **Limestone**<br>140.5-141.2' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), 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' | |
| | | | 2 | 141.2' - Fracture, horizontal, rough, undulating<br>141.3' - Fracture, 80 deg, smooth, undulating | | | |
| | | | 1 | 141.5' - Fracture, horizontal, rough, undulating, open | | | |
| | | | NR | 141.7' - Fracture, 70 deg, rough to smooth, undulating, may join with 80 deg fracture at 141.3'<br>142.1' - Mechanical break | | 141.2-143.0' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, medium strong to strong (R3 to R4), variations of 0-10% fine voids vary over interval | R16: 23 minutes |
| 145<br>-104.3 | 145.5 | | | | | **No Recovery 143.0-145.5'** | |
| | R17-NQ 5 ft 50% | 20 | 2 | 145.9' - Bedding plane, 10 deg, smooth, planar, open | | **Limestone**<br>145.5-146.5' - Same as 141.2-143.0' | |
| | | | 5 | 146.3' - Fracture, horizontal, planar, open<br>146.4' - Fracture, 50 deg, planar | | 146.5-148.0' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), medium strong to strong (R3 to R4), up to 20% 1/16" voids, few 1/4" thin elongated fossils, red iron staining embedded and in fractures | Retrieved core from barrel when rods pulled (1.5' of core) |
| | | | 1 | 146.5' - Fracture, horizontal, undulating, open<br>146.8, 147.1' - Fractures (2), horizontal, rough, undulating, tight | | | |
| | | | NR | 147.2, 147.4, 147.55' - Fractures (3), horizontal, rough, undulating, open | | **No Recovery 148.0-150.5'** | |
| 150 | | | | | | | R17: 18 minutes |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-23 SHEET 9 OF 9 |

# ROCK CORE LOG

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 on 4/18/07 START : 4/11/2007 END : 4/19/2007 LOGGER : J. Schaeffer, D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES | | | SYMBOLIC LOG | LITHOLOGY | COMMENTS |
|---|---|---|---|---|---|---|---|
| | | 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. |
| -109.3 | 150.5 | | | | | | |
| | | | | | | Bottom of Boring at 150.5 ft bgs on 4/19/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-23A SHEET 1 OF 4 |

# SOIL BORING LOG

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 ORIENTATION : Vertical

WATER LEVELS : 5.0 ft bgs on 6/30/07 START : 11/28/2007 END : 11/28/2007 LOGGER : D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.4 | 0.0 – 1.5 | 1.1 | SS-1 | 1-2-5 (7) | **Topsoil (ML)** 0.0-0.45' - grayish brown, (5YR 3/2), very loose, little organics, 0.3-0.45' wood and roots<br>**Poorly Graded Sand With Organics (SP)** 0.45-1.1' - brownish black to light brownish gray, (5YR 2/1 to 5YR 6/1), moist, loose, very fine to fine grained, no HCl reaction, 30% organic fines, decreasing with depth | | Boring conducted for hammer testing purposes only; 2-7/8" drag bit |
| 5 | 5.0 – 6.5 | 0.9 | SS-2 | 5-8-12 (20) | **Silty Sand (SM)** 5.0-5.9' - moderate yellowish brown, (10YR 5/4), wet, medium dense, very fine to fine grained, no HCl reaction, 25% nonplastic fines, slight orange staining at 5.0-5.3', trace organics and black staining. | | |
| 37.4 | | | | | | | |
| 10 | 10.0 – 11.5 | 1.1 | SS-3 | 2-2-2 (4) | **Silty Sand (SM)** 10.0-10.75' - dark yellowish orange, (10YR 6/6), wet, very loose, very fine to fine grained, no HCl reaction, 25-30% nonplastic fines<br>**Sandy Silt (ML)** 10.75-11.1' - moderate yellowish brown, (10YR 5/4), wet, nonplastic, rapid dilatancy, no HCl reaction, 40% fine silica sand | | Driller's Remark: Becomes harder-rocky at 14' |
| 32.4 | | | | | | | |
| 15 | 15.0 – 16.5 | 1.0 | SS-4 | 3-7-15 (22) | **Silt (ML)** 15.0-16.0' - dark yellowish orange, (10YR 6/6), wet, very stiff, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 5-10% very fine sand sized, carbonate material | | |
| 27.4 | | | | | | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-23A SHEET 2 OF 4 |

# SOIL BORING LOG

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 ORIENTATION : Vertical

WATER LEVELS : 5.0 ft bgs on 6/30/07 START : 11/28/2007 END : 11/28/2007 LOGGER : D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.4 | 20.0 – 21.5 | 1.4 | SS-5 | 12-42-50 (92) | **Silt (ML)** 20.0-21.35' - Same as 15.0-16.0' except hard | | |
| 25 | 25.0 – 26.5 | 0.9 | SS-6 | 20-20-24 (44) | **Sandy Silt And Limestone (ML)** 25.0-25.9' - yellowish gray and dusky yellow, (5Y 7/2 and 5Y 6/4), wet, hard, nonplastic, rapid dilatancy, mild HCl reaction, 35% fine to coarse sand sized, 10-15% fine gravel-sized limestone fragments, carbonate materials | | Driller's Remark: Hard drilling from 26.5-30.0' |
| 17.4 | | | | | | | |
| 30 | 30.0 – 31.5 | 1.1 | SS-7 | 45-26-33 (59) | **Sandy Silt And Limestone (ML)** 30.0-31.05' - Same as 25.0-25.9 except dusky yellow, (5Y 6/4), moderate HCl reaction | | Driller's Remark: Encountering rock at 33' and chattering |
| 12.4 | | | | | | | |
| 35 | 35.0 – 36.5 | 0.7 | SS-8 | 9-4-2 (6) | **Silty Sand (SM)** 35.0-35.65' - light olive gray, (5Y 2/2), wet, very loose, fine to coarse grained, moderate HCl reaction, 10% fine to gravel-sized limestone fragments, 20-25% nonplastic fines, carbonate materials | | Driller's Remark: Hard at 37'; change to 2-7/8" tricone bit |
| 7.4 | | | | | | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-23A SHEET 3 OF 4 |

# SOIL BORING LOG

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 ORIENTATION : Vertical

WATER LEVELS : 5.0 ft bgs on 6/30/07 START : 11/28/2007 END : 11/28/2007 LOGGER : D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.4 | 40.0 | 0.0 | SS-9 | 50/1.5 (50/1.5") | **No Recovery 40.0-40.1'** | | Driller's Remark: Medium hard drilling from 41-62' |
| 45 | 45.0 | | | | | | |
| -2.6 | 46.0 | 0.0 | SS-10 | 46-50/5.5 (96/11.5") | **No Recovery 45.0-46.0'** | | |
| 50 | 50.0 | | | | | | |
| -7.6 | 50.8 | 0.3 | SS-11 | 33-50/3.5 (83/9.5") | **Limestone Fragments** 50.0-50.25' - light olive gray, (5Y 5/2), mild HCl reaction, fine gravel-sized fragments | | |
| 55 | 55.0 | | | | | | |
| -12.6 | 55.4 | 0.0 | SS-12 | 50/5 (50/5") | **No Recovery 55.0-55.4'** | | |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-23A SHEET 4 OF 4 |

# SOIL BORING LOG

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 ORIENTATION : Vertical

WATER LEVELS : 5.0 ft bgs on 6/30/07 START : 11/28/2007 END : 11/28/2007 LOGGER : D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -17.6 | 60.0 60.8 | 0.0 | SS-13 | 50-50/4 (100/10") | **No Recovery 60.0-60.8'** | | |
| | | | | | | | Driller's Remark: Hard at 62' |
| | | | | | | | Driller's Remark: Soft from 62.5-64.5' |
| 65 -22.6 | 65.0 65.1 | 0.0 | SS-14 | 50/1 (50/1") | **No Recovery 65.0-65.1'** | | Driller's Remark: Hard from 64.5-66.5' |
| | | | | | | | Driller's Remark: Soft from 66.5-67.5' |
| | | | | | | | Driller's Remark: Hard from 67.5-70.0' |
| 70 -27.6 | 70.0 70.1 | 0.0 | SS-15 | 50/1 (50/1") | **No Recovery 70.0-70.1'** Bottom of Boring at 70.1 ft bgs on 11/28/2007 | | Boring completed at 16:55 on 11/28/2007 Water level at 5.0' below ground surface Driller's Remark: 25% loss of circulation throughout entire boring |
| 75 -32.6 | | | | | | | |
| 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

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 : 1.61 ft bgs on 6/14/07 START : 5/15/2007 END : 5/17/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 40.9 | 0.0 – 1.5 | 0.4 | SS-1 | 0-4-4 (8) | **Silty Sand With Organics (SM)** 0.0-0.4' - grayish brown to dusky brown, (5YR 2/3 to 5Y 2/2), moist to wet, loose, fine sand, 16% fines, 12% organic matter | | "Water level is based on Ground Water Monitoring at LNP site (FSAR Table 2.4.12.08)" Begin drilling with 3-7/8" tri-cone bit at 2.0' |
| 5 | 5.0 | | | | | | |
| 35.9 | 5.0 – 6.5 | 1.0 | SS-2 | 2-3-4 (7) | **Poorly Graded Sand With Silt (SP-SM)** 5.0-5.95' - moderate yellowish brown, (10YR 5/4), wet, loose, very fine to fine grained, no HCl reaction, 11% low plasticity fines, trace roots, trace coarse gravel, sand is silica | | |
| 10 | 10.0 | | | | | | |
| 30.9 | 10.0 – 11.5 | 1.1 | SS-3 | 4-5-10 (15) | **Silt (ML)** 10.0-11.05' - grayish orange, (10YR 7/4), wet, stiff, nonplastic, rapid dilatancy, moderate HCl reaction, trace fine grained sand, all carbonate derived | | Driller's Remark: Surface around borehole sinking slightly |
| 15 | 15.0 | | | | | | |
| 25.9 | 15.0 – 15.8 | 0.6 | SS-4 | 47-50/3 (97/9") | **Limestone Fragments And Silt (ML)** 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 grained sand to coarse grained gravel-sized fragments, moderate HCl reaction | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.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

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 : 1.61 ft bgs on 6/14/07 START : 5/15/2007 END : 5/17/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 20.9 | 20.0 – 21.5 | 1.3 | SS-5 | 13-47-18 (65) | **Silt With Sand (ML)** 21.0-21.25' - grayish orange to moderate yellowish brown, (10YR 7/4 to 10YR 6/2), moist to wet, hard, 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' |
| 25 / 15.9 | 25.0 – 26.5 | 1.5 | SS-6 | 8-8-6 (14) | **Sandy Silt (ML)** 25.0-26.5' - Same as 20.0-21.25' except 27% fine grained sand, 13% medium to coarse grained sand | | Driller's Remark: Hard drilling at 28', 20% circulation loss |
| 30 / 10.9 | 30.0 – 30.2 | 0.2 | SS-7 | 50/2 (50/2") | **Limestone Fragments** 30.0-30.15' - light brown, (5YR 5/6), mild to moderate HCl reaction, moderately fossiliferous | | 4" casing set at 30' |
| 35 / 5.9 | 35.0 – 36.5 | 1.5 | SS-8 | 6-10-19 (29) | **Silty Sand (SM)** 35.0-36.5' - dark yellowish brown, (10YR 4/2), moist to wet, medium dense, fine to coarse grained, mild HCl reaction, 30% nonplastic fines, all carbonate derived | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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

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 : 1.61 ft bgs on 6/14/07 START : 5/15/2007 END : 5/17/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 0.9 | 40.0 | 0.0 | SS-9 | 50/3 (50/3") | **No Recovery 40.0-40.3'** | | |
| 45 -4.1 | 45.0 45.4 | 0.4 | SS-10 | 50/5 (50/5") | **Silty Sand (SM)** 45.0-45.4' - moderate yellowish brown, (10YR 5/4), moist, very dense, fine to coarse grained, mild HCl reaction, 25-30% low plasticity fines, 5% fine grained gravel | | Driller's Remark: Hard to soft material from 45-50' (heavy to no grinding) |
| 50 -9.1 | 50.0 51.5 | 1.5 | SS-11 | 39-37-50 (87) | **Limestone Fragments And Silty Sand (SM)** 50.0-51.5' - Same as 45.0-45.6' except dark yellowish brown, (10YR 4/2), 60% limestone fragments, 40% silty sand | | Driller's Remark: Medium grinding from 50-55' |
| 55 -14.1 | 54.8 54.9 | 0.0 | SS-12 | 50/1 (50/1") | **No Recovery 55.0-55.1'** Begin Rock Coring at 55.0 ft bgs See the next sheet for the rock core log | | Advanced 4" casing to 55', switch to rock coring, see rock core log |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-24 SHEET 4 OF 9 |

# 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

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 : 5/15/2007 END : 5/17/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -14.1 | 55.0 | | >10 | 55.1' - Fracture, horizontal, rough, planar, open | | **Limestone** 55.0-57.0' - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to 10YR 4/2), medium grained, mild to moderate HCl reaction, weak (R2), voids (1/16-3/16") over 20-30% of surface, moderately fossiliferous (shell fragments), black organic lenses 3/16-3/8" at 55.6-55.9' and 56.8-57.0' | |
| | | | 0 | 55.4-55.6' - Fracture zone, multiple fractures, gravel-sized rock fragments<br>55.9' - Fracture or mechanical break, horizontal, rough, planar, tight | | | |
| | R1-HQ 5 ft 82% | 45 | 2 | 57.0-57.2' - Clay seam, 0.2' thick | | **Fat Clay (CH)** 57.0-57.2' - moderate brown, (5YR 4/4), high plasticity | |
| | | | >10 | 57.9-58.4' - Fracture zone, multiple fractures | | **Limestone** 57.2-58.0' - Same as 55.0-57.0' | R1: 11 minutes |
| | | | 0 | | | | |
| | | | NR | | | | |
| 60 | 60.0 | | | | | | |
| -19.1 | | | 2 | 60.3' - Fracture or mechanical break, 60 deg<br>60.6' - Fracture, rough, stepped, open 1/8-5/16" | | **Fat Clay (CH)** 58.0-58.4' - grayish brown to dusky yellowish brown, (5YR 3/2 to 10YR 2/2), medium to high plasticity | |
| | | | 0 | | | **Limestone** 58.4-59.1' - Same as 55.0-57.0' except cavities (3/16-9/16") over 40% of surface | |
| | R2-HQ 5 ft 96% | 33 | 5 | 62.1, 62.5, 62.7, 62.8, 63.0, 63.3, 63.4, 63.7, 64.1, 64.4' - Fractures (10), rough, planar, <1/16" clay infilling | | **No Recovery 59.1-60.0'** | |
| | | | 3 | | | **Limestone** 60.0-61.2' - Same as 55.0-57.0' except pale yellowish brown, (10YR 6/2), medium to coarse grained | |
| | | | 2 | | | 61.2-64.8' - pale yellowish brown to dark yellowish brown, (10YR 6/2 to 10YR 4/2), fine to coarse grained, moderate HCl reaction, very weak (R1), weak rock (R2) at 63.7', 63.8' and 64.0', friable, poorly fossiliferous | R2: 12 minutes |
| 65 | 65.0 | | NR | | | | |
| -24.1 | | | >10 | 65.0-66.2' - Fracture zone, rough to smooth, planar, <1/16" silt and/or clay sized infilling | | **No Recovery 64.8-65.0'** | |
| | | | 2 | 66.35, 66.5' - Fractures (2), rough, stepped, open 1/8" | | **Limestone** 65.0-66.2' - Same as 61.2-64.8' except increase in weak rock (R2), rock chips | SC-1 collected at 66.5-67.25' |
| | R3-HQ 5 ft 94% | 38 | 1 | 67.2' - Fracture, rough, stepped, open 3/16-1/4" | | 66.2-69.7' - dark yellowish brown, (10YR 4/2), moderate HCl reaction, very weak to weak (R1 to R2), voids (up to 3/16") over 30% of surface, solution cavities (up to 3/4") over 10% of surface, intervals of fine grained limestone with no voids or solution cavities from 69.0-69.7' | |
| | | | 2 | 68.5, 68.7' - Fractures (2), rough, stepped, open 1/16-3/16" | | | |
| | | | <10 | | | | R3: 9 minutes |
| 70 | 70.0 | | NR | | | | |
| -29.1 | | | 10 | 70.0-74.0' - Fracture zone, vertical, multiple fractures, mostly vertical along weak joints, slight infilling | | **No Recovery 69.7-70.0'** | |
| | | | 10 | | | **Limestone** 70.0-72.4' - pale yellowish brown, (10YR 6/2), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids (<1/8") over 5-10% of surface, silt-like matrix over 5% of surface, poorly fossiliferous | |
| | R4-HQ 5 ft 76% | 0 | 10 | | | | |
| | | | 10 | | | **Fat Clay (CH)** 72.4-72.6' - light brown, (5YR 5/6), medium to high plasticity, no HCl reaction, with black, friable organics | |
| | | | NR | | | | R4: 8 minutes |
| 75 | 75.0 | | | | | | |

| PROJECT NUMBER: | 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

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 : 5/15/2007 END : 5/17/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -34.1 | R5-HQ 5 ft 92% | 72 | 0 | | | **Limestone** 72.6-73.8' - moderate yellowish brown, (10YR 5/4), very weak (R1), voids (up to 1/16") over 10-20% of surface, moderately fossiliferous **No Recovery 73.8-75.0'** **Limestone** 75.0-79.6' - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to 10YR 4/2), moderate HCl reaction, very weak to weak (R1 to R2), voids (up to 1/16") over 30-40% of surface, solution cavities at 76.4-77.3', highly fossiliferous **No Recovery 79.6-80.0'** | |
| | | | 1 | 76.6' - Fracture, horizontal, rough, stepped, open 3/16-5/16", fracture along cavity | | | |
| | | | 3 | 77.5-77.8' - Fractures, irregular fractures along solution cavities | | | |
| | | | 2 | 78.6' - Fracture, 60 deg, rough, planar | | | |
| | | | 1 | | | | R5: 7 minutes |
| 80 | 80.0 | | NR | 79.6' - Fracture, horizontal, rough, stepped, open 1/16-1/8" | | | |
| -39.1 | R6-HQ 5 ft 68% | 37 | 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 (R2 to R3), voids (1/16") over 20-30% of surface, solutions cavities (<3/4") over 10-15% of surface | |
| | | | >10 | 81.6, 82.0' - Fracture zone, multiple fractures along solution cavities | | | |
| | | | 3 | 82.2' - Fracture or mechanical break, vertical 82.4' - Fracture, 3-5 deg, rough, stepped, trace infilling, open 1/8-1/4" | | | |
| | | | 1 | 83.1' - Fracture, 15 deg, rough, planar | | **No Recovery 83.4-85.0'** | |
| | | | NR | | | | R6: 7 minutes |
| 85 | 85.0 | | | | | | |
| -44.1 | R7-HQ 5 ft 58% | 35 | 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 reaction, weak (R2), trace voids, trace fossils, 20-30% silt sized matrix material 87.3-87.9' - Same as 85.0-87.3' except extremely weak to very weak (R0 to R1), silty matrix increases to 40-50% **No Recovery 87.9-90.0'** | |
| | | | 1 | 86.2' - Fracture, horizontal, smooth, stepped, infilling | | | |
| | | | 1 | 87.1, 87.4' - Mechanical break (2), horizontal, rough, planar | | | |
| | | | NR | 87.9' - Fracture, smooth, planar, irregular pieces | | | Driller's Remark: 90% circulation loss at 88' R7: 8 minutes |
| 90 | 90.0 | | | | | | |
| -49.1 | R8-HQ 5 ft 100% | 52 | 2 | 90.6' - Fracture, 7-10 deg, rough, planar 90.9' - Fracture, 0-1 deg, rough, planar | | **Limestone** 90.0-94.3' - grayish orange, (10YR 7/4), medium to coarse grained, moderate HCl reaction, extremely weak to very weak (R0 to R1), voids (up to 1/8") over 20-30% of surface, moderately fossiliferous, silty matrix up to 40-50% | |
| | | | 3 | 91.7, 91.8, 91.9' - Fractures (3), 2-4 deg, rough, planar | | | |
| | | | 10 | 92.0-92.2' - Fractures or mechanical break, irregular fractures 92.4' - Fracture, horizontal, rough, planar, trace infilling | | | |
| | | | 1 | 92.7' - Fracture, 40-50 deg, rough, planar, to undulating | | | |
| | | | 10 | 93.9' - Fracture, 5-10 deg, rough, stepped, <3/16" infilling | | | R8: 7 minutes |
| 95 | 95.0 | | | | | | |

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|---|---|
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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

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 : 5/15/2007 END : 5/17/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -54.1 | R9-HQ 5 ft 100% | 78 | 1 | 94.3-95.0' - Fracture zone, multiple fractures, very soft material<br>95.2' - Fracture, horizontal, smooth, planar | | **Limestone**<br>94.3-95.0' - Same as 90.0-94.3' except strong HCl reaction, silty matrix increases to 60-70%<br>95.0-100.0' - pale yellowish brown, (10YR 6/2), strong HCl reaction, very weak (R1), voids (up to 1/16") over 10-20% of surface, solution cavities (up to 3/8") over 5-10% of surface, moderately fossiliferous, 5-10% silty matrix (chalk-like) | SC-2 collected at 95.2-96.4' |
| | | | 2 | 96.4, 96.85' - Fractures (2), 1 deg, rough, stepped, open 1/8-5/16" | | | |
| | | | 3 | 97.2, 97.8, 97.9, 98.0, 98.15, 98.9' - Fractures (6), rough, stepped, open 3/16" | | | |
| | | | 3 | | | | |
| | | | 2 | | | | R9: 6 minutes |
| 100 | 100.0 | | | 99.6, 99.7' - Fractures (2), horizontal, smooth, planar | | | |
| -59.1 | R10-HQ 5 ft 28% | 0 | 10 | 100.0-100.35' - Fracture zone, irregular pieces | | 100.0-101.4' - grayish orange, (10YR 7/4), medium to coarse grained, strong HCl reaction, very weak (R1), voids (up to 1/16") over 5-10% of surface, poorly to moderately fossiliferous<br>**No Recovery 101.4-105.0'** | |
| | | | 1 | 101.0, 101.3' - Fractures (2), 60 deg, rough, planar, tight | | | |
| | | | NR | | | | R10: 4 minutes |
| 105 | 105.0 | | | | | | |
| -64.1 | R11-HQ 5 ft 100% | 52 | 0 | | | **Limestone**<br>105.0-108.5' - Same as 100.0-101.4' except pale yellowish brown, (10YR 6/2) | |
| | | | 1 | 106.75, 107.2' - Fractures (2), horizontal, smooth, planar, tight | | | |
| | | | 4 | 107.4, 107.7, 107.9' - Fractures (3), horizontal, rough, planar, open | | | |
| | | | 10 | 108.3-108.7' - Fracture zone, irregular breaks along weak fractures | | 108.5-110.0' - pale yellowish brown, (10YR 6/2), strong HCl reaction, extremely weak (R0), poorly fossiliferous, no voids | |
| | | | 3 | 109.3, 109.5, 109.9' - Fractures (3), rough, stepped, open 1/8-3/16" | | | R11: 5 minutes |
| 110 | 110.0 | | | | | | |
| -69.1 | R12-HQ 5 ft 78% | 23 | 4 | 110.1, 110.2, 110.3' - Fractures (3), smooth, breaks along smooth fractures<br>110.8' - Fracture, rough, undulating | | **Limestone**<br>110.0-113.9' - grayish orange to pale yellowish brown, (10YR 7/4 to 10YR 6/2), strong HCl reaction, very weak (R1), voids (up to 3/16") over 30-40% of surface, trace solution cavities (up to 3/8"), 10-20% silty and sandy sized matrix | |
| | | | 4 | 111.1, 111.6' - Fractures (2), rough, planar | | | |
| | | | >10 | 111.9, 111.98' - Fractures (2), 5 deg, smooth, planar<br>112.1-112.6' - Fracture zone, multiple irregular breaks, some gravel sized rock fragments | | | |
| | | | >10 | 113.0-113.9' - Fracture zone, multiple irregular breaks along weak fractures | | | |
| | | | NR | | | **No Recovery 113.9-115.0'** | R12: 4 minutes |
| 115 | 115.0 | | | | | | |

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|---|---|
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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

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 : 5/15/2007 END : 5/17/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -74.1 | R13-HQ 5 ft 100% | 62 | 1 | 115.3' - Fracture, horizontal, rough, planar | | **Limestone** 115.0-120.0' - grayish orange to pale yellowish brown, (10YR 7/4 to 10YR 6/2), strong HCl reaction, very weak (R1), voids over 20-30% of surface, solution cavities (9/16") over 15-20% of surface from 116.5-118.0', silty laminations (pale yellowish brown) with no voids/cavities at 118.7' and 118.9' | SC-3 collected at 115.3-116.15' |
| | | | 2 | 116.25' - Fracture, rough, stepped, open 1/16-1/8" | | | |
| | | | 1 | 116.45' - Fracture, rough, planar | | | |
| | | | 6 | 117.7' - Fracture, smooth, undulating<br>118.1' - Fracture, horizontal, smooth, planar, open 1/16"<br>118.6' - Fracture, 60 deg, rough, undulating | | | |
| | | | 2 | 118.7-118.9' - Fracture zone, regular breaks along weak fractures | | | R13: 7 minutes |
| 120 | 120.0 | | | 119.2, 119.4' - Fractures (2), irregular breaks | | | |
| -79.1 | R14-HQ 5 ft 86% | 58 | 4 | 120.2, 120.3, 120.5, 120.8' - Fractures, smooth, stepped, open 1/8-3/16" | | 120.0-124.3' - grayish orange to pale yellowish brown, (10YR 7/4 to 10YR 6/2), strong HCl reaction, very weak to weak (R1 to R2), voids (up to 1/16") over 20-25% of surface, 10-15% silty matrix, silty laminations at 123.5-123.6', fine grained carbonate laminations (very pale orange [10YR 8/2], weak to medium strong [R2 to R3]) at 123.8' and 123.9' | |
| | | | 0 | | | | |
| | | | 4 | 122.1, 122.2, 122.6, 122.95' - Fractures (4), horizontal, rough, stepped | | | |
| | | | 4 | 123.1, 128.2, 123.35, 123.5' - Fractures (4), 0-1 deg, smooth, planar | | | |
| | | | 0 | | | | R14: 6 minutes |
| | | | NR | | | **No Recovery 124.3-125.0'** | |
| 125 | 125.0 | | | | | | |
| -84.1 | R15-HQ 5 ft 100% | 70 | 2 | 125.1' - Fracture, rough, undulating<br>125.5' - Fracture, 2 deg, rough, planar | | **Limestone** 125.0-130.0' - pale yellowish brown, (10YR 6/2), moderate to strong HCl reaction, very weak to weak (R1 to R2), voids (up to 1/16") over 15-20% of surface, solution cavities (up to 3/4") over 20-30% of surface at 125.0-126.7', moderately fossiliferous, fine grained at 128.8-129.5', 15-20% silty matrix | |
| | | | 0 | 126.6, 127.7' - Mechanical break (2) | | | |
| | | | 0 | | | | |
| | | | 5 | 128.2, 128.3, 128.4, 128.6, 128.8, 129.0' - Fractures (6), smooth, planar, breaks along weak fractures | | | |
| | | | 2 | 129.1, 129.3' - Fractures (2), 0-2 deg, rough, planar | | | R15: 6 minutes |
| 130 | 130.0 | | | | | | |
| -89.1 | R16-HQ 5 ft 92% | 70 | 4 | 130.7, 130.8, 130.9, 130.95' - Fractures (4), smooth, planar, breaks along weak fractures | | 130.0-132.5' - moderate yellowish brown, (10YR 5/4), mild to moderate HCl reaction, very weak (R1), solution cavities (up to 9/16") over 5-10% of surface, moderately fossiliferous | |
| | | | 1 | 131.3' - Fracture, rough, stepped, open 1/8-3/16" | | | |
| | | | 0 | 132.2, 132.4, 132.5, 134.6' - Mechanical break (4), irregular breaks | | 132.5-134.6' - very pale orange to pale yellowish brown, (10YR 8/2 to 10YR 6/2), fine grained, strong to moderate HCl reaction, medium strong to strong (R3 to R4), solution cavities (up to 3/4") over 5% of surface, moderately fossiliferous | |
| | | | 0 | | | | |
| | | | 0 | | | | R16: 7 minutes |
| 135 | 135.0 | | NR | | | | |

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|---|---|
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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

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 : 5/15/2007 END : 5/17/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -94.1 | R17-HQ 5 ft 88% | 47 | 4 | 135.1, 135.4, 135.7, 135.9' - Fractures (4), horizontal, rough, undulating, open, dark yellowish brown staining | | **No Recovery 134.5-135.0'** **Limestone** 135.0-136.0' - pale yellowish brown to grayish orange, (10YR 6/2 to 10YR 7/4), fine grained, moderate HCl reaction, weak (R2), voids (up to 3/16") over 10-20% of surface, cavities (up to 1-3/16"x3/8") over 15-25% of surface, some fossil casts/molds 136.0-136.4' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, very weak (R1), voids (up to 3/16") over 30-40% of surface, trace cavities (3/8"x3/16"), moderately fossiliferous 136.4-138.6' - pale yellowish brown interlaminated with moderate yellowish brown, (10YR 6/2 with 10YR 5/4), fine to medium grained, moderate HCl reaction, weak (R2), trace voids (up to 1/16"), trace fossils (casts/molds), laminated 138.6-139.4' - pale yellowish brown, (10YR 6/2), fine to medium grained, strong HCl reaction, very weak to weak (R1 to R2), trace voids (up to 1/16"), some fossils | |
| | | | 10 | 136.0-136.5' - Fracture zone, some gravel sized rock fragments | | | |
| | | | 0 | 136.6' - Fracture zone or mechanical break, 60 deg, tight 137.2' - Fracture or mechanical break, 40 deg, smooth, planar, tight | | | SC-4 collected at 137.75-138.6' |
| | | | 0 | 137.6' - Fracture or mechanical break, rough, planar, tight 138.6, 138.9' - Mechanical break (2), rough, stepped, open 3/16-5/16" | | | R17: 9 minutes |
| | | | 0 | | | | |
| 140 | 140.0 | | NR | 139.3, 139.8' - Mechanical break (2), rough, planar | | | |
| -99.1 | R18-HQ 5 ft 100% | 93 | 0 | | | | |
| | | | 0 | | | | |
| | | | 4 | 142.3, 142.35, 142.4, 142.5' - Fractures (4), horizontal, smooth, planar, breaks along weak fractures | | | |
| | | | 0 | | | | |
| | | | 0 | | | | R18: 5 minutes |
| 145 | 145.0 | | | | | **No Recovery 139.4-140'** **Limestone** 140.0-142.5' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), fine to medium grained, strong HCl reaction, very weak to weak (R1 to R2), voids (up to 1/16") over 5-10% of surface, trace fossils 142.5-142.8' - moderate yellowish brown, (10YR 5/4), fine to medium grained, mild HCl reaction, very weak to weak (R1 to R2), voids (up to 1/16") over 10-20% of surface, trace fossils 142.8-145.0' - pale yellowish brown, (10YR 6/2), fine grained, mild to moderate HCl reaction, very weak to weak (R1 to R2), voids (up to 1/8") over 10% of surface, fossils (molds/casts) over 10% of surface 145.0-146.0' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, very weak (R1), voids (up to 1/8") over 30-35% of surface, laminated, 20% silty matrix, friable 146.0-149.4' - moderate yellowish brown to pale yellowish brown, (10YR 5/4 to 10YR 6/2), fine to medium grained, moderate HCl reaction, very weak to weak (R1 to R2), solution cavities (up to 3/4") at 147.8-148.2', laminated | |
| -104.1 | R19-HQ 5 ft 88% | 67 | 5 | 145.1, 145.3, 145.4, 145.5, 145.8' - Fractures (5), horizontal, rough, planar, open 3/16" | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | R19: 5 minutes |
| 150 | 150.0 | | NR | | | | |
| -109.1 | | | | | | | Total depth 150.0' |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-24 SHEET 9 OF 9 |

# 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

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 : 5/15/2007 END : 5/17/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES | | | SYMBOLIC LOG | LITHOLOGY | COMMENTS |
|---|---|---|---|---|---|---|---|
| | | R Q D (%) | FRACTURES PER FOOT | DESCRIPTION<br>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. |
| | | | | | | **No Recovery 149.4-150.0'**<br>Bottom of Boring at 150.0 ft bgs on 5/17/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-25 SHEET 1 OF 9 |

# SOIL BORING 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

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 bgs on 6/30/07 START : 4/19/2007 END : 4/23/2007 LOGGER : D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.5 | 0.0 – 1.5 | 1.1 | SS-1 | 2-2-4 (6) | **Topsoil** 0-0.2' - roots<br>**Poorly Graded Sand With Organics (SP)** 0.2-1.1' - light gray, (N7), moist, loose, fine grained, no HCl reaction, silica sand, trace nonplastic fines, roots and organics decreasing with depth | | Limited space in header: 3-15/16" tri-cone bit<br>Soils logged by D. Roraback and J. Schaeffer<br>Note: D50 S/N 240 (with cathead) started boring; due to mechanical issues, rig swapped to CME-55 S/N 299205 at 60 feet below ground surface. Soils drilled with D50. |
| 5 | 5.0 – 6.5 | 1.2 | SS-2 | 2-3-4 (7) | **Poorly Graded Sand (SP)** 5.0-6.2' - moderate yellowish brown, (10YR 5/4), wet, loose, very fine to fine grained, no HCl reaction, silica sand, trace nonplastic fines, trace roots/organics. | | |
| 10 | 10.0 – 11.5 | 1.2 | SS-3 | 4-4-5 (9) | **Poorly Graded Sand With Silt (SP-SM)** 10.0-11.2' - pale yellowish brown, (10YR 6/2), wet, loose, very fine to fine grained, no HCl reaction, silica sand, 5% nonplastic fines, trace very fine sand-sized black minerals or organics | | |
| 15 | 15.0 – 16.5 | 1.0 | SS-4 | 6-6-5 (11) | **Clayey Sand (SC)** 15.0-16.0' - mottled yellowish gray, (5YR 8/1), wet, very fine to fine grained, no HCl reaction, silica sand, 21% medium plastic fines | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-25 SHEET 2 OF 9 |

# SOIL BORING 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

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 bgs on 6/30/07 START : 4/19/2007 END : 4/23/2007 LOGGER : D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.5 | 20.0 – 21.5 | 1.1 | SS-5 | 2-5-5 (10) | **Clayey Sand (SC)** 20.0-21.1' - yellowish gray, (5YR 8/1), moist, stiff, high plasticity, no dilatancy, no HCl reaction, 68% fine silica sand | | |
| 25 / 17.5 | 25.0 – 26.5 | 1.0 | SS-6 | 5-5-5 (10) | **Silty Sand (SM)** 25.0-26.0' - pale yellowish brown, (10YR 6/4), wet, loose, very fine to fine grained, no HCl reaction, silica sand, 20% low to medium plasticity fines | | |
| 30 / 12.5 | 30.0 – 31.5 | 0.7 | SS-7 | 3-3-4 (7) | **Clayey Sand (SC)** 30.0-30.7' - pale yellowish brown, (10YR 6/2), wet, loose, very fine to fine grained, no HCl reaction, silica sand, 25-30% medium to high plastic fines, clay lenses throughout | | |
| 35 / 7.5 | 35.0 – 36.5 | 1.4 | SS-8 | 22-44-41 (85) | **Sandy Silt (ML)** 35.0-36.4' - light olive gray, (5Y 5/2), wet, very hard, nonplastic to low plasticity, rapid dilatancy, mild to moderate HCl reaction, 20-35% very fine to coarse sand-sized particles, carbonate materials | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-25 SHEET 3 OF 9 |

# SOIL BORING 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

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 bgs on 6/30/07 START : 4/19/2007 END : 4/23/2007 LOGGER : D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.5 | 40.0 – 41.5 | 1.0 | SS-9 | 17-47-43 (90) | **Sandy Silt (ML)**<br>40.0-41.0' - Same as 35.0-36.4' | | Driller's Remark: Hitting hard material |
| 45<br>-2.5 | 45.0 | 0.0 | SS-10 | 50/0.5 (50/0.5") | **Slough And Limestone Fragments**<br>45.0-45.05' - very poor recovery | | Driller's Remark: 45.5-46' softer |
| 50<br>-7.5 | 49.9 | 0.0 | SS-11 | 50/0.5 (50/0.5") | **Slough And Limestone Fragments**<br>50.0-50.05' - Same as 45.0-45.05'<br>Begin Rock Coring at 50.0 ft bgs<br>See the next sheet for the rock core log | | |
| 55<br>-12.5 | | | | | | | |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-25 SHEET 4 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -7.5 | 50.0 | | | | | **No Recovery 50.0-55.0'** | Rock core logged by D. Roraback and P. De Sa'Rego |
| | R1-NQ 5 ft 0% | 0 | NR | | | | Driller's Remark: Possible sand layer; tagged bottom at 55' below ground surface |
| | | | | | | | R1: 16 minutes |
| 55 -12.5 | 55.0 | | | | | **Limestone** 55.0-59.75' - pale yellowish brown, (10YR 6/4), fine to medium grained, mild delayed HCl reaction, extremely weak to very weak (R0 to R1), variable 10-20% voids to 1/16", trace casts/cavities up to 3/8"x3/8" throughout run, 30-40% cavities at 56.0-56.15' | |
| | R2-NQ 5 ft 94% | 0 | 4 | 55.3' - Fracture, 20 deg, rough, undulating, open | | | |
| | | | 4 | 55.55' - Fracture, 10 deg, rough, undulating, open | | | |
| | | | 7 | 55.7-55.75' - Fracture, 30 deg, rough, planar<br>55.8' - Fracture, horizontal, rough, undulating, lenticular | | | |
| | | | >10 | 55.95-56.0' - Fracture, 20 deg, rough, undulating, open<br>56.15' - Fracture, 20 deg, rough, undulating, open | | | R2: 11 minutes |
| | | | 5 | 56.4-56.7' - Fracture zone<br>56.8, 56.85, 56.95, 57.05, 57.2, 57.3, 57.5' - Fractures (7), <10 deg, rough, undulating, open | | | |
| 60 -17.5 | 60.0 | | NR | | | **No Recovery 59.75-60.0'** | Rig switched out partway through boring due to mechanical issues -- change to CME 55 rig SN 299705 at 60' |
| | R3-NQ 5 ft 52% | 9 | 1 | 57.7-57.8' - Fracture zone<br>57.9, 58.1' - Fractures (2), horizontal, rough, undulating, open | | **Limestone** 60.0-62.6' - yellowish gray, (5Y 7/2), fine to medium grained, mild delayed HCl reaction, weak (R2), 15-20% voids up to 1/16", trace voids up to 1-3/16" by 3/8", thread-like black mottling up to 1-9/16" by 1/32" at 62.4'-62.8' | |
| | | | 2 | 58.15-58.3' - Fracture zone<br>58.5, 58.6, 58.8' - Fractures (3), 10 deg, rough, undulating, open | | | Driller's Remark: Water level at 2.3' below ground surface |
| | | | 1 | 59.1-59.3' - Fracture zone | | | SC-1 collected at 60.15-61.20' |
| | | | NR | 59.6, 59.75' - Fractures (2), 10 deg, rough, undulating, open<br>60.1, 61.5' - Fractures (2), horizontal, rough, undulating, open<br>61.85-62.1' - Fracture, 60 deg, rough, undulating<br>62.5' - Mechanical break | | **No Recovery 62.6-65.0'** | |
| 65 -22.5 | 65.0 | | | | | | R3: 5 minutes |
| | R4-NQ 5 ft 78% | 42 | 5 | 65.1, 65.2, 65.35, 65.5, 65.7, 66.3' - Fractures (6), <10 deg, rough, undulating, open | | **Limestone** 65.0-68.9' - moderate yellowish brown, (10 YR 5/4), mild delayed HCl reaction, weak (R2), 25-30% voids up to 3/16", no visible cavities except 67.75-67.95': large 3-1/8" by 2" infilled with medium gray (N5), medium strong (R3) fine grained carbonate | |
| | | | 1 | | | | |
| | | | 3 | 67.15, 67.5' - Mechanical break (2) | | | |
| | | | 2 | 67.7' - Fracture, horizontal, rough, undulating, open<br>68.2' - Mechanical break | | | |
| | | | NR | 68.7' - Fracture, horizontal, rough, undulating, open | | **No Recovery 68.9-70.0'** | R4: 4 minutes |
| 70 | 70.0 | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: B-25 | SHEET 5 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -27.5 | R5-NQ 5 ft 86% | 50 | 2 | 70.35' - Fracture, horizontal, rough, undulating, open<br>70.95' - Mechanical break | | **Limestone**<br>70.0-72.5' - Same as 65.0-68.9' except black (organic) 1/8" thick irregular laminae at 72.3' and moderately fossiliferous at 72.35-72.5'<br>72.5-74.3' - pale yellowish brown mottled with dark yellowish brown, (10YR 6/2 and 10YR 4/2), fine to medium grained, mild delayed HCl reaction, weak (R2), 10% voids up to 1/16", trace cavities to 3/4" x 3/8", trace black (organic) thread-like mottles at 73.6'<br>**No Recovery 74.3-75.0'** | |
| | | | 0 | | | | |
| | | | 3 | 72.35, 72.5' - Fractures (2), horizontal, rough, undulating, open<br>72.8, 73.0-73.05' - Fractures (2), 30 deg, rough, undulating, open | | | |
| | | | 3 | 73.4' - Fracture, <10 deg, rough, undulating, open | | | |
| | | | 1 | 73.6' - Mechanical break | | | R5: 8 minutes |
| 75 | 75.0 | | NR | 74.2' - Fracture, horizontal, rough, undulating, open | | | |
| -32.5 | R6-NQ 5 ft 100% | 69 | 2 | 75.1' - Fracture, horizontal, rough, undulating, open<br>75.25, 75.8' - Mechanical break (2) | | **Limestone**<br>75.0-76.9' - Same as 72.5-74.3' except very weak to weak (R1 to R2), 80% dark yellowish brown mottled from 75.6-76.15'<br>76.4-76.9' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, weak to medium strong (R2 to R3), 15-20% voids up to 3/16", no visible casts/cavities<br>76.9-78.7' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), fine grained, mild HCl reaction, medium strong (R3), no visible voids, 10% casts/cavities up to 2-3/8" by 9/16", infilled with material similar to 76.4-76.9'<br>78.7-80.0' - Same as 65.0-68.9'<br>80.0-83.05' - moderate yellowish brown, (10YR 5/4), fine to medium 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 fossiliferous<br>83.05-83.6' - yellowish gray to very pale orange, (5Y 7/2 to 10YR 8/2), fine grained, mild HCl reaction, medium strong to strong (R3 to R4), trace voids to 1/16", 15-20% casts/cavities up to 1-9/16" x 3/4", infilled with material similar to 80.0-83.5'<br>**No Recovery 83.6-85.0'**<br>**Limestone**<br>85.0-87.4' - moderate yellowish brown, (10YR 5/4), fine to medium grained, mild HCl reaction, extremely weak to very weak (R0 to R1), 10-15% voids up to 1/16", trace casts/cavities up to 3/8" x 9/16" at 85.5-85.7' | |
| | | | 2 | 75.6' - Fracture, horizontal, smooth, planar, open | | | |
| | | | 5 | 76.2, 76.45' - Fractures (2), horizontal, rough, undulating, open<br>76.7-77.5' - Fracture, 85 deg, rough, undulating, tight to open over depth | | | |
| | | | 1 | 77.1-77.5' - Fracture, 85 deg, parallel to above | | | |
| | | | 1 | 77.5, 77.6' - Mechanical break (2)<br>77.6-77.7' - Fracture, vertical, rough, undulating, open | | | R6: 12 minutes |
| 80 | 80.0 | | | | | | |
| -37.5 | R7-NQ 5 ft 72% | 40 | 2 | 77.75' - Fracture, vertical, rough, stepped<br>78.15' - Fracture, <10 deg, smooth, planar | | | |
| | | | 1 | 79.75-79.8' - Fracture, 30 deg, rough, undulating, open<br>80.6-80.7' - Fracture, 45 deg, rough, undulating, open | | | |
| | | | 2 | 80.8-81.2' - Fracture, 60 deg, rough, undulating, open<br>82.5' - Mechanical break | | | |
| | | | <10 | 82.95-83.15' - Fracture zone<br>83.3-83.6' - Fracture, 60 deg, rough, undulating, open | | | |
| | | | NR | 83.5-83.6' - Fracture zone | | | R7: 8 minutes |
| 85 | 85.0 | | | | | | |
| -42.5 | R8-NQ 5 ft 75% | 38 | 2 | 85.2, 85.25, 87.0' - Mechanical break (3)<br>85.45-85.5' - Fracture, 30 deg, rough, undulating, open | | | |
| | | | 2 | 85.7-85.85' - Fracture, 60 deg, rough, undulating, open | | | |
| | | | 2 | 86.35' - Fracture, horizontal, rough, undulating, open<br>86.6' - Mechanical break | | | |
| | | | 1 | 87.2-87.5' - Fracture, 60 deg, rough, undulating | | | |
| | | | NR | 87.75-87.8' - Fracture, 30 deg, smooth, undulating, black (organic?) clay infill up to 1/16" thick, open | | | R8: 9 minutes |
| 90 | 90.0 | | | | | | |

| 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -47.5 | R9-NQ 5 ft 95% | 72 | 1 | 88.6' - Fracture, horizontal, rough, undulating, open | | 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 1/16" | |
| | | | 1 | 90.6-90.65' - Fracture or mechanical break, 30 deg, rough, undulating, open | | **No Recovery 88.75-90.0'** | |
| | | | 4 | 91.1-91.2' - Fracture or mechanical break, 60 deg, rough, undulating, open | | **Limestone** 90.0-92.3' - pale yellowish brown, (10YR 6/2), fine to medium grained, mild HCl reaction, medium strong (R3), 5-10% voids up to 1/8" in size, casts/cavities up to 9/16"x3/8" | |
| | | | >10 | 92.05-92.15' - Fracture, horizontal, rough, undulating, open | | 92.3-92.5' - Same as 90.0-92.3' except 20% thin (1/16") organic (dark brown to black) laminae | R9: 9 minutes |
| | | | 1 | 92.5' - Fracture, horizontal, rough, undulating, open | | 92.5-94.75' - Same as 90.0-92.3' except single cavity at 93.5': 2"x1-3/16" | |
| | | | | 92.5-92.8' - Fracture, 75 deg, rough, undulating, open | | **No Recovery 94.75-95.0'** | |
| | | | | 92.65' - Fracture, horizontal, rough, undulating, open | | **Limestone** 95.0-97.3' - Same as 90.0-94.75' except pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4) | |
| 95 | 95.0 | | NR | 93.0' - Mechanical break | | | |
| -52.5 | R10-NQ 5 ft 80% | 57 | 2 | 93.7-94.2' - Fracture zone | | 97.3-98.15' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), fine grained, mild HCl reaction, medium strong (R3), 10-15% voids up to 3/16", 10% cavities up to 9/16"x3/8", trace black pyrite infilling of cavities | |
| | | | | 94.2-94.3' - Fracture, 45 deg, rough, undulating, open | | | |
| | | | 0 | 95.1-95.3' - Fracture, 60 deg, smooth, undulating | | | |
| | | | 5 | 95.75' - Fracture, horizontal, rough, undulating, open | | | |
| | | | | 97.05' - Fracture, horizontal, rough, undulating, tight | | | |
| | | | >10 | 97.5, 97.5-97.6, 97.6' - Mechanical break (3) | | | |
| | | | | 97.85' - Fracture, horizontal, rough, undulating, open | | | |
| | | | NR | 98.25' - Fracture, 5 deg, smooth, planar, open, 25% black staining on surface | | | R10: 12 minutes |
| 100 | 100.0 | | | 98.4' - Fracture, horizontal, smooth, planar, open | | 98.15-99.0' - Same as 90.0-94.75' except no visible cavities | |
| -57.5 | R11-NQ 5 ft 75% | 20 | >10 | 98.6-98.7' - Fracture, 45 deg, rough, undulating, open | | **No Recovery 99.0-100.0'** | |
| | | | | 98.7-99.0' - Fracture zone | | **Limestone** 100.0-103.75' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), fine grained, mild HCl reaction, weak to medium strong (R2 to R3), 10% voids up to 1/8", 10% casts/cavities up to 3/8"x3/4" at 100.36-100.65', 101.7-101.9', and 103.2-103.75' | |
| | | | >10 | 100.0-100.3' - Fracture zone | | | |
| | | | | 100.3' - Fracture, 10 deg, rough, undulating, open | | | |
| | | | 0 | 100.55, 100.65' - Fractures (2 parallel), 20 deg, rough, undulating, open | | | SC-2 collected at 102.0-103.0' |
| | | | 7 | 100.55-100.65' - Fracture, 40 deg, rough, undulating, open, running between above fractures | | | |
| | | | NR | 100.65-100.9, 100.9-101.1, 101.1-101.3' - Fractures (3), 60 deg, rough, undulating, open, some fragments associated with fractures | | **No Recovery 103.75-105.0'** | R11: 9 minutes |
| 105 | 105.0 | | | | | | |
| -62.5 | R12-NQ 5 ft 90% | 43 | >10 | 101.3-101.4' - Fracture, 50 deg, rough, planar, open | | **Limestone** 105.0-109.5' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), fine grained, mild HCl reaction, weak to medium strong (R2 to R3), 10% voids to 1/16" throughout run, 25% casts/cavities up to 9/16"x3/8" at 105.0-105.2', trace casts/cavities, up to 9/16"x3/8" throughout entire run. | |
| | | | | 101.55-101.7' - Fracture zone | | | |
| | | | 4 | 102.0, 103.0' - Fractures (2), horizontal, rough, undulating, open | | | Driller's Remark: 106-107' Soft drilling "Pushed right through" |
| | | | | 103.2-103.3' - Fracture, 45 deg, rough, undulating, open | | | |
| | | | 5 | 103.65-103.75' - Fracture zone | | | |
| | | | | 105.35-105.85' - Fracture zone | | | |
| | | | 9 | 105.85-105.95' - Mechanical break, vertical | | | |
| | | | | 105.85, 105.95, 106.1, 106.35' - Mechanical break (4) | | | |
| | | | 4 | 106.55' - Fracture, horizontal, rough, undulating, open | | | R12: 9 minutes |
| 110 | 110.0 | | NR | | | **No Recovery 109.5-110.0'** | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -67.5 | R13-NQ 5 ft 66% | 50 | >10 | 106.75' - Fracture or mechanical break, 40 deg, rough, undulating, open<br>107.5' - Mechanical break | | **Limestone**<br>110.0-113.3' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, very weak (R1) from 110.0-110.5', weak (R2) from 110.5-113.5', 10% voids up to 1/16", trace casts/cavities up to 9/16"x2", trace thin dark organic inclusions (3/4" x 1-3/16") at 112.6' | |
| | | | 3 | 107.6' - Fracture, horizontal, rough, undulating, open<br>107.6-108.05' - Fracture zone | | | |
| | | | 2 | 107.6-108.1' - Mechanical break, >80 deg, one face fractured as described above<br>108.25' - Mechanical break | | | |
| | | | 2 | 108.8' - Fracture, 20 deg, smooth, undulating, open | | **No Recovery 113.3-115.0'** | |
| | | | NR | 108.8-109.2, 109.1-109.5' - Fractures (2), 70 deg, rough, undulating, open<br>109.05, 109.25' - Fractures (2), horizontal, rough, undulating, open | | | R13: 6 minutes |
| 115 | 115.0 | | | | | | |
| -72.5 | R14-NQ 5 ft 97% | 58 | 1 | 110.0-110.5' - Fracture zone<br>111.1' - Fracture or mechanical break, horizontal, rough, undulating, open | | **Limestone**<br>115.0-116.4' - Same as 110.0-113.3' except 10-15% voids up to 1/16", and no visible casts/cavities | |
| | | | 1 | 111.7-111.85, 111.95-112.05' - Mechanical break (2)<br>112.5' - Fracture, 10 deg, rough, undulating, open | | 116.4-117.7' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, very weak (R1), trace voids up to 1/16", no visible casts/cavities | SC-3 collected at 116.4-117.5' |
| | | | 1 | 113.1' - Fractures (2 separated by 1/4"), 15 deg, rough, undulating, open | | | |
| | | | 7 | 115.1-115.45' - Fracture, 75 deg, rough, undulating, open, trace black (pyrite) staining <1/16" thick on surface | | 117.7-118.4' - Same as 110.0-113.3' except very weak (R1) at 118.0-118.15' and trace voids up to 1/16", no visible casts/cavities throughout | |
| | | | >10 | 116.4' - Fracture, horizontal, smooth, undulating, open<br>117.75, 118.05' - Mechanical break (2) | | | R14: 7 minutes |
| 120 | 120.0 | | NR | 118.5, 118.6' - Fractures (2), horizontal, rough, undulating, open, some fragments | | 118.4-118.95' - Same as 116.4-117.7' | |
| -77.5 | R15-NQ 5 ft 48% | 11 | 5 | 118.55, 118.65' - Mechanical break (2) | | 118.95-119.85' - Same as 116.4-117.7' except very weak (R1) at 119.33-119.65' | |
| | | | >10 | 118.8, 118.95' - Fractures (2), horizontal, rough, undulating, open<br>119.35-119.65' - Fracture zone | | **No Recovery 119.85-120.0'** | |
| | | | 1 | 120.4' - Mechanical break | | **Limestone**<br>120.0-122.4' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), fine to medium (coarser with depth) grained, mild HCl reaction, medium strong (R3), trace voids to 1/16", trace casts/cavities to 3/8"x3/8" except at 120.5-120.7' and 121-121.7': with 15-20% casts/cavities, up to 2" x 3/4" x 3/4" "deep", partially infilled with recrystalized carbonate material moderate yellowish brown (10YR 5/4), weak, poorly fossiliferous, trace dark gray pyrite or organic material mottling at 121.9-122.0' | |
| | | | NR | 120.6' - Fracture, horizontal, rough, undulating, open<br>120.85-120.95' - Fracture zone, 4 fragments<br>121.2-121.3' - Fracture zone<br>121.5' - Fracture, 5 deg, rough, undulating, open, associated with large cavity<br>121.7' - Fracture, horizontal, rough, undulating, open | | | Driller's Remark: "Soft at 123.5 to 124 feet"<br>R15: 11 minutes |
| 125 | 125.0 | | | | | | |
| -82.5 | R16-NQ 5 ft 76% | 30 | >10 | 121.9-122.4' - Fracture or mechanical break, 60 deg<br>125.0-125.3' - Fracture zone<br>125.4' - Mechanical break | | **No Recovery 122.4-125.0'** | |
| | | | 2 | 125.65, 125.9' - Fractures (2), horizontal, rough, undulating, open | | | |
| | | | 4 | 126.1-126.15' - Fracture, 25 deg, rough, undulating, tight<br>126.25-126.3' - Mechanical break, 25 deg, healed | | | |
| | | | 3 | 127.225, 127.25, 127.5' - Fractures (3), horizontal, rough, undulating, open | | | |
| | | | NR | 127.6' - Fracture, horizontal, rough, planar, open to tight<br>127.85' - Fracture, horizontal, rough, planar, open | | | R16: 13 minutes |
| 130 | 130.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -87.5 | R17-NQ 5 ft 61% | 23 | 1 | 128.2' - Fracture, 20 deg, rough, undulating, open | | **Limestone** 125.0-128.8' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, weak to medium strong (R2 to R3), 20% voids <1/32", trace voids to 1/16", trace spherical casts 3/16"-1/4", 3/8" spherical casts at 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 recrystalized material | |
| | | | 1 | 128.3-128.45' - Mechanical break, 45 deg, tight<br>128.45-128.5' - Mechanical break, 30 deg, tight | | | SC-4 collected at 130.3-131.4' |
| | | | >10 | 130.3' - Fracture, horizontal, rough, undulating, open | | | |
| | | | 1 | 131.4' - Fracture, 25 deg, rough, undulating, open | | | |
| | | | NR | 131.7' - Fracture, horizontal, rough, undulating, open<br>131.95-132.05' - Fracture, 45 deg, rough, undulating, open, likely due to cavity | | **No Recovery 128.8-130.0'** | R17: 11 minutes |
| 135 | 135.0 | | | 132.2, 132.4, 132.5' - Fractures (3), horizontal, rough, undulating, open | | **Limestone** 130.0-133.05' - pale yellowish brown 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 1-3/16" by 3/16", well-formed casts to 3/4" x 3/4" x 3/8" "deep" at 132.8' | |
| -92.5 | R18-NQ 5 ft 44% | 7 | >10 | 132.5-132.7' - Fracture, vertical, rough, undulating, open | | | |
| | | | >10 | 132.6-132.65' - Fracture, 30 deg, rough, undulating, open<br>132.9-133.05' - Fracture zone<br>135.15-135.35' - Fracture zone | | | |
| | | | NR | 135.45' - Fracture, horizontal, smooth, planar to undulating, open<br>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<br>136.7-136.8' - Fractured rock fragments (3), horizontal, rough, planar to undulating, open | | **No Recovery 133.05-135.0'**<br>**Limestone** 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 material similar to 130.0-133.05' | R18: 7 minutes |
| 140 | 140.0 | | | | | | |
| -97.5 | R19-NQ 5 ft 76% | 48 | 1 | | | 135.65-137.2' - pale yellowish brown to moderate yellowish brown, (10YR 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 up to 3/16", trace cast/cavities up to 9/16"x3/16", 5-10% gray shell fragments inclusions at 136.85-137.2', mottled dark brown at 136.4-136.45' | |
| | | | 1 | 140.8' - Fracture, <10 deg, rough, undulating, open<br>141.6' - Fracture, horizontal, rough, undulating, open | | | |
| | | | 8 | 142.4-142.5' - Fracture zone<br>142.65-142.75' - Fracture zone | | | |
| | | | 1 | 143.6' - Fracture, 10 deg, rough, planar, open | | **No Recovery 137.2-140.0'** | |
| | | | NR | | | **Limestone** 140.0-141.3' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), fine to medium grained, mild HCl reaction, weak to medium strong (R2 to R3), voids (1/16") over 10% of surface, trace casts/cavities up to 1-3/16" by 3/8", partially infilled with similar material to matrix, black pyrite staining at 141.15-141.2' and 142.3-142.35' | R19: 14 minutes |
| 145 | 145.0 | | | | | | |
| -102.5 | R20-NQ 5 ft 82% | 60 | 2 | 145.45' - Fracture, horizontal, rough, undulating, open | | | |
| | | | >10 | 145.7' - Mechanical break<br>146.15-146.3' - Fracture zone, 50% dark brown staining on surfaces | | | |
| | | | 5 | 146.95' - Mechanical break<br>147.5-147.6' - Fracture, 70 deg, rough, undulating, open | | 141.3-141.6' - light gray, (N7), fine grained, moderate HCl reaction, medium strong (R3)<br>141.6-142.4' - Same as 140.0-141.3' | |
| | | | 1 | 148.2-149.1' - Mechanical break, 80 deg | | | |
| | | | NR | 149.1-150.0' - Mechanical break | | | R20: 17 minutes |
| 150 | 150.0 | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: B-25 | SHEET 9 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (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 HCl 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'<br>**No Recovery 143.8-145.0'**<br>**Limestone**<br>145.0-145.7' - very pale orange, (10YR 5/2), fine grained, mild HCl 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<br>145.7-146.3' - Same as 145.0-145.7' except mottled yellowish gray, (5Y 7/2)<br>146.3-146.45' - moderate yellowish brown, (10YR 5/4), medium grained, mild HCl reaction, weak to medium strong (R2 to R3), 25-30% voids up to 1/16", moderately fossiliferous, sharp contacts above and below<br>146.45-147.5' - pale yellowish brown, (10YR 6/2), fine grained, moderate HCl reaction, thin (<1/8") planar to irregular dark brown laminae, no voids, trace casts<br>147.5-147.8' - moderate yellowish brown, (10YR 5/4), medium grained, moderate HCl reaction, medium strong (R3), trace voids up to 1/16", no casts, poorly fossiliferous<br>147.8-148.2' - Same as 146.45-147.5' except grades into unit below<br>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'<br>**No Recovery 149.1-150.0'**<br>Bottom of Boring at 150.0 ft bgs on 4/23/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-25A SHEET 1 OF 3 |

# SOIL BORING LOG

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 bgs on 11/27/08 START : 11/27/2007 END : 11/27/2007 LOGGER : D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.2 | 0.0 | 1.5 | SS-1 | 3-5-7 (12) | **Limestone Fill** 0.0-0.2' - dark yellowish orange, (10YR 6/6), strong HCl reaction | | 2-7/8" tricone bit This boring is being drilled for hammer test purposes only. |
| | 1.5 | | | | **Topsoil** 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' | | |
| 5 | 5.0 | | | | | | |
| 37.2 | | 0.4 | SS-2 | 3-2-3 (5) | **Lean Clay (CL)** 5.0-5.1' - grayish black, (N2), wet, medium plasticity, no HCl reaction, trace very fine sand | | 5.0-5.1' May be slough |
| | 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 | | |
| 10 | 10.0 | | | | | | |
| 32.2 | | 1.0 | SS-3 | 1-1-2 (3) | **Fat Clay (CH)** 10.0-10.1' - light greenish gray, (5G 8/1), moist to wet, soft, high plasticity, no dilatancy, no HCl reaction, trace very fine silica sand | | |
| | 11.5 | | | | **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 plastic fines | | |
| | | | | | **Fat Clay With Sand (CH)** 10.3-10.95' - Same as 10.0-10.1' except 15% very fine silica sand | | |
| 15 | 15.0 | | | | | | |
| 27.2 | | 1.3 | SS-4 | 3-5-5 (10) | **Fat Clay (CH)** 15.0-15.3' - light greenish gray, (5G 8/1), wet, stiff, high plasticity, no dilatancy, trace fine to coarse sand that can be crushed, no HCl reaction with silty/clay matrix, strong HCl reaction for sand material | | Changed to 2-7/8" drag bit<br>Driller's Remark: Losing water while drilling |
| | 16.5 | | | | **Silty Sand (SM)** 15.3-15.4' - light olive gray, (5Y 6/1), wet, loose, no HCl reaction, 20-25% low plastic fines | | |
| | | | | | **Fat Clay (CH)** 15.4-15.9' - Same as 15.0-15.3' | | |
| | | | | | **Silty Sand (SM)** 15.9-16.25' - Same as 15.3-15.4' | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-25A SHEET 2 OF 3 |

# SOIL BORING LOG

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 bgs on 11/27/08 START : 11/27/2007 END : 11/27/2007 LOGGER : D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.2 | 20.0 – 21.5 | 1.1 | SS-5 | 3-4-4 (8) | **Fat Clay (CH)** 20.0-20.4' - Same as 15.0-15.3'<br>**Silty Sand (SM)** 20.4-20.7' - Same as 15.3-15.4'<br>**Fat Clay (CH)** 20.7-21.1" - Same as 15.0-15.3' and 20.0-20.4' | | Driller's Remark: Continue to lose circulation<br>Fat clay and silty sand alternating from 10' (if not from 5') |
| 25 | 25.0 | | | | | | |
| 17.2 | 26.5 | 1.3 | SS-6 | 4-3-2 (5) | **Fat Clay (CH)** 25.0-25.3' - light greenish gray, (5G 8/1), wet, soft, high plasticity, no dilatancy, mild HCl reaction, trace fine to coarse carbonate sand/fragments with strong HCl reaction, (predominantly carbonate fragments)<br>**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<br>**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 | 31.5 | 1.5 | SS-7 | 5-7-8 (15) | **Fat Clay With Sand (CH)** 30.0-30.4' - light greenish gray to light bluish gray, (6G 8/1 to 5B 7/1), moist, soft, medium plasticity, no HCl reaction, 20% very fine silica sand<br>**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 | | | | | | |
| 7.2 | 36.5 | 1.5 | SS-8 | 5-4-4 (8) | **Fat Clay (CH)** 35.0-35.4' - Same as 30.0-30.4'<br>**Silty Sand (SM)** 35.4-36.5' - Same as 30.4-31.0 except loose | | Driller's Remark: Continuing to lose circulation/ water since 15-20' bgs (about 25 gallons per 5 foot run) |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-25A SHEET 3 OF 3 |

# SOIL BORING LOG

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 bgs on 11/27/08 START : 11/27/2007 END : 11/27/2007 LOGGER : D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.2 | 40.0 – 41.5 | 1.3 | SS-9 | 4-2-4 (6) | **Silt With Sand (ML)** 40.0-40.4' - light olive gray, (5Y 5/2), moist, medium stiff, low plasticity, rapid dilatancy, no HCl reaction, 20% very fine silica sand | | SS-9 has an organic rich appearence |
| | | | | | **Silt With Sand (ML)** 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 medium plasticity, 25% very fine silica sand, organic soil (OL/OH) seams 1/4" thick | | Driller's Remark: Rocky, chatter at 44' |
| 45 -2.8 | 45.0 – 45.4 | 0.4 | SS-10 | 50/4.5 (50/4.5") | **Silt (ML)** 45.0-45.4' - dusky yellow, (5Y 6/4), moist, hard, nonplastic, rapid dilatancy, mild HCl reaction, trace limestone fragments up to 1/8", carbonate material | | Driller's Remark: Changed back to tricone bit<br>For SS-10, 0.7' of soil in spoon; top 0.3' apparently slough. Material appears to be organic soil (OL), olive gray (5Y 3/2), wet, soft, low to medium plasticity, rapid dilantancy, no HCl reaction, 10% fine silica sand<br>Driller's Remark: Firm drilling from 44-49', soft again from 49-50' |
| 50 -7.8 | 50.0 – 51.5 | 1.5 | SS-11 | 15-25-36 (61) | **Silty Sand And Limestone (SM)** 50.0-51.5' - light olive gray, dusky yellow, and moderate olive brown, (5Y 5/2, 5Y 6/4, and 5Y 4/4), fine to coarse grained, mild HCl reaction, 20-30% low plastic fines (varies in sample), fine to coarse gravel-sized limestone fragments, carbonate materials | | For SS-11, 2.1' of soil in spoon; top 0.6' apparently slough |
| 55 -12.8 | | | | | Bottom of Boring at 51.5 ft bgs on 11/27/2007 | | 11/27/2007 at 17:00 water level = 4.5' bgs<br>11/28/2007 at 08:00 water level = 4.0' bgs |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-26 SHEET 1 OF 9 |

# SOIL BORING 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

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 START : 2/21/2007 END : 2/23/2007 LOGGER : C. LeBlanc

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.4 | | | | | | | Start drilling at 15:00 on 2/21/07<br>"Water level is based on Ground Water Monitoring at LNP site (FSAR Table 2.4.12.08)"<br>18" of topsoil at ground surface |
| 5 | 5.0 | | | | | | |
| 37.4 | 6.5 | 0.5 | SS-1 | 3-2-2 (4) | **Poorly Graded Sand (SP)**<br>5.0-5.5' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), wet, very loose, fine grained, no HCl reaction, silica sand, trace nonplastic fines, trace fine organics | | SS-1 sampled at 15:10 |
| 10 | 10.0 | | | | | | |
| 32.4 | 11.5 | 1.4 | SS-2 | 2-2-8 (10) | **Silty Sand With Limestone Fragments (SM)**<br>10.0-11.4' - yellowish gray, (5Y 8/1), wet, loose, fine to coarse grained, strong HCl reaction, 26% nonplastic to low plasticity fines, 15-20% gravel-sized fossiliferous limestone fragments, all carbonate | | SS-2 sampled at 15:25 |
| 15 | 15.0 | | | | | | |
| 27.4 | 16.5 | 1.0 | SS-3 | 17-19-5 (24) | **Silty Sand With Limestone Fragments (SM)**<br>15.0-16.0' - Same as 10.0-11.4' | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-26 SHEET 2 OF 9 |

# SOIL BORING 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

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 START : 2/21/2007 END : 2/23/2007 LOGGER : C. LeBlanc

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.4 | 20.0 20.5 | 0.4 | SS-4 | 50/6 (50/6") | **Silt (ML)** 20.0-20.4' - yellowish gray, (5Y 8/1), wet, hard, nonplastic, very rapid dilatancy, mild HCl reaction, all carbonate, 5-10% fine to medium sand-sized | | |
| 25 | 25.0 | | | | | | |
| 17.4 | 26.5 | 1.4 | SS-5 | 40-47-44 (91) | **Silty Sand (SM)** 25.0-26.4' - grayish orange, (10YR 7/4), moist to wet, very dense, fine to coarse grained, moderate HCl reaction, all carbonate, 35-40% nonplastic fines | | SS-5 sampled at 16:00 |
| 30 | 30.0 | | | | | | |
| 12.4 | 31.0 | 1.0 | SS-6 | 47-50/6 (97/12") | **Silt (ML)** 30.0-31.0' - dark yellowish orange, (10YR 6/6), moist to wet, hard, nonplastic, very rapid dilatancy, mild to moderate HCl reaction, 10-15% very fine grained sand-sized, carbonate materials | | |
| 35 | 35.0 | | | | | | |
| 7.4 | 36.5 | 1.3 | SS-7 | 23-33-50 (83) | **Sandy Silt (ML)** 35.0-36.3' - moderate yellowish brown, (10YR 5/4), moist, hard, nonplastic, very rapid dilatancy, mild HCl reaction, 40% fine to medium grained sand-sized, carbonate materials | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-26 SHEET 3 OF 9 |

# SOIL BORING 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

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 START : 2/21/2007 END : 2/23/2007 LOGGER : C. LeBlanc

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.4 | 40.0<br>40.6 | 0.3 | SS-8 | 46-50/1<br>(96/7") | **Silty Sand And Limestone Fragments (SM)**<br>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 | | SS-8 sampled at 16:41<br>Driller's Remark: Rig chatter at 43.0'<br>Driller's Remark: Lost circulation at 43.0' |
| 45<br>-2.6 | 45.0<br>45.9 | 0.7 | SS-9 | 36-50/5<br>(86/11") | **Sandy Silt (ML)**<br>45.0-45.7' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), wet, hard, nonplastic, very rapid dilatancy, mild to moderate HCl reaction, all carbonate, 35-40% fine to medium sand-sized | | SS-9 sampled at 17:05 |
| 50<br>-7.6 | 50.0<br>50.3 | 0.3 | SS-10 | 50/4<br>(50/4") | **Sandy Silt (ML)**<br>50.0-50.25' - Same as 45.0-45.7' | | SS-10 sampled at 17:30 |
| 55<br>-12.6 | 55.0<br>55.3 | 0.1 | SS-11 | 50/4<br>(50/4") | **Limestone Fragments**<br>55.0-55.1' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), mild HCl reaction, fossiliferous | | |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-26 SHEET 4 OF 9 |

# SOIL BORING 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

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 START : 2/21/2007 END : 2/23/2007 LOGGER : C. LeBlanc

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -17.6 | 60.0 60.4 | 0.3 | SS-12 | 50/5 (50/5") | **Silty Sand (SM)** 60.0-60.3' - moderate yellowish brown, (10YR 5/4), wet, very dense, fine to coarse grained, mild HCl reaction, 20% nonplastic fines, 15% organics, all carbonate except organics | | SS-12 sampled at 08:00 on 2/22/07 |
| 65 | 65.0 | | | | | | |
| -22.6 | 66.5 | 1.5 | SS-13 | 15-29-47 (76) | **Sandy Silt (ML)** 65.0-66.5' - Same as 45.0-45.7' | | SS-13 sampled at 08:20 |
| 70 | 70.0 | | | | | | |
| -27.6 | 71.0 | 1.0 | SS-14 | 19-50/6 (69/12") | **Silt With Sand (ML)** 70.0-71.0' - Same as 65.0-66.5' except mild to moderate HCl reaction, 20% fine to medium sand-sized | | |
| 75 | 75.0 | | | | | | SS-15 sampled at 08:50 Switch to rock coring at 75.0' |
| -32.6 | 75.1 | 0.0 | SS-15 | 50/1 (50/1") | **Limestone Fragments** 75.0-75.1' - few limestone fragments recovered, mild HCl reaction Begin Rock Coring at 75.0 ft bgs See the next sheet for the rock core log | | |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-26 SHEET 5 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 : 4.41 ft bgs on 3/06/07 START : 2/21/2007 END : 2/23/2007 LOGGER : C. LeBlanc

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -32.6 | 75.0 | | | | | | |
| | R1-NQ 1.5 ft 73% | 73 | 0 | | | **Limestone** 75.0-76.3' - dusky yellow, (5Y 6/4), very fine to fine grained, moderate to strong HCl reaction, weak (R2), voids (1/16") over 15% of surface, <1/16" thick laminations at 76.0-76.1', oval 3/8" fossil at 75.1' | R1: Run time not recorded<br>Driller's Remark: Rig chatter at 76.0' |
| | | | 1 | 76.15' - Fracture or bedding plane, horizontal, rough, undulating, open, loose | | | |
| | 76.5 | | NR | | | **No Recovery 76.3-76.5'**<br>**No Recovery 76.5-81.5'** | Driller's Remark: Soft drilling, possible unconsolidated material |
| | R2-NQ 5 ft 0% | 0 | NR | | | | |
| 80<br>-37.6 | | | | | | | R2: Run time not recorded |
| | 81.5 | | | | | **No Recovery 81.5-86.5'** | |
| | R3-NQ 5 ft 0% | 0 | NR | | | | |
| 85<br>-42.6 | | | | | | | R3: Run time not recorded |
| | 86.5 | | | | | **No Sample 86.5-88.0'** | Switch back to SPT sampling at 86.5', blind drill without sampling from 86.5-88.0' |
| | | | | | | **Limestone Fragments** 88.0-88.2' - moderate yellowish brown, (10YR 5/4), fine grained, fine to coarse gravel-sized fragments, voids present on fragment surfaces | Split spoon sample SS-16 advanced 88.0-88.4', 0.2' recovery, N=50/5" Installed casing to 88.5' |
| 90<br>-47.6 | | | 0 | | | **No Sample 88.2-94.5'** | |
| | 94.5 | | | | | **Limestone Fragments** 94.5-94.6' - coarse grained sand-size rock fragments recovered | Split spoon sample SS-17 advanced 94.5-94.7', 0.1' recovery, N=50/2" |
| 95 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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 : 4.41 ft bgs on 3/06/07 START : 2/21/2007 END : 2/23/2007 LOGGER : C. LeBlanc

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -52.6 | R4-NQ 2 ft 85% | 50 | >10 | 94.8, 94.9' - Fracture, 10 deg, rough, undulating, open | | **Limestone** 94.5-94.9' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, extremely weak to very weak (R0 to R1), no voids | Resume rock coring at 94.5' R4: 4 minutes |
| | | | NR | | | | |
| | | | 1 | 94.9-95.85' - Fracture zone, angular to subangular fragments | | | |
| | 96.5 | | | 96.5' - Mechanical break, 50 deg | | **No Recovery 94.9-95.2'** | |
| | R5-NQ 5 ft 94% | 24 | 1 | 96.95' - Mechanical break | | **Limestone** 95.2-96.5' - moderate yellowish brown, (10YR 5/4), moderate HCl reaction, weak to medium strong (R2 to R3), begins in fracture zone with many deep cavities, below 95.8' voids increase from 0% to 20%, cavities up to 1" at 95.2' | Because of fracture surface at bottom end of core R4 matching top end of core R5, core loss for R4 is interpreted to be within fracture zone at 94.9' |
| | | | 1 | 97.3' - Fracture, 65 deg, smooth, undulating, tight | | | |
| | | | | 98.15' - Fracture, 50 deg, rough, undulating | | | |
| | | | 3 | 98.8, 99.3, 99.8, 100.4, 100.7, 101.1' - Fractures (6), 60-80 deg, rough, undulating, significant fragmentation throughout, fragments 1/2"-3", elongate to angular | | | |
| 100 -57.6 | | | 2 | 99.4' - Fracture, horizontal, rough, stepped, open | | 96.5-98.4' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, medium strong (R3), 15-20% fine voids (1/16"), few small (1/4") cavities/fossils | |
| | | | 2 | | | | R5: Run time not recorded |
| | 101.5 | | NR | | | | |
| | R6-NQ 5 ft 60% | 7 | >10 | 101.5-102.0' - Fracture zone, subangular rock fragments 1/2"-2" | | 98.4-99.3' - moderate yellowish brown interbedded with yellowish gray, (10YR 5/4 with 5Y 7/2), moderate to strong HCl reaction, very weak to medium strong (R1 to R3) | |
| | | | >10 | 102.35' - Fracture, 80 deg, smooth, undulating, terminates above at fracture zone 102.8' - Fracture, 30 deg, smooth, undulating | | | |
| | | | >10 | 103.0-103.3' - Fractures (3), vertical, rough, undulating, fragmented 103.3-104.5' - Fracture zone, rock fragments from silt-size to 2", friable | | 99.3-99.5' - yellowish gray, (5Y 7/2), strong HCl reaction, very weak (R1) | |
| 105 -62.6 | | | NR | | | 99.5-101.2' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine grained, strong (R4), voids (<1/16") 0-10% (intermittently), several 1/4"-1/2" cavities and spiral fossil molds | R6: 8 minutes |
| | 106.5 | | | | | **No Recovery 101.2-101.5'** | |
| | R7-NQ 5 ft 89% | 64 | 2 | 106.85' - Fracture, 55 deg, rough, stepped, open with small fragments | | **Limestone** 101.5-102.0' - Same as 99.5-101.2' except fragmented | |
| | | | 3 | 107.15, 107.7' - Fractures (2), 25 deg, rough, undulating, fragmented, particularly at 107.15' | | 102.0-103.3' - Same as 99.5-101.2' except medium strong (R3), core intact until 102.8', several 1/4"-1/2" cavities and molds | |
| | | | 2 | 107.85, 107.95' - Fractures, 10 deg, rough, undulating, tight to open | | 103.3-104.5' - Same as 99.5-101.2' except extremely weak to very weak (R0 to R1), friable | |
| | | | | 108.75' - Fracture or mechanical break, 50 deg, healed | | | |
| 110 -67.6 | | | 2 | 109.25' - Fracture, horizontal, rough, undulating to planar, open | | **No Recovery 104.5-106.5'** | |
| | | | 1 | 109.7' - Fracture, 30 deg, smooth, undulating, tight with missing fragments | | **Limestone** 106.5-106.8' - moderate yellowish brown to moderate olive brown, (10YR 5/4 to 5Y 4/4), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), fine (1/16") voids over 10-25% (variably), many 1/4" elongated cavities | R7: 5 minutes |
| | 111.5 | | NR | 109.95' - Fracture, 75 deg, rough, undulating, weathered, with slight infill | | | |
| | R8-NQ 5 ft 100% | 64 | 3 | 110.7' - Fracture, horizontal, rough, stepped to undulating | | | SC-1 collected 112.0-112.95' |
| | | | 2 | 111.75' - Fracture, 80 deg, rough, stepped, second half of fracture is fragmented into angular 1"-2" pieces | | 106.8-107.3' - Same as 106.5-106.8' except extremely weak to very weak (R0 to R1), friable | |
| | | | 3 | 112.0' - Fracture, 50 deg, smooth, undulating 112.95' - Fracture, horizontal, rough, planar 113.15' - Fracture, 60 deg, smooth, stepped, tight, with weathered edges | | 107.3-109.25' - Same as 106.5-106.8' 109.25-109.7' - Same as 106.5-106.8' except very weak (R1) | |
| 115 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-26 SHEET 7 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 : 4.41 ft bgs on 3/06/07 START : 2/21/2007 END : 2/23/2007 LOGGER : C. LeBlanc

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -72.6 | | | 1 | 113.7' - Fracture, horizontal, rough, planar, tight, with weathered edges | | 109.7-110.95" - Same as 106.5-106.8' | |
| | | | 3 | 113.9' - Fracture or mechanical break, 70 deg, rough, undulating, healed | | **No Recovery 110.95-111.5'** | R8: 5 minutes |
| | 116.5 | | | 114.35' - Fracture, horizontal, planar to slightly undulating | | **Limestone** | |
| | | | >10 | 115.3' - Fracture, 70 deg, rough, undulating, 5/16" relief, terminates at a rough stepped fracture at 115.65', tight | | 111.5-116.5' - dusky yellow to moderate yellowish brown, (5Y 6/4 to 10YR 5/4), fine grained, moderate HCl reaction, weak (R2), 20% fine (1/16") voids, few cavities up to 1/4" | |
| | | | 1 | 115.9' - Fracture, 70 deg, rough, undulating, tight, weathered | | 116.5-116.7' - Same as 111.5-116.5' except medium strong (R3), with some weaker zones and rock fragments | SC-2 collected 118.0-118.97' |
| | R9-NQ 5 ft 72% | 19 | 2 | 116.45' - Fracture, horizontal, rough, undulating, 1/8" relief | | | |
| | | | 1 | 116.7-117.0' - Fracture zone, subrounded rock fragments 1/2"-2" | | 116.7-117.0' - Same as 111.5-116.5' except fragmented | |
| 120 -77.6 | | | NR | 117.45' - Fracture, 10 deg, rough, undulating, tight, cuts across 80 deg fracture at 117.65' 117.65' - Fracture, 80 deg, rough, undulating, 10 inches long, black staining (pyrite), tight, weathered | | 117.0-119.2' - Same as 111.5-116.5' except medium strong (R3), with some weaker zones and rock fragments | R9: 5 minutes |
| | 121.5 | | | | | 119.2-120.1' - Same as 111.5-116.5' except no to mild HCl reaction, very weak to weak (R1 to R2), sections of increased voids | |
| | | | 0 | 118.0' - Fracture, 25 deg, smooth, stepped, voids and molds on fracture surface | | **No Recovery 120.1-121.5'** | |
| | | | >10 | 118.97' - Fracture, 10 deg, rough, undulating, white crystalline infill, trace 1/16" voids on surface | | **Limestone** | |
| | R10-NQ 5 ft 58% | 19 | >10 | 119.20' - Fracture, 10 deg, rough, stepped, open, friable, infilling, increased voids 120.8' - Fracture, horizontal, rough, undulating | | 121.5-122.5' - dusky yellow to moderate yellowish brown, (5Y 6/4 to 10YR 5/4), fine grained, moderate to strong HCl reaction, medium strong (R3), small (1/16") voids over 20-25%, fossiliferous (numerous molds/casts, small [1/4"] circular/oval voids, larger [1"] thin elongate cavities) | |
| 125 -82.6 | | | NR | 122.5' - Fracture, 15 deg, rough, undulating, tight but weathered and friable 122.7' - Fracture, 25 deg, smooth, stepped, top of fracture zone | | | R10: Run time not recorded |
| | 126.5 | | | 122.7-122.9' - Fracture zone, subangular 1" fragments | | 122.5-122.85' - Same as 121.5-122.5' except very weak to weak (R1 to R2), secondary infilling of cavities, more friable | |
| | | | >10 | 123.15, 123.4' - Fractures or bedding plane, 0-10 deg, rough, planar, tight, some fragmentation | | 122.85-123.7' - Same as 121.5-122.5' except 5% coverage of voids (1/16"), no fossils or cavities, elongate molds 1/16" wide, sharp angular breaks | |
| | | | >10 | 123.25' - Fracture, 80 deg, rough, planar, tight, angular | | **Silty Sand (SM)** | |
| | R11-NQ 5 ft 78% | 42 | 1 | 123.66' - Fracture, 20 deg, rough, undulating, top of unconsolidated zone 124.15' - Fracture, 10 deg, rough, undulating, bottom of unconsolidated zone | | 123.7-124.15' - dark yellowish orange, (10YR 6/6), wet, fine grained, nonplastic, mild HCl reaction, 10% coarse sand-sized, 30% nonplastic fines, 10% fine gravel-size material, small fossil fragments, all calcareous material | 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 | | | |
| | 131.5 | | NR | 126.8-127.9' - Fracture zone, no clear contacts, some vertical fractures at depth within zone | | | R11: 5 minutes |
| | | | >10 | 127.9' - Fracture, horizontal, rough, undulating, open | | **Limestone** | |
| | | | >10 | 128.05' - Fractures (2), horizontal and 30 deg, rough, undulating, tight to open, fit together, weathered, slight infill | | 124.15-124.4' - Same as 122.85-123.7' except weak (R2) | |
| | R12-NQ 5 ft 42% | 8 | | 128.50' - Fracture, 20 deg, rough, undulating 128.92' - Fracture, 10 deg, smooth, undulating | | **No Recovery 124.4-126.5'** | |
| 135 | | | | 131.6-131.8' - Fracture zone, with angular fragments 1/2"-2" in size, bounded by rough and undulating horizontal fractures | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-26 SHEET 8 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 : 4.41 ft bgs on 3/06/07 START : 2/21/2007 END : 2/23/2007 LOGGER : C. LeBlanc

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -92.6 | | | NR | 132.05, 132.2, 132.45' - Fractures (3), 0-10 deg, rough, undulating to stepped, open, increasing voids with depth<br>132.85' - Fracture, horizontal, rough, stepped to planar, open, cavity at break | | **Limestone**<br>126.5-126.8' - moderate yellowish brown to moderate olive brown, (10YR 5/4 to 5Y 4/4), fine grained, moderate HCl reaction, weak (R2), 5-20% coverage of voids (1/16"), with infill of silty sand material similar to 123.7-124.15'<br>126.8-130.4' - Same as 126.5-126.8' except weak to medium strong (R2 to R3), no infill<br>**No Recovery 130.4-131.5'**<br>**Limestone**<br>131.5-132.2' - moderate yellowish brown to moderate olive brown, (10YR 5/4 to 5Y 4/4), fine grained, moderate HCl reaction, strong (R4), 20% fine (1/16") voids, elongate fossil molds 1/4"x1/2"<br>132.2-132.9' - Same as 131.5-132.2' except 30% voids (up to 1/8"), more fossiliferous with larger cavities<br>132.9-133.6' - Same as 131.5-132.2' except grading to light olive gray, (5Y 5/2), 0-15% voids<br>**No Recovery 133.6-136.5'**<br>**Limestone**<br>136.5-137.6' - light olive gray grading to light olive brown with depth, (5Y 5/2 to 5Y 5/6), very fine grained, moderate HCl reaction, medium strong to strong (R3 to R4), <5% voids, laminated bedding, white recrystallization infilling<br>137.6-139.1' - light olive gray to moderate yellowish brown, (5Y 5/2 to 10YR 5/4), fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), 5-25% voids (1/16"), horizontal bedding and 0-5% voids at 138.5-139.1', few cavities up to 1/2", some dark infilling<br>139.1-139.6' - moderate yellowish brown, (10YR 5/4), fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), 5-10% fine (1/16") voids, some organic infilling<br>**No Recovery 139.6-141.5'**<br>**Limestone**<br>141.5-141.95' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, weak (R2), 10% fine (1/16") voids, several elongate (1/4"x1") cavities and 1/4" round cavities, light gray infilling of some cavities, 1/8" thick black laminations at top | R12: 6 minutes<br>R13: Run time not recorded<br>R14: 5 minutes<br>R15: Run time not recorded<br>End of Boring at 151.5' on 2/23/07 |
| | 136.5 | | | | | | |
| | R13-NQ 5 ft 62% | 28 | >10 | 133.15' - Fracture, 10 deg, rough, undulating, soft, very weak rock material at fracture face, followed by rock fragments | | | |
| | | | 3 | 133.15-133.60' - Fracture zone, angular rock fragments 1/2"-2" with horizontal fractures within zone at 133.25' and 133.4' | | | |
| | | | 4 | 136.55, 136.6' - Fracture (2), horizontal, smooth, planar, along bedding planes<br>136.8 137.05, 137.2, 137.35' - Fractures (4), 0-10 deg, smooth, planar, fragmentation between fractures, slight infill, some black staining | | | |
| 140<br>-97.6 | | | NR | 137.6' - Fracture, horizontal, rough, undulating to stepped, open | | | |
| | 141.5 | | | | | | |
| | R14-NQ 5 ft 69% | 25 | 3 | 138.0, 138.4, 138.55' - Fractures (3), 20-40 deg, rough, undulating, tight to open with weathering at fractures | | | |
| | | | 3 | 139.1' - Fracture, 40 deg, rough, stepped, no matching face beneath<br>139.1' - Fracture, horizontal, rough, planar<br>139.6' - Mechanical break, 10 deg | | | |
| | | | 6 | 141.85' - Fracture, horizontal, rough, stepped, open | | | |
| 145<br>-102.6 | | | 3 | 142.25' - Fracture, 10 deg, smooth, undulating, open, with color change starting at 141.95' and noticeable at 142.25' | | | |
| | | | NR | 142.45' - Fracture or mechanical break, 40 deg, rough, planar, healed<br>142.6' - Fracture, smooth, undulating, open and weathered/rounded faces coated with lighter colored film of infill | | | |
| | 146.5 | | | | | | |
| | R15-NQ 5 ft 48% | 9 | 4 | 143' - Fracture, 20 deg, smooth, undulating, 3/4" cavity, weathered, subangular | | | |
| | | | 4 | 143.5' - Fracture, 20 deg, rough, undulating, tight | | | |
| | | | 2 | 143.55, 143.8, 143.95, 144.2, 144.4, 144.8' - Fractures (6), 0-25 deg, rough, undulating to stepped, less weathered and rounded than at 143.0', subangular fragments at all fractures, all open, some fragments between fractures | | | |
| 150<br>-107.6 | | | NR | 146.6' - Fracture, horizontal, rough, planar, staining on upper face only<br>146.7' - Fracture or mechanical break, vertical, smooth, planar, healed, terminates at fractures at 146.6' and 146.5' | | | |
| | 151.5 | | | | | | |
| | | | | 146.8' - Fracture, horizontal, rough, stepped to planar, voids visible on fracture face<br>147.3, 147.6, 147.75, 148.3' - Fractures (4), 0-10 deg, rough, planar, tight with some minor fragmentation, angular breaks<br>147.7' - Fracture, 80 deg, rough, planar, terminated by fracture at 147.3', missing second half<br>148.45' - Fracture, 70 deg, rough, planar<br>148.6, 148.7' - Fractures (2), horizontal, undulating, open, weathered | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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 : 4.41 ft bgs on 3/06/07 START : 2/21/2007 END : 2/23/2007 LOGGER : C. LeBlanc

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES | | | SYMBOLIC LOG | LITHOLOGY | COMMENTS |
|---|---|---|---|---|---|---|---|
| | | R Q D (%) | FRACTURES PER FOOT | DESCRIPTION<br>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. |
| | | | | | | 141.95-144.95' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl reaction, strong (R4), 5-15% fine (1/16") voids, many 1/4"-1/2" cavities, 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 transition sequence)<br>**No Recovery 144.95-146.5'**<br>**Limestone**<br>146.5-148.6' - repeated transitions from dusky yellow to light olive gray or light olive brown, (5Y 6/4 to 5Y 5/2 or 5Y 5/6), very fine to fine grained, moderate to strong HCl reaction, strong (R4), <3% voids (1/16") but with increased voids at 146.5-146.6' (5%), 148.1-148.2' (10%), and 148.6-148.9' (40%)<br>148.6-148.9' - Same as 141.5-141.95' except darker brown color, increased voids<br>**No Recovery 148.9-151.5'**<br>Bottom of Boring at 151.5 ft bgs on 2/23/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-27 SHEET 1 OF 9 |

# SOIL BORING 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

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 START : 2/8/2007 END : 2/10/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.4 | | | | | | | "Water level is based on Ground Water Monitoring at LNP site (FSAR Table 2.4.12.08)" |
| | | | | | | | Water levels not recorded during drilling |
| | 4.5 | | | | | | |
| 5 / 37.4 | 6.0 | 1.0 | SS-1 | 1-1-0 (1) | **Poorly Graded Sand With Silt (SP-SM)** 4.5-5.5' - moderate yellowish brown, (10YR 5/4), wet, very loose, very fine to fine grained, 10-15% nonplastic fines, silica sand, 10-12% organics | | SS-1: Weight of hammer drove split spoon the last 6" |
| | 9.5 | | | | | | |
| 10 / 32.4 | 11.0 | 0.3 | SS-2 | 0-0-0 (0) | **Silty Sand (SM)** 9.5-9.8' - very pale orange, (10YR 8/2), very wet, very soft, very fine to medium grained, strong HCl reaction, 30% low to medium plastic fines, silica and carbonate sands, 5-10% organics | | SS-2: Weight of hammer drove split spoon 18", sample may be slough |
| | 14.5 | | | | | | |
| 15 / 27.4 | 16.0 | 1.0 | SS-3 | 10-17-9 (26) | **Silty Sand With Limestone Fragments (SM)** 14.4-15.5' - white to yellowish gray, (N9 to 5GY 8/2), wet, medium dense, very strong HCl reaction, 40% fine to coarse gravel, 20% low to medium plastic fines, all carbonate materials | | |
| | 19.5 | | | | | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-27 SHEET 2 OF 9 |

# SOIL BORING 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

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 START : 2/8/2007 END : 2/10/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.4 | 21.0 | 0.8 | SS-4 | 11-7-20 (27) | **Silt (ML)** 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 | | |
| | 24.5 | | | | | | |
| 25 17.4 | 26.0 | 0.8 | SS-5 | 39-18-14 (32) | **Silt With Sand And Limestone Fragments (ML)** 24.5-25.3' - Same as 19.5-20.25' except 15% very fine to medium grained, 20% fine gravel-sized limestone fragments | | |
| | 29.5 | | | | | | |
| 30 12.4 | 30.8 | 1.3 | SS-6 | 18-29-50/3 (79/9") | **Silt With Sand (ML)** 29.5-30.8' - Same as 24.5-25.3' except moderate yellowish brown, (10YR 5/4), moist to wet, hard, nonplastic, rapid dilatancy, mild to moderate HCl reaction, trace fine gravel, 20-25% very fine to medium grained sand, all carbonate materials | | |
| | 34.5 | | | | | | |
| 35 7.4 | 36.0 | 1.1 | SS-7 | 31-18-22 (40) | **Silty Sand (SM)** 34.5-35.6' - moderate olive brown, (5Y 4/4), wet, dense, very fine to coarse grained, mild HCl reaction, 10-15% fine gravel, 20-25% low plastic fines, all carbonate materials | | |
| | 39.5 | | | | | | |
| 40 | 39.8 | 0.1 | SS-8 | 50/3 | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-27 SHEET 3 OF 9 |

# SOIL BORING 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

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 START : 2/8/2007 END : 2/10/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.4 | | | | (50/3") | **Limestone Fragments** 39.5-39.6' - light olive gray, (5Y 5/2), mild HCl reaction, poor recovery | | |
| | 44.5 | | | | | | |
| | 44.6 | 0.0 | SS-9 | 50/1 (50/1") | **Limestone Fragments** 44.5-44.6' - Same as 39.5-39.6' except poor recovery<br>Begin Rock Coring at 44.0 ft bgs<br>See the next sheet for the rock core log | | Encountered rock from 37.0-46.0' switched to NQ coring<br>Terminate soil sampling at 44.6'<br>Set 35.0' NW casing |
| 45<br>-2.6 | | | | | | | |
| 50<br>-7.6 | | | | | | | |
| 55<br>-12.6 | | | | | | | |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
| 338884.FL | B-27 | SHEET 4 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 : 4.41 ft bgs on 3/06/07 START : 2/8/2007 END : 2/10/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | 44.0 | | | | | **Limestone** | |
| 45 -2.6 | R1-NQ 2 ft 85% | 45 | 2 | 44.1' - Fracture, 10 deg, smooth, undulating, open | | 44.0-45.1' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, weak (R2), voids <1/16" on 50% of surface, trace voids to 3/16" | R1: 13 minutes |
| | | | 1 | 44.2' - Fracture, 20 deg, smooth, undulating, open | | | 18:06 End day 2/8/07 at 46.0' |
| | 46.0 | | NR | 45.1' - Fracture, 5 deg, smooth, undulating, sandy infilling, open | | **Silt (ML)** 45.1-45.7' - moderate olive brown, (5Y 4/4), wet, stiff, moderate HCl reaction, trace fine sand **No Recovery 45.7-46.0'** | |
| | R2-NQ 5 ft 66% | 0 | 2 | 46.25' - Fracture, 50 deg, rough, planar | | **Limestone** 46.0-46.5' - moderate olive brown, (5Y 4/4), fine grained, moderate to strong HCl reaction, weak (R2), voids <1/16" on 40% of surface, moderately fossiliferous (molds to 3/16") | |
| | | | | 46.5' - Fracture, 20 deg, rough, undulating | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| 50 -7.6 | | | NR | | | **Silt (ML)** 46.5-49.3' - Same as 45.1-45.7' except trace limestone fragments to 1/16" | R2: 7 minutes |
| | 51.0 | | | | | **No Recovery 49.3-51.0'** | Section appears competent but breaks into sandy silt sized particles when pushed on with 2 fingers |
| | R3-NQ 5 ft 97% | 43 | 5 | 51.25' - Fracture, 5 deg, smooth, undulating | | **Limestone** 51.0-52.5' - moderate olive brown, (5Y 4/4), fine grained, strong HCl reaction, extremely weak (R0), trace organics, friable | |
| | | | | 51.3' - Fracture, 15 deg, smooth, undulating | | | |
| | | | | 51.8' - Fracture, 10 deg, rough, undulating | | | |
| | | | 1 | 52.0' - Fracture, 25 deg, smooth, undulating, tight | | | |
| | | | 0 | 53.35, 53.8' - Mechanical break (2) | | 52.5-54.7' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, very weak to weak (R1 to R2), voids <1/16" on 40% of surface, trace voids to 3/16" (fossils) on <5% of surface, trace organics | |
| | | | 0 | | | | |
| 55 -12.6 | | | 0 | | | | R3: 4 minutes |
| | 56.0 | | NR | | | **Silt (ML)** 54.7-55.85' - moderate yellowish brown, (10YR 5/4), moderate to strong HCl reaction, trace limestone fragments to 1/16" **No Recovery 55.85-56.0'** | |
| | R4-NQ 5 ft 100% | 46 | >10 | | | **Limestone** 56.0-56.7' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, extremely weak to very weak (R0 to R1), 56.4-56.7' extremely weak (R0) zone 56.7-61.0' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, weak (R2), voids <1/16" on 50% of surface in two zones from 58.2-61.0', trace voids to 3/8" are <5% of surface on 58.2-61.0', zones of very weak rock 57.3-57.8' and 58.8-59.3', moderately fossiliferous (molds) below 60.0' | |
| | | | >10 | 56.9, 57.3, 57.4' - Mechanical break | | | |
| | | | 1 | | | | |
| | | | 5 | 58.75' - Fracture, 60 deg, rough, undulating, 1/8" clay infilling | | | |
| 60 -17.6 | | | 0 | 59.1' - Fracture, horizontal, smooth, undulating, 1/8" clay infilling | | | R4: 5 minutes |
| | | | | 59.1-59.5' - Fracture, 80 deg, rough, planar, open | | | |
| | 61.0 | | | 59.3' - Fracture, 10 deg, smooth, undulating, open | | | |
| | R5-NQ 5 ft 88% | 71 | 4 | 59.5' - Fracture, 5 deg, smooth, undulating, open | | | |
| | | | 1 | 59.6' - Fracture, 50 deg, rough, undulating, open | | | |
| | | | | 60.35' - Mechanical break | | | |
| | | | 1 | 60.8' - Mechanical break | | | |
| | | | | 61.5' - Fracture, 10 deg, rough, undulating, 20% coverage clay infilling, tight | | | |

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|---|---|---|

# 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 : 4.41 ft bgs on 3/06/07 START : 2/8/2007 END : 2/10/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 65<br>-22.6 | 66.0 | | 2<br>1<br>NR | 61.75, 62.0' - Mechanical break<br>62.3' - Fracture, 20 deg, smooth, undulating, 15% coverage clay infilling, open to 3/8"<br>63.9' - Fracture, 5 deg, smooth, undulating, 10% coverage clay infilling, open<br>64.3' - Mechanical break | | **Limestone**<br>61.0-65.4' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, medium strong (R3), very fossiliferous on 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 zones with voids <1/16" on 40% of surface, molds and casts up to 3/8"x3/4" on 5% of surface, trace organics | R5: 12 minutes |
| 70<br>-27.6 | R6-NQ<br>5 ft<br>34%<br>71.0 | 16 | 4<br>2<br>NR | 64.5' - Fracture, 40 deg, rough, undulating, tight<br>64.7' - Fracture, 60 deg, rough, undulating, 10% coverage clay infilling, tight<br>65.2' - Fracture, 20 deg, smooth, planar, clay infilling<br>66.1' - Fracture, 10 deg, smooth, undulating, open<br>66.5' - Fracture, 15 deg, smooth, undulating, open<br>66.65' - Fracture, 5 deg, smooth, undulating, open<br>66.8' - Fracture, 15 deg, smooth, undulating, open<br>67.2' - Fracture, 25 deg, smooth, undulating, open | | **No Recovery 65.4-66.0'**<br>**Limestone**<br>66.0-67.7' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, very weak (R1), voids <1/16" on 40 % of surface, trace voids to 3/16", trace organics, 67.2-67.7' rock appears brecciated and more fossiliferous fewer voids and medium strong to strong rock (R3 to R4) | R6: 12 minutes |
| 75<br>-32.6 | R7-NQ<br>5 ft<br>62%<br>76.0 | 29 | 2<br>>10<br>>10<br>NR | 67.75' - Fracture, 10 deg, smooth, undulating, open<br>71.6' - Fracture, 20 deg, rough, undulating, 20% coverage clay infilling, open to 3/8"<br>72.1' - Fracture, 15 deg, rough, undulating, open<br>72.1-73.3' - Fracture zone, horizontal and vertical, rough, undulating, open, fragments from 3/8" to 4"<br>73.3' - Fracture, 30 deg, rough, undulating, open<br>73.75' - Fracture, 10 deg, rough, undulating, tight to open up to 9/16"<br>74.1' - Fracture, 30 deg, rough, undulating, open | | **No Recovery 67.7-71.0'**<br>**Limestone**<br>71.0-74.1' - Same as 66.0-67.7' except voids <1/16" below 72.0' on 25% of surface, moderately fossiliferous<br>**No Recovery 74.1-76.0'** | R7: 8 minutes |
| 80<br>-37.6 | R8-NQ<br>5 ft<br>76%<br>81.0 | 48 | >10<br>1<br>1<br>0<br>NR | 76.0-76.6' - Fracture zone, rough, undulating, fragments 3/16" to 1-1/2"<br>76.8' - Fracture, 10 deg, rough, undulating, 30% coverage clay infilling, open<br>77.1' - Fracture, 30 deg, rough, undulating, 30% coverage clay infilling, open<br>78.5' - Fracture, 10 deg, rough, undulating, 20-25% coverage clay infilling | | **Limestone**<br>76.0-79.8' - moderate yellowish brown to pale yellowish brown, (10YR 5/4 to 10YR 6/2), fine grained, moderate HCl reaction, medium strong (R3), voids <1/16" on 50% of surface decreasing with depth to 25% by 79.0', trace voids to 3/16", moderately fossiliferous<br>**No Recovery 79.8-81.0'** | R8: Run time not recorded |
| | R9-NQ<br>5 ft<br>88% | 40 | 0<br>1<br>4 | 82.4' - Mechanical break<br>83.25' - Fracture, 60 deg, rough, planar, tight to open up to 3/16" | | **Limestone**<br>81.0-85.4' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, weak to medium strong (R2 to R3), voids <1/16" on 20% of surface, trace voids and fossil molds to 3/16"x3/8", trace organics | SC-1 collected at 81.0-82.0' |

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# 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 : 4.41 ft bgs on 3/06/07 START : 2/8/2007 END : 2/10/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 85<br>-42.6 | | | 4<br>2<br>NR | 83.4' - Fracture, 20 deg, smooth, undulating, tight<br>83.65' - Fracture, 30 deg, rough, undulating, open<br>83.8' - Fracture, 20 deg, rough, undulating, open | | **No Recovery 85.4-86.0'** | R9: Run time not recorded |
| | 86.0<br>R10-NQ<br>5 ft<br>94% | 50 | >10<br>>10<br>>10<br>0<br>>10<br>NR | 84.0' - Fracture, 70 deg, rough, planar, tight<br>84.1' - Fracture, 10 deg, rough, undulating, open<br>84.5' - Fracture, 10 deg, rough, undulating, tight to open up to 3/16"<br>84.75' - Fracture, 50 deg, rough, undulating, open<br>85.0' - Fracture, 50 deg, rough, planar, tight<br>85.3' - Fracture, 50 deg, smooth, planar, open<br>86.65' - Fracture, 20 deg, rough, undulating, open<br>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**<br>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'<br>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<br>87.0-90.7' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, medium strong to 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 | |
| 90<br>-47.6 | 91.0<br>R11-NQ<br>5 ft<br>50% | 27 | >10<br>1<br>0<br>NR | 87.05-87.5' - Fracture (2), 45 deg and 80 deg, rough, undulating, open, tight-open respectively<br>91.0-92.2' - Fracture zone, 0-75 deg, rough, undulating, fragments 1/2"-2", trace bi-directional drill marks<br>92.4, 92.6' - Mechanical break (2) | | **No Recovery 90.7-91.0'**<br>**Limestone**<br>91.0-93.5' - Same as 87.0-90.7'<br>**No Recovery 93.5-96.0'** | R10: Run time not recorded |
| 95<br>-52.6 | 96.0<br>R12-NQ<br>5 ft<br>66% | 34 | >10<br>3<br>2<br>0<br>NR | 96.0-96.3' - limestone fragments gravel to cobble sized<br>96.4' - Fracture, 10 deg, rough, undulating, open<br>96.7' - Fracture, 15 deg, rough, undulating, open<br>97.0' - Fracture, 25 deg, rough, undulating, open<br>97.5' - Fracture, 10 deg, smooth, undulating<br>97.6' - Fracture, 50 deg, smooth, planar, tight<br>98.0' - Fracture, 15 deg, rough, undulating<br>98.2' - Fracture, 20 deg, rough, undulating, open<br>99.3' - Fracture, 40 deg, smooth, planar | | **Limestone**<br>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 surface, cavities to 3/8"x3/4" from 96.0-97.3', moderately fossiliferous (casts, molds)<br>**No Recovery 99.3-101.0'** | R11: Run time not recorded |
| 100<br>-57.6 | 101.0<br>R13-NQ<br>5 ft<br>100% | 68 | 3<br>2<br>1 | 101.05' - Fracture, 40 deg, smooth, undulating, tight<br>101.3' - Fracture, 40 deg, smooth, planar, charcoal gray staining, tight<br>101.8' - Fracture, 35 deg, rough, undulating, open<br>102.4, 102.65' - Fracture (2), 40 deg, rough, undulating, tight<br>103.0' - Mechanical break | | **Limestone**<br>101.0-104.5' - Same as 96.0-99.3' except weak (R2) | R12: Run time not recorded |

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# 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 : 4.41 ft bgs on 3/06/07 START : 2/8/2007 END : 2/10/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 105<br>-62.6 | 106.0 | | 4<br>2 | 103.5' - Fracture, 30 deg, rough, undulating, yellowish brown staining on 20% of surface, tight<br>103.6-103.9' - Fracture, 60 deg, rough, undulating, tight<br>104.1' - Fracture, 25 deg, rough, undulating, charcoal gray staining, open to 3/16" | | **Limestone**<br>104.5-106.0' - pale yellowish brown, (10YR 6/2), fine grained, mild HCl reaction, very weak to weak (R1 to R2), voids <1/16" on 15% of surface, trace fossil molds and casts to 3/16"<br>106.0-107.3' - Same as 104.5-106.0' | SC-2 collected at 104.5-105.45'<br>R13: 10 minutes |
| 110<br>-67.6 | R14-NQ<br>5 ft<br>60%<br>111.0 | 24 | >10<br>6<br>>10<br>NR | 104.15' - Fracture, 60 deg, rough, planar, open to 1/16"<br>104.4' - Fracture, 15 deg, rough, undulating, charcoal gray staining, open to 3/8"<br>104.5' - Fracture, 50 deg, rough, planar, charcoal gray staining, tight<br>105.45, 105.7' - Fracture (2), 70 deg, rough, planar, charcoal gray staining, open<br>106.15' - Fracture, 50 deg, rough, planar, charcoal gray staining<br>106.15-106.5' - Fracture, 30 deg, rough, undulating, tight<br>106.15-106.5' - limestone fragments 2"x2" | | 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<br>**No Recovery 109.0-111.0'** | R14: 7 minutes |
| 115<br>-72.6 | R15-NQ<br>5 ft<br>55%<br>116.0 | 45 | 1<br>1<br>2<br>NR | 107.0' - Fracture, 15 deg, rough, undulating, open<br>107.2' - Fracture, 30 deg, rough, undulating, open<br>107.6' - Fracture, 30 deg, rough, undulating, open<br>108.3-108.8' - limestone fragments from 3/16" to 1"x2"<br>111.9' - Fracture, horizontal, rough, stepped<br>113.0' - Fracture, 5 deg, smooth, undulating, brown staining, tight<br>113.4-113.8' - Fracture zone, fragments to 1-1/2" subangular to subround | | **Limestone**<br>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"<br>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), 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'<br>**No Recovery 113.75-116.0'** | Recovery loss assumed to be from bottom of run<br>R15: Run time not recorded |
| 120<br>-77.6 | R16-NQ<br>5 ft<br>76%<br>121.0 | 42 | 5<br>2<br>3<br>2<br>NR | 116.1, 116.35, 116.85, 117.0, 117.1' - Fracture (5), horizontal and 5 deg, rough, undulating<br>118.0-119.5' - Fracture zone or mechanical break (5) | | **Limestone**<br>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<br>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 weak (R1 to R2) rock zone from 117.9-118.3'<br>**No Recovery 119.8-121.0'** | R16: Run time not recorded |
| | R17-NQ<br>5 ft<br>22% | 0 | >10<br>NR | 121.0-126.0' - recovery too low to accurately identify fracture depths | | **Limestone**<br>121.0-122.1' - Same as 117.1-119.8'<br>**No Recovery 122.1-126.0'** | Low recovery |

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# 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 : 4.41 ft bgs on 3/06/07 START : 2/8/2007 END : 2/10/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 125<br>-82.6 | | | NR | | | | R17: Run time not recorded |
| | 126.0 | | | | | | |
| | R18-NQ<br>5 ft<br>94% | 32 | 2 | 126.0-126.5' - Fracture zone | | **Limestone**<br>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" | |
| | | | 3 | 126.8' - Fracture, horizontal, rough, stepped, tight<br>127.1' - Fracture, 5 deg, rough, undulating, open | | | |
| | | | 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" | Weaker rock at 129.0' |
| | | | 2 | 129.4-130.2' - Fracture zone | | | |
| 130<br>-87.6 | | | 0 | | | 127.7-130.7' - dusky yellow, (5Y 6/4), fine grained, mild HCl reaction, weak 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' | R18: Run time not recorded |
| | 131.0 | | NR | | | **No Recovery 130.7-131.0'** | |
| | R19-NQ<br>5 ft<br>62% | 26 | 3 | 131.5' - Fracture, 10 deg, rough, undulating, open | | **Limestone**<br>131.0-131.5' - Same as 127.7-130.7' except more fossiliferous with both gray and brown limestone fragments to 3/8"x3/4" | |
| | | | 4 | 131.7' - Fracture, 45 deg, rough, planar, open<br>131.75' - Fracture, 30 deg, rough, undulating, tight | | | |
| | | | >10 | 132.2, 132.5, 133.4' - Fracture, 20 deg, rough, undulating, open<br>132.4, 132.75, 133.2' - Fracture, 10 deg, rough, undulating, open | | | |
| 135<br>-92.6 | | | NR | 133.7' - Fracture, 30 deg, rough, undulating<br>133.8-134.0' - Fracture zone, rough, undulating, fragments 3/16"-1" | | 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 |
| | 136.0 | | | | | **No Recovery 134.1-136.0'** | |
| | R20-NQ<br>5 ft<br>50% | 16 | 2 | 136.5' - Fracture, horizontal, smooth, planar, tight | | **Silty Sand (SM)**<br>136.0-136.5' - pale yellowish brown, (10YR 6/2), fine grained, 20% silt, poorly graded | SC-3 collected at 137.15-138.0' |
| | | | 0 | 136.7' - rough, undulating, open<br>136.8, 137.05, 137.37' - Mechanical break (3) | | | |
| | | | >10 | 138.0-138.3' - Fracture zone | | **Limestone**<br>136.5-138.0' - yellowish gray to pale 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 | Driller's Remark: Soft material at 138.0' |
| 140<br>-97.6 | | | NR | | | | R20: 46 minutes |
| | 141.0 | | | | | | |
| | R21-NQ<br>5 ft<br>86% | 60 | 3 | 141.15' - Fracture, 5 deg, rough, undulating, open to 3/16" | | 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 | |
| | | | 2 | 141.5' - Fracture, 10 deg, rough, undulating, open to 1/4"<br>141.9' - Fracture, 15 deg, rough, undulating, open | | **No Recovery 138.5-141.0'** | |
| | | | 1 | 142.0' - Fracture, 10 deg, rough, undulating, open to 1/8" | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-27 SHEET 9 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 : 4.41 ft bgs on 3/06/07 START : 2/8/2007 END : 2/10/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 145<br>-102.6 | | | 5<br>2<br>NR | 142.55' - Fracture, 30 deg, smooth, planar, open to 3/16"<br>143.3' - Fracture, 65 deg, rough, planar, 30% coverage brown staining, open to 3/16"<br>143.7, 144.0' - Mechanical break<br>144.4' - Fracture, 5 deg, rough, planar, tight | | **Limestone**<br>141.0-142.2' - Same as 138.0-138.5' except voids <1/16" increase to 40%, laminated bedding on last 4" of run<br>142.2-145.3' - pale yellowish brown transitions to yellowish brown, (10YR 6/2 to 10YR 5/4), fine grained, moderate to mild HCl reaction, medium strong (R3), laminated bedding below 143.5' increasing crenulations with depth, bedding angles up to 10 deg, voids <1/16" over 5% coverage except zone at 20% from 143.5-145.0' trace voids to 3/16", color changes to moderate yellowish brown (10YR 5/4) at 144.8' | R21: 20 minutes |
| | 146.0<br>R22-NQ<br>4 ft<br>88% | 56 | 2<br>1<br>5<br>0<br>NR | 144.6, 144.7' - Fracture, horizontal, rough, undulating, open<br>144.9, 144.95, 145.0' - Bedding plane, horizontal, smooth, planar, tight to open up to 1/8"<br>146.3' - Fracture, 75 deg, rough, undulating, tight to open up to 3/16", gray staining on 20% at surface<br>146.5' - Fracture, 5 deg, rough, undulating, tight<br>147.1' - Fracture, 15 deg, rough, undulating, open | | **No Recovery 145.3-146.0'** | R22: 18 minutes |
| 150<br>-107.6 | 150.0 | | | 147.2' - Fracture, 25 deg, rough, undulating, tight to open 1/8"<br>147.7' - Fracture, 10 deg, rough, undulating, tight<br>148.0' - Fracture, 10 deg, rough, undulating, open<br>148.2' - Bedding plane, 10 deg, smooth, undulating, tight<br>148.3' - Fracture, 10 deg, rough, undulating, open<br>148.9, 148.95' - Fractures, horizontal, smooth, planar, open up to 1/16" | | **Limestone**<br>146.0-148.0' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), fine grained, mild to moderate HCl 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<br>148.0-148.4' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, very weak (R1), thin laminated bedding, voids <1/16" over 25% of surface<br>148.4-149.5' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, medium strong to strong (R3 to R4), thin laminated bedding, 5 deg angle bedding, trace voids <1/16", trace fossil casts, molds<br>**No Recovery 149.5-150.0'**<br>Bottom of Boring at 150.0 ft bgs on 2/10/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-28 SHEET 1 OF 9 |

# SOIL BORING 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

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 ft bgs on 4/25/07 START : 4/25/2007 END : 5/1/2007 LOGGER : D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 41.5 | 0.0 | 1.5 | SS-1 | 2-2-3 (5) | **Top Soil** 0-0.5' - roots | | |
| | 1.5 | | | | **Poorly Graded Sand (SP)** 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 | | |
| | | | | | **Poorly Graded Sand With Silt (SP-SM)** 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 | | |
| 5 | 5.0 | | | | | | |
| 36.5 | | 1.2 | SS-2 | 0-0-1 (1) | **Silty Sand (SM)** 5.0-6.2' - yellowish gray, (5Y 7/2), wet, very loose, fine grained, no HCl reaction, 25-30% nonplastic fines, trace roots | | |
| | 6.5 | | | | | | |
| 10 | 10.0 | | | | | | |
| 31.5 | | 0.7 | SS-3 | 1-2-3 (5) | **Silty Sand (SM)** 10.0-10.7' - pale yellowish brown to dark yellowish brown, (10YR 6/2 to 10YR 4/2), wet, loose, fine grained, no HCl reaction, 15-20% nonplastic fines, 10% organics | | Organic odor |
| | 11.5 | | | | | | |
| 15 | 15.0 | | | | | | |
| 26.5 | | 1.1 | SS-4 | 2-4-10 (14) | **Silty Sand (SM)** 15.0-15.35' - light olive gray, (5Y 5/2), wet, very loose, fine grained, mild HCl reaction, 25-30% low to medium plasticity fines | | |
| | 16.5 | | | | **Silt (ML)** 15.35-15.55' - grayish orange, (10YR 7/4), wet, soft to medium stiff, fine grained, nonplastic, very rapid dilatancy, mild HCl reaction, 5-10% very fine sand | | |
| | | | | | **Silty Sand (SM)** 15.55-16.1' - yellowish gray, (5Y 8/1), moist, medium dense, fine to medium grained, strong HCl reaction, 25% low to medium plasticity fines, two gravel-sized pieces up to 1" | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-28 SHEET 2 OF 9 |

# SOIL BORING 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

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 ft bgs on 4/25/07 START : 4/25/2007 END : 5/1/2007 LOGGER : D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 21.5 | 20.0 – 21.5 | 1.0 | SS-5 | 7-9-8 (17) | **Silt (ML)** 20.0-21.0' - yellowish gray, (5Y 8/1), wet, very stiff, nonplastic, very rapid dilatancy, mild HCl reaction | | |
| 25 / 16.5 | 25.0 – 26.5 | 1.4 | SS-6 | 10-15-15 (30) | **Silt With Sand (ML)** 25.0-26.4' - dark yellowish orange, (10YR 6/6), wet, very stiff, fine to medium grained, nonplastic, very rapid dilatancy, mild to moderate HCl reaction, 15-25% fine to medium sand-sized | | |
| 30 / 11.5 | 30.0 – 31.5 | 1.0 | SS-7 | 17-20-17 (37) | **Silt With Sand (ML)** 30.0-31.0' - Same as 25.0-26.4' except moist to wet, hard, trace fine to coarse gravel-sized | | |
| 35 / 6.5 | 35.0 – 36.5 | 0.3 | SS-8 | 4-0-0 (0) | **Sandy Silt (ML)** 35.0-35.25' - moderate yellowish brown, (10YR 5/4), wet, very loose, mild HCl reaction, 40% fine to medium sand-sized, trace organics | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-28 SHEET 3 OF 9 |

# SOIL BORING 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

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 ft bgs on 4/25/07 START : 4/25/2007 END : 5/1/2007 LOGGER : D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 1.5 | 40.0 | 0.4 | SS-9 | 50/5 (50/5") | **Silty Sand With Limestone Fragments (SM)** 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 | | |
| 45 -3.5 | 45.0 | 1.0 | SS-10 | 23-30-17 (47) | **Silt With Sand (ML)** 45.0-46.0' - moderate yellowish brown, (10YR 5/4), wet, hard, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 10-15% fine sand-sized, 5-10% organics in <1/16" thick lenses | | |
| 50 -8.5 | 46.5 | 1.3 | SS-11 | 13-24-50/5 (74/11") | **Silt With Sand (ML)** 50.0-51.3' - Same as 45.0-46.0' except 25% fine to medium sand-sized, trace organics | | |
| 55 -13.5 | 50.0 | 0.8 | SS-12 | 32-50/3 (82/9") | **Silt (ML)** 55.0-55.8' - Same as 50.0-51.3' except 10-15% fine sand-sized, trace organics in thin threads and chunks | | |
| 60 | 51.4 | | | | | | |
| | 55.0 | | | | | | |
| | 55.8 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

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 ft bgs on 4/25/07 START : 4/25/2007 END : 5/1/2007 LOGGER : D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -18.5 | 60.0 | 0.3 | SS-13 | 50/4 (50/4") | **Silt With Sand And Limestone Fragments (ML)** 60.0-60.3' - Same as 55.0-56.0' except 20% fine to medium sand-sized, 20% coarse sand to fine gravel-sized limestone fragments | | |
| 65 -23.5 | 65.0 | | | | | | Complete soil sampling at 11:45 on 4/25/07 |
| | 65.1 | 0.0 | SS-14 | 50/1 (50/1") | **Limestone Fragments** 65.0-65.1' - light gray, (N7), moderate to strong HCl reaction, fragments about 3/8"x3/4" in size<br>Begin Rock Coring at 65.0 ft bgs<br>See the next sheet for the rock core log | | |
| 70 -28.5 | | | | | | | |
| 75 -33.5 | | | | | | | |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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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 ORIENTATION : Vertical

WATER LEVELS : 2 ft bgs on 4/25/07 START : 4/25/2007 END : 5/1/2007 LOGGER : D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -23.5 | 65.0 | | | | | | Start rock coring at 65.0' |
| | R1-HQ 5 ft 54% | 32 | 1 | 65.15' - Fracture, horizontal, rough, undulating, faces do not join together | | **Limestone Fragments** 65.0-66.2' - pale yellowish brown, (10YR 6/2), fine grained, moderate HCl reaction, medium strong (R3), large infilled cavities 1"-2", trace organic inclusions | Water level approximately 2.0' (very muddy, may not be accurate, 4/25/07, 15:00) |
| | | | 2 | 66.1' - Fracture, 10 deg, rough, undulating, open, weathered faces, shell like fossil imprint on both sides of fracture | | | |
| | | | NR | 66.15' - Fracture, horizontal, rough, undulating | | **No Recovery 66.2-68.2'** | Driller's Remark: Rods dropped at 66.0-68.0', interpret lost recovery to be from 66.2-68.2' |
| | | | 3 | 68.15' - Fracture, horizontal, smooth, rounded face | | **Limestone** 68.2-69.7' - Same as 65.0-66.2' except small voids (<1/16") over 30% of core, fossiliferous with few 1/4"-1/2" cavities (molds) with couple of casts, increased large dissolution type cavities from 69.1-69.7' | |
| | | | 3 | 68.35, 68.75' - Fractures (2), horizontal, smooth, undulating, tight | | | R1: 5 minutes |
| 70 | 70.0 | | NR | 69.15, 69.3, 69.55' - Fractures (3), 0-20 deg, rough, undulating, slightly weathered, open | | **No Recovery 69.7-70.0'** | |
| -28.5 | | | | | | **Limestone** 70.0-72.5' - moderate olive brown to moderate yellowish brown, (5Y 4/4 to 10YR 5/4), moderate HCl reaction, medium strong (R3), highly fossiliferous with 30% fine (<1/16") voids and 5% 1/16"-1/8" voids/casts/molds, several larger cavities up to 1", trace organic laminations/inclusions | |
| | R2-HQ 5 ft 100% | 65 | 8 | 70.0-70.4' - Fracture zone, five 1-2" angular fragments | | | |
| | | | | 70.4' - Fracture, horizontal, rough, stepped, terminates fracture zone above | | | |
| | | | 1 | 70.9' - Fracture, horizontal, rough, planar, open | | | SC-1 collected at 71.5-72.5' |
| | | | 2 | 71.5' - Fracture, 5 deg, rough, undulating | | | |
| | | | 2 | 72.8, 73.1' - Fractures (2), 10 deg, rough, stepped, some fragmentation | | | |
| | | | | 73.0' - Fracture, 70 deg, rough, planar, tight, some fragmentation | | | |
| | | | 3 | 73.85, 74.2, 74.45' - Fractures (3), 10 deg, rough, planar, open | | 72.5-73.6' - Same as 70.0-72.5' except 5-10% fine (1/16") voids, very few large voids or cavities, grayer 3/8" thick laminations throughout core | R2: 7 minutes |
| 75 | 75.0 | | | | | | |
| -33.5 | | | | | | | |
| | R3-HQ 5 ft 76% | 0 | >10 | 74.8' - Fracture, 60 deg, rough, undulating, terminates with some rock fragments at end of core (75.0') | | 73.6-78.1' - Same as 72.5-73.6' except very weak (R1) | |
| | | | | 75.0-75.4' - Fracture zone, 1-2" fragments | | | |
| | | | >10 | 75.4' - Fracture, 10 deg, rough, planar, tight | | | |
| | | | | 75.65, 75.7, 75.9, 76.1, 76.25, 76.27' - Fractures (6), horizontal, smooth to rough, planar, open | | | |
| | | | >10 | 76.25-76.4' - Fracture zone, fragments up to 3/4" | | | |
| | | | 3 | 76.6' - Fracture, 45 deg, smooth, planar, slightly weathered, open | | 78.1-78.65' - Same as 72.5-73.6' except 0-10% fine voids | |
| | | | NR | 76.8, 77.15' - Fractures (2), 10 deg, rough, undulating, open, with rock fragments between | | 78.65-78.8' - Same as 73.6-78.1' **No Recovery 78.8-80.0'** | R3: 4 minutes |
| 80 | 80.0 | | | 77.5-78.1' - Fracture zone | | | Drilling ended at 80.0' on 4/25/07 |
| -38.5 | | | | | | **Limestone** 80.0-83.8' - moderate yellowish brown, (10YR 5/4), moderate to strong HCl reaction, very weak to weak (R1 to R2), 25-40% fine (<1/16") voids throughout core, fossiliferous with many 3/16" to 3/8" fossil casts and molds, minor black infilling | Drilling resumed on 4/26/07 |
| | R4-HQ 5 ft 76% | 28 | 2 | 78.1' - Bedding plane, horizontal, rough, stepped, open | | | Rock varies from competent to friable intermittently with no clear contacts, but on the whole described as friable |
| | | | | 78.3' - Fracture, 20 deg, rough, stepped, open | | | |
| | | | 2 | 78.65' - Fracture, horizontal, rough, stepped, open | | | |
| | | | >10 | 80.1' - Fracture, 20 deg, rough, undulating, open | | | SC-2 collected at 80.5-81.6' |
| | | | | 80.4' - Fracture, 10 deg, rough, undulating, open | | | |
| | | | >10 | 81.6' - Mechanical break | | | |
| | | | NR | 82.3' - Fracture, 60 deg, rough, undulating, open with lots of associated rock fragments | | **No Recovery 83.8-85.0'** | R4: 5 minutes |
| 85 | 85.0 | | | 82.3-83.5' - Fracture zone, angular 3/4"-2" fragments | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-28 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 ft bgs on 4/25/07 START : 4/25/2007 END : 5/1/2007 LOGGER : D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -43.5 | R5-HQ 5 ft 100% | 65 | 2 | 83.5, 83.7' - Fractures (2), 20 deg, rough, undulating, slightly weathered | | **Limestone** 85.0-89.05' - Same as 68.2-69.7' except moderate yellowish brown, (10YR 5/4), very weak to medium strong (R1 to R3), 10-25% fine (<1/16") voids (fewer voids at 85.0-85.5', 88.1-88.2'), many 1/4" fossil molds/casts, some gray or beige infill in cavities, trace organics | |
| | | | 1 | 85.45' - Fracture, 15 deg, rough, undulating, slightly weathered, open<br>85.6' - Fracture, 10 deg, rough, planar, weathered but tight | | | |
| | | | 1 | 86.7' - Fracture, 40 deg, rough, undulating, tight<br>87.05' - Fracture, vertical, rough, undulating, tight | | | |
| | | | 2 | 87.25' - Fracture, 30 deg, rough, undulating, tight, half of core is missing from 87.2-87.35' | | | |
| | | | 2 | 88.1, 88.45' - Fractures (2), 10 deg, rough, undulating, tight | | 89.05-89.6' - Same as 85.0-89.05' except interbedded zones of very weak (R1) rock with few voids and medium strong (R3) rock with 20% voids | R5: 5 minutes |
| 90 | 90.0 | | | 89.25' - 10 deg, rough, undulating, tight to healed | | | |
| -48.5 | R6-HQ 5 ft 92% | 72 | 1 | 89.8' - Fracture, horizontal, rough, undulating to stepped, open | | 89.6-93.4' - Same as 85.0-89.05' | |
| | | | 2 | 90.8, 91.3' - Fractures (2), 30 deg, rough, planar, opposing, tight | | | |
| | | | 2 | 91.9, 92.1' - Mechanical break (2), 60 deg, rough, planar to undulating | | | |
| | | | 6 | 92.9' - Fracture, 10 deg, rough, planar, fine organic lamination<br>93.25' - Fracture, 60 deg, rough, stepped, beginning of fracture zone | | 93.4-94.6' - moderate olive brown to moderate yellowish brown, (5Y 4/4 to 10YR 5/4), very fine grained, mild to moderate HCl reaction, strong (R4), no small (1/16") voids at top, increase with depth to 5% at bottom, a few 1/4" round cavities | R6: 15 minutes |
| | | | 1 | 93.3-93.5' - Fracture zone | | | |
| 95 | 95.0 | | NR | 93.5, 93.8, 94.2' - Fractures (3), horizontal, smooth, planar | | **No Recovery 94.6-95.0'** | |
| -53.5 | R7-HQ 5 ft 90% | 52 | 5 | 95.5, 95.9' - Fractures (2), rough, stepped, silty sand infilling, open | | **Limestone** 95.0-98.3' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), 10-20% fine voids, small cavities up to 1/4" and larger and sometime elongated cavities contain light colored infill, trace organics | |
| | | | 1 | 96.75' - Fracture, 40 deg, rough, stepped, tight | | | |
| | | | 0 | 97.5' - Mechanical break | | | |
| | | | 3 | 98.2' - Fracture, 10 deg, smooth, planar, open to tight | | | |
| | | | 4 | 98.6, 99.5' - Fracture, vertical, rough, stepped, some fragmentation, some crystallization on surfaces | | 98.3-99.5' - Same as 95.0-98.3' except 3% fine voids, cavities up to 1" in size | R7: 15 minutes |
| 100 | 100.0 | | NR | | | **No Recovery 99.5-100.0'** | |
| -58.5 | R8-HQ 5 ft 92% | 43 | >10 | 100.0-100.9' - Fracture zone, several horizontal and vertical fractures | | **Limestone** 100.0-104.6' - Same as 95.0-98.3' except sequence of rock with voids and rocks without, with cavities present at at transitions, maximum of 35% fine voids | |
| | | | 3 | 100.9, 101.15, 101.4, 101.9, 102.25' - Fractures (5), 20-40 deg, rough, undulating, open | | | |
| | | | 3 | 102.25' - Fracture, vertical, rough, undulating, some fragmentation | | | |
| | | | 1 | 102.9' - Fractures (2), horizontal and 60 deg, rough, undulating, open<br>103.6' - Fracture, 20 deg, rough, undulating | | | |
| | | | 2 | | | | R8: 10 minutes |
| 105 | 105.0 | | NR | | | **No Recovery 104.6-105.0'** | |

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|---|---|
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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 ORIENTATION : Vertical

WATER LEVELS : 2 ft bgs on 4/25/07 START : 4/25/2007 END : 5/1/2007 LOGGER : D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -63.5 | R9-HQ 5 ft 78% | 37 | 6 | 104.45' - Fracture, horizontal, rough, stepped, beige-colored infill<br>105.0-105.2' - Fracture zone, 1/2"-1" angular fragments | | **Limestone**<br>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 | |
| | | | 1 | 105.3' - Fracture, 50 deg, rough, stepped, open | | | |
| | | | >10 | 105.9' - Fracture, 20 deg, rough, stepped, open<br>106.3' - Fracture, 45 deg, rough, planar, tight but weathered | | | |
| | | | >10 | 107.1' - Fracture, 25 deg, rough, stepped, very open and weathered with dissolution and fragmentation | | 108.4-108.9' - moderate yellowish brown, (10YR 5/4), strong HCl reaction, 20% gravel, 30% sand, 50% silt-sized particles, very friable | |
| | | | NR | 107.7-108.0' - Fracture zone, with angular rock fragments up to 2" | | **No Recovery 108.9-110.0'** | R9: 8 minutes |
| 110 | 110.0 | | | | | | |
| -68.5 | R10-HQ 5 ft 100% | 93 | 0 | 108.15' - Fracture, 60 deg, rough, undulating, open<br>108.4' - Fracture, 10 deg, rough, stepped, open | | **Limestone**<br>110.0-114.4' - Same as 105.0-108.4' | |
| | | | 0 | | | | |
| | | | 1 | 112.3' - Fracture, 45 deg, rough, undulating, tight to open | | | Driller's Remark: Hit silt layer at 112.0' about 4" thick; not evident in core |
| | | | 0 | | | | |
| | | | 1 | | | | R10: 13 minutes |
| 115 | 115.0 | | | | | 114.4-115.0' - Same as 110.0-114.4' except very weak (R1) | |
| -73.5 | R11-HQ 5 ft 70% | 47 | 1 | 114.9' - Fracture, horizontal, rough, undulating<br>115.1' - Fracture, horizontal, rough, undulating | | 115.0-117.5' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, very weak (R1), 5-10% fine voids, few elongated 1/4"-1/2" fossil molds | SC-3 collected at 115.1-116.1' |
| | | | 2 | 116.5' - Fracture, 40 deg, rough, undulating, open | | | |
| | | | 1 | 116.6' - Fracture, 5 deg, rough, undulating, slightly weathered, open | | 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 | |
| | | | 2 | 117.1' - Fracture, horizontal, rough, undulating, open | | | |
| | | | NR | 118.05' - Fracture, 30 deg, rough, undulating, tight<br>118.3' - Fracture, rough, undulating, tight to open, 3" side fracture | | 117.95-118.2' - Same as 115.0-117.5' except very weak (R1), with increased voids to 15%<br>118.2-118.5' - Same as 115.0-117.5' except weak (R2), 10-15% fine voids<br>**No Recovery 118.5-120.0'** | R11: 6 minutes |
| 120 | 120.0 | | | | | | |
| -78.5 | R12-HQ 5 ft 24% | 8 | >10 | 120.0-120.2' - Fracture zone, subangular rock fragments 1/2"-1" in size<br>120.2' - Fracture, 5 deg, rough, undulating | | **Limestone**<br>120.0-121.2' - moderate yellowish brown to dusky yellow, (10YR 5/4 to 5Y 6/4), fine grained, moderate HCl reaction, medium strong (R3), fine voids (<1/16"), fossiliferous with voids and cavities primarily elongated up to 1/4"-1/2" | |
| | | | 2 | 120.4, 121.0' - Fractures (2), 25 deg, rough, stepped to undulating, open with subangular fragments | | | |
| | | | NR | | | **No Recovery 121.2-125.0'** | R12: Run time not recorded |
| 125 | 125.0 | | | | | | |

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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 ORIENTATION : Vertical

WATER LEVELS : 2 ft bgs on 4/25/07 START : 4/25/2007 END : 5/1/2007 LOGGER : D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -83.5 | R13-HQ 5 ft 84% | 22 | 3 | 125.35' - Fracture, 80 deg, smooth, undulating, tight | | **Limestone** 125.0-126.25' - moderate yellowish brown to light olive brown, (10YR 5/4 to 5Y 5/6), fine grained, moderate HCl reaction, medium strong (R3), 10-20% small (1/16") voids, some 1/4" cavities | |
| | | | 8 | 125.45' - Fracture, 20 deg, rough, planar, tight but weathered | | | |
| | | | NR | 125.85' - Fracture, 0-70 deg, rough, stepped, tight, some minor fragmentation | | | Driller's Remark: Rods dropped at 127.0-127.5', interpret lost recovery to be from 127.0-127.8' |
| | | | 1 | 126.1' - Fracture, 10 deg, rough, undulating, minor fragmentation | | 126.25-127.0' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, strong (R4), 0-10% fine (1/16") voids, very fine horizontal laminations | |
| | | | 1 | 126.35, 126.4, 126.45, 126.6, 126.75, 126.85' - Bedding plane (6), horizontal, smooth, planar, tight to open | | | |
| | | | >10 | 126.95' - Fracture, vertical, rough, planar<br>127.8' - Fracture, 10 deg, open, weathered | | **No Recovery 127.0-127.8'**<br>**Limestone** | R13: 9 minutes |
| 130 | 130.0 | | | 128.9' - Fracture, 10 deg, rough, undulating, tight, weathered | | 127.8-130.3' - Same as 125.0-126.25' except alternating very weak (R1) and medium strong (R3) zones below 128.8' | |
| -88.5 | R14-HQ 5 ft 26% | 7 | >10 | 129.4' - Fractures (2), 20 deg and 70 deg, rough, undulating to planar, tight, friable | | | |
| | | | 1 | 129.4-130.0' - Fracture zone, 1/2"-1" angular fragments | | 130.3-131.3' - moderate yellowish brown to moderate olive brown, (10YR 5/4 to 5Y 4/4), fine grained, moderate HCl reaction, medium strong (R3), 20% voids <1/16", several 1/4" cavities and few larger elongated cavities | |
| | | | NR | 130.0-130.3' - Fracture zone, 1/2"-1" subangular rock fragments<br>130.3' - Fracture, horizontal, rough, planar<br>130.6' - Fracture, 70 deg, rough, undulating, trace iron oxide infill of 1/4" cavity on fracture face<br>131.0' - Fracture, horizontal, rough, undulating, tight | | **No Recovery 131.3-135.0'** | R14: 6 minutes |
| 135 | 135.0 | | | | | | |
| -93.5 | R15-HQ 5 ft 52% | 13 | >10 | 135.0-135.3' - Fracture zone, 1/2"-1" subangular rock fragments<br>135.3' - Fracture, 10 deg, rough, undulating, open | | **Limestone** 135.0-135.3' - Same as 130.3-131.3' except moderate olive brown to light olive gray, (5Y 4/4 to 5Y 5/2) | Driller's Remark: 134.0-135.0' soft drilling |
| | | | 8 | 135.45' - Fracture, 5 deg, smooth, planar, open | | 135.3-136.45' - moderate olive brown, (5Y 4/4), moderate HCl reaction, strong (R4), 0-3% fine (1/16") voids, horizontal bedding planes 1/8"-1/2" thick, trace organics | Driller's Remark: Drilling rod sank approximately 2" during lunch break |
| | | | >10 | 135.5, 135.65, 135.75, 135.77' - Fractures (4), 10 deg, smooth, planar, tight but weathered | | | |
| | | | NR | 136.45' - Fracture, 0-40 deg, rough, stepped, open<br>136.5' - Fracture, horizontal, rough, planar<br>136.6, 136.75, 136.85, 135.88, 136.95' - Fractures (5), horizontal, rough, planar, tight to open | | 136.45-137.1' - alternating intervals of material same as 135.0-135.3' and same as 135.3-136.45'<br>137.1-137.6' - Same as 135.0-135.3'<br>**No Recovery 137.6-140.0'** | R15: 7 minutes |
| 140 | 140.0 | | | | | | |
| -98.5 | R16-HQ 5 ft 64% | 22 | 4 | 136.7' - Fracture, horizontal, rough, planar, healed | | **Limestone** 140.0-140.15' - light olive brown, (5Y 5/6), fine grained, moderate HCl reaction, medium strong (R3), 20% small (1/16") voids | |
| | | | 2 | 137.1' - Fracture, 20 deg, rough, stepped, open, weathered<br>137.1-137.6' - Fracture zone, rock fragments 1/2"-2" | | 140.15-143.2' - light olive gray to yellowish gray, (5Y 5/2 to 5Y 7/2), very fine to fine grained, moderate HCl reaction, strong (R4), 3-10% small (<1/16") voids, several 1/4" to 1/2" cavities, some molds/cast, several up to 1" cavities, some with infill | |
| | | | >10 | 140.15' - Bedding plane, horizontal, rough, stepped, open | | | |
| | | | 0 | 140.6, 140.8, 141.0, 141.25' - Fractures (4), 0-20 deg, rough, stepped, 1/8" infilling, open, breaks typically occur at large cavities | | | |
| | | | NR | 140.8-141.0' - Fracture, vertical, 1" fragments<br>141.95' - Fracture, 10 deg, rough, undulating, highly weathered, tight, black organics on fracture face | | **No Recovery 143.2-145.0'** | R16: 12 minutes |
| 145 | 145.0 | | | | | | |

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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 ORIENTATION : Vertical

WATER LEVELS : 2 ft bgs on 4/25/07 START : 4/25/2007 END : 5/1/2007 LOGGER : D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -103.5 | R17-HQ 5 ft 58% | 0 | >10 | 142.3' - Fracture, 40 deg, rough, undulating<br>142.4-142.65' - Fracture zone, very angular 1"-2" rock fragments<br>142.65' - Fracture, 0-30 deg, rough, stepped | | **Limestone**<br>145.0-145.55' - light olive gray, (5Y 5/2), mottled appearance, fine grained, moderate HCl reaction, medium strong to strong (R3 to R4), 5% fine (<1/16") voids, many 3/16" voids, irregular laminations, trace organics<br>145.55-146.8' - grayish orange, (10YR 7/4), very fine to fine grained, strong HCl reaction, strong (R4), no voids, no cavities<br>146.8-147.9' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine grained, mild to strong HCl reaction, weak to strong (R2 to R4), strength decreasing with depth, 5% fine (<1/16") voids at top, increasing to 20% fine voids with depth<br>**No Recovery 147.9-150.0'**<br>Bottom of Boring at 150.0 ft bgs on 5/1/2007 | Driller's Remark: 147.0-150.0' soft drilling<br>R17: 12 minutes |
| | | | 3 | 142.8' - Fracture, horizontal, rough, stepped, underlain by angular 1"-2" rock fragments | | | |
| | | | 8 | 143.05' - Fracture, 20 deg, rough, undulating<br>145.0-145.4' - Fracture zone, red staining on fracture faces, angular to subangular rock fragments, 1/2"-2" | | | |
| | | | NR | 145.4' - Fracture, 30 deg, rough, stepped, trace infill, weathered<br>145.55' - Fracture, 10 deg, smooth, undulating, open | | | |
| 150 | 150.0 | | | 145.7' - Fracture, 10 deg, rough, stepped, tight | | | |
| -108.5 | | | | 145.9' - Fracture, 70 deg, smooth, undulating, tight, fracture extends from 145.55-146.2'<br>146.5, 146.8' - Fracture (2), 85 deg, rough, undulating, tight, 1/16" relief<br>146.8, 146.9' - Fractures (2), horizontal, weathered zone<br>147.5-147.9' - Fracture zone, angular to subangular 1/2"-1-1/2" fragments | | | |

| 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 ORIENTATION : Vertical

WATER LEVELS : 4.2 ft bgs on 5/30/07 START : 5/23/2007 END : 5/31/2007 LOGGER : T. Stewart, P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 41.7 | 0.0 – 1.5 | 1.5 | SS-1 | 1-2-4 (6) | **Poorly Graded Sand With Silt (SP-SM)** 0.0-1.5' - very light gray to yellowish gray, (N8 to 5Y 8/1), moist, loose, fine grained, 5% nonplastic fines, 10% organics, trace very fine sand-sized particles at the bottom | | Installed 6" SW casing to approximately 5' below ground surface Using 24" split spoon (SS) |
| 5 | 5.0 | | | | | | |
| 36.7 | 5.0 – 6.5 | 0.8 | SS-2 | 0-1-2 (3) | **Clayey Sand (SC)** 5.0-5.4' - pale green, (10G 6/2), wet, very loose, very fine to fine grained, medium to high plasticity **Silt (ML)** 5.4-5.7' - grayish yellow, (5Y 8/4), wet, soft, nonplastic, very rapid dilatancy, moderate HCl reaction, carbonate derived | | Water level assumed at 3.0' below ground surface due to wet sample at 5.0' (SS-2) and increasing moisture content in SS-1 SS-2 taken at 14:36 |
| 10 | 10.0 | | | | | | |
| 31.7 | 10.0 – 11.4 | 1.4 | SS-3 | 8-25-50/5 (75/11") | **Silt (ML)** 10.0-11.4' - grayish yellow mottled with moderate yellow, (5Y 8/4 with 5Y 7/6), moist, hard, nonplastic, very rapid dilatancy, moderate HCl reaction, trace very fine sand, trace black fragments, carbonate derived | | |
| 15 | 15.0 | | | | | | |
| 26.7 | 15.0 – 16.5 | 1.0 | SS-4 | 21-11-17 (28) | **Silt (ML)** 15.0-16.0' - grayish yellow, (5Y 8/4), moist, very stiff, nonplastic, rapid dilatancy, moderate HCl reaction, trace very fine to medium grained sand, carbonate derived | | SS-4 taken at 14:50 |
| 20 | | | | | | | |

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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

WATER LEVELS : 4.2 ft bgs on 5/30/07 START : 5/23/2007 END : 5/31/2007 LOGGER : T. Stewart, P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 21.7 | 20.0–21.5 | 1.5 | SS-5 | 16-12-14 (26) | **Silty Sand (SM)** 20.0-21.5' - grayish yellow, (5Y 8/4), wet, medium dense, fine to coarse grained, moderate HCl reaction, trace fine gravel-sized, 30-40% nonplastic fines, carbonate derived | | SS-5 taken at 14:56 |
| 25 / 16.7 | 25.0–25.5 | 0.5 | SS-6 | 50/5.5 (50/5.5") | **Silty Sand (SM)** 25.0-25.5' - grayish yellow, (5Y 8/4), wet, very dense, fine to coarse grained, moderate HCl reaction, 15% gravel-sized, 25-30% nonplastic fines, carbonate derived | | SS-6 taken at 15:02 |
| 30 / 11.7 | 30.0–31.5 | 1.2 | SS-7 | 10-6-2 (8) | **Silt (ML)** 30.0-31.15' - light olive brown, (5Y 5/6), wet, loose, fine to medium grained, mild to moderate HCl reaction, 62% nonplastic fines, carbonate derived | | SS-7 taken at 15:10<br>Driller's Remark: Hard at 32.8' |
| 35 / 6.7 | 35.0–35.1 | 0.1 | SS-8 | 50/1.5 (50/1.5") | **Limestone Fragments And Silt** 35.0-35.1' - light olive grey, (5Y 5/2), mild to moderate HCl reaction | | SS-8 taken at 15:22<br>Driller's Remark: Drilled into softer zone after 37.0' |
| 40 | | | | | | | |

| 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 ORIENTATION : Vertical

WATER LEVELS : 4.2 ft bgs on 5/30/07 START : 5/23/2007 END : 5/31/2007 LOGGER : T. Stewart, P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 1.7 | 40.0<br>41.0 | 1.0 | SS-9 | 35-50/5.5 (85/11.5") | **Silt With Sand (ML)**<br>40.0-41.0' - moderate olive brown to light olive brown, (5Y 4/4 to 5Y 5/6), moist to wet, hard, low plasticity, rapid dilatancy, moderate to strong HCl reaction, 25% fine to medium sand-sized, carbonate derived, trace very fine sand-sized black particles | | Drill time from 37.0-40.0' approximately 1-1/2 minutes |
| 45<br>-3.3 | 45.0<br>46.3 | 1.3 | SS-10 | 35-48-50/4 (98/10") | **Silt (ML)**<br>45.0-46.3' - Same as 40.0-41.0' except trace medium sand-sized gray particles | | SS-10 taken at 15:51 |
| 50<br>-8.3 | 50.0<br>51.5 | 1.4 | SS-11 | 34-27-30 (57) | **Silty Sand With Limestone Fragments (SM)**<br>50.0-51.4' - light olive gray, (5Y 5/2), wet, very dense, fine to coarse grained, moderate HCl reaction, 40% of sample is fine to coarse gravel-sized limestone, 30-35% low plastic fines, all carbonate derived | | SS-11 taken at 16:00 |
| 55<br>-13.3 | 55.0<br>55.8 | 0.7 | SS-12 | 39-50/3.5 (89/9.5") | **Silty Sand (SM)**<br>55.0-55.7' - moderate olive brown, (5Y 4/4), wet, dense, fine to coarse grained, moderate HCl reaction, 10% fine gravel-sized limestone, 40% low plastic fines, 5% organics, carbonate derived | | SS-12 taken at 16:10 |
| 60 | | | | | | | |

| 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 ORIENTATION : Vertical

WATER LEVELS : 4.2 ft bgs on 5/30/07 START : 5/23/2007 END : 5/31/2007 LOGGER : T. Stewart, P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -18.3 | ~~60.0~~ | 0.0 | SS-13 | 50/2 (50/2") | **No Recovery 60.0-60.2'** | | Driller's Remark: Will add 60.0' of 4" HW casing before continuing SPTs<br>Last SPT taken on 5/23/07 at 60.0' (SS-13)<br>Deviated hole during 4" HW casing installation |
| | | | | | Begin Rock Coring at 61.0 ft bgs<br>See the next sheet for the rock core log | | |
| 65<br>-23.3 | | | | | | | |
| 70<br>-28.3 | | | | | | | |
| 75<br>-33.3 | | | | | | | |
| 80 | | | | | | | |

| PROJECT NUMBER: | 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 ORIENTATION : Vertical

WATER LEVELS : 4.2 ft bgs on 5/30/07 START : 5/23/2007 END : 5/31/2007 LOGGER : T. Stewart, P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 61.0 | | | | | | |
| | R1-NQ 5 ft 52% | 42 | 1 | 61.5' - Fracture, horizontal, rough, undulating, possible contact between limestone and sand lens | | **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' | 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' |
| | | | 7 | 62.0, 62.4' - Mechanical break (2) | | | P. De Sa'rego begins logging |
| | | | 0 | 62.6-63.0' - Fracture zone | | | Water level: 4.2' below ground surface on 5/30/07 |
| 65 -23.3 | | | NR | | | **No Recovery 63.6-66.0'** | Driller's Remark: Possible sand lense at 61.5-63.0'; driller will advance casing |
| | 66.0 | | | | | | R1: 5 minutes |
| | | | | | | | 11:55 Advancing HW casing to 65.0' |
| | R2-NQ 5 ft 64% | 42 | 1 | 66.6, 67.05, 67.25, 67.95' - Fractures (4), horizontal, smooth to rough, planar to undulating, 1/8" relief | | **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' | |
| | | | 3 | | | | |
| | | | >10 | 68.65' - Fracture, horizontal, rough, undulating, 1/4" relief | | 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" | |
| | | | 1 | 69.05' - Fracture, <10 deg, rough, undulating | | **No Recovery 69.2-71.0'** | |
| 70 -28.3 | | | NR | | | | R2: 6 minutes |
| | 71.0 | | | | | | |
| | R3-NQ 5 ft 48% | 28 | 0 | | | **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 | |
| | | | >10 | 72.0-72.4' - Fracture zone | | | SC-1 collected at 71.0-71.95' |
| | | | >10 | 72.6' - Mechanical break<br>72.9-73.4' - Fracture zone | | | |
| 75 -33.3 | | | NR | | | 71.95-72.4' - Same as 61.0-63.6' except fine grained, very weak (R1), trace voids | R3: 7 minutes |
| | 76.0 | | | | | | |
| | R4-NQ 5 ft 40% | 20 | >10 | 76.0-76.1' - Fracture zone<br>76.1-76.4' - Mechanical break<br>76.4-76.7' - Fracture zone | | 72.4-73.4' - Same as 71.0-71.95' except very weak (R1)<br>**No Recovery 73.4-76.0'**<br>**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 | |
| | | | 2 | 77.25, 77.7' - Fracture or mechanical break, rough, undulating, tight | | | |
| | | | NR | | | | |
| 80 -38.3 | | | | | | | R4: 9 minutes |
| | 81.0 | | | | | | |

| PROJECT NUMBER: | 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 ORIENTATION : Vertical

WATER LEVELS : 4.2 ft bgs on 5/30/07 START : 5/23/2007 END : 5/31/2007 LOGGER : T. Stewart, P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R5-NQ 5 ft 88% | 75 | 2 | 81.7, 82.3, 82.5' - Mechanical break (3) | | **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 | |
| | | | 3 | 82.0' - Fracture, <5 deg, smooth, planar to undulating, tight | | | |
| | | | 1 | 82.95, 83.4' - Fractures (2), <5 deg, smooth, planar to undulating<br>83.5' - Mechanical break | | **No Recovery 78.0-81.0'** | |
| | | | 1 | 84.25' - Fracture, 10-15 deg, smooth, undulating | | **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 cavities up to 1-9/16"x1-3/16", partially infilled with soft black (possible organic) material | |
| 85<br>-43.3 | | | 3 | 85.0, 85.2' - Fractures (2), 10-15 deg, rough, undulating | | | R5: 6 minutes |
| | 86.0 | | NR | | | | |
| | R6-NQ 5 ft 56% | 22 | 1 | 86.3' - Mechanical break<br>86.6' - Mechanical break | | 83.4-85.1' - Same as 81.0-83.4' except weak to medium strong (R2 to R3) | |
| | | | >10 | 87.1- 88.1' - Fracture zone | | | |
| | | | >10 | 88.3-88.6' - Fracture zone | | 85.1-85.4' - Same as 81.0-83.4' | |
| | | | NR | | | **No Recovery 85.4-86.0'** | |
| 90<br>-48.3 | | | | | | **Limestone** 86.0-87.6' - moderate yellowish brown, (10YR 5/4), medium grained, mild HCl reaction, very weak to weak (R1 to R2), 10-15% voids up to 3/16", trace casts/cavities up to 3/8"x3/8" | R6: 9 minutes |
| | 91.0 | | | | | | |
| | R7-NQ 5 ft 70% | 42 | 6 | 91.0-91.4' - Fracture zone<br>91.7-91.75' - Fracture zone | | 87.6-88.8' - Same as 86.0-87.6' except medium strong (R3), trace dark (organic) clasts, 15% casts/cavities up to 3/8"x3/8" | |
| | | | 4 | 92.0' - Fracture, <10 deg, rough, undulating, 1/16" relief | | **No Recovery 88.8-91.0'** | |
| | | | 1 | 92.75' - Fracture or mechanical break, 35-40 deg, rough, undulating, 1/16" relief | | **Limestone** 91.0-91.7' - moderate yellowish brown, (10YR 5/4), fine to medium grained, mild HCl reaction, medium strong (R3), 10-15% surface coverage of voids up to 1-3/16" | |
| | | | 0 | 93.9' - Fracture, horizontal, rough, undulating, 1/8-3/16" relief | | | |
| 95<br>-53.3 | | | NR | 94.2-94.5' - Mechanical break | | 91.7-92.3' - Same as 91.0-91.7' except 30-40% casts/cavities up to 2"x1" | R7: 6 minutes |
| | 96.0 | | | | | 92.3-94.5' - Same as 91.0-91.7' except trace casts/cavities up to 9/16"x3/8", trace dark organic matter, large (2"x1") cavity at 93.8' | |
| | R8-NQ 5 ft 98% | 38 | 2 | 96.4' - sand/limestone contact, horizontal, rough, undulating | | **No Recovery 94.5-96.0'** | |
| | | | >10 | 96.6' - Fracture, horizontal, rough, undulating<br>97.4' - Fracture, horizontal, rough, undulating<br>97.55-97.75' - Fracture zone | | **Silty Sand (SM)** 96.0-96.4' - carbonate derived, 30% nonplastic fines | |
| | | | 4 | 98.1, 98.5' - Fractures (2), horizontal, rough, undulating, 3/16" relief<br>98.6' - Fracture, 30 deg, rough, undulating | | | |
| | | | 3 | 98.9-99.2' - Fracture zone (3 or more), 0-60 deg, rough, undulating | | | |
| 100<br>-58.3 | | | 6 | 99.55, 99.85, 100.25' - Fractures (3), <30 deg, rough, undulating | | | R8: 5 minutes |
| | 101.0 | | | 100.55-100.9' - Fracture zone | | | |

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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 ORIENTATION : Vertical

WATER LEVELS : 4.2 ft bgs on 5/30/07 START : 5/23/2007 END : 5/31/2007 LOGGER : T. Stewart, P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R9-NQ 5 ft 44% | 31 | NR | | | **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'** | |
| | | | >10 | 101.5-102.1' - Fracture zone | | | |
| | | | 4 | 102.5' - Fracture, 0-30 deg, rough, undulating, 1/8" relief | | | |
| | | | >10 | 103.0-103.2' - Fracture zone, <3/16" relief | | | |
| 105 -63.3 | 106.0 | | NR | | | **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" 102.1-103.2' - Same as 101.0-102.1' except very weak (R1) **No Recovery 103.2-106.0'** | R9: 3 minutes Driller's Remark: Fluid loss at 105.0' below ground surface |
| | R10-NQ 5 ft 68% | 46 | >10 | 106.0-106.3' - Fracture zone 106.5, 106.95' - Fractures (2), <10 deg, rough, undulating | | **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' | |
| | | | 1 | 107.7' - Fracture, <10 deg, rough, undulating | | | |
| | | | 2 | 108.0' - Fracture, 30 deg, rough, undulating 108.5' - Fracture or mechanical break, <15 deg, rough, stepped, tight, <1/16" relief | | | |
| | | | 1 | 109.3' - Fracture, horizontal, rough, undulating, 3/16" relief | | **No Recovery 109.4-111.0'** | |
| 110 -68.3 | 111.0 | | NR | | | | R10: 3 minutes |
| | R11-NQ 5 ft 14% | 0 | 3 | 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 |
| | | | NR | | | | |
| 115 -73.3 | 116.0 | | | | | | R11: 3 minutes |
| | R12-NQ 5 ft 56% | 27 | >10 | 116.0-116.2' - Fracture zone 116.5-116.85' - Fracture zone | | **Limestone** 116.0-116.5' - Same as 101.0-102.1' 116.5-118.8' - pale yellowish orange to light gray, (10YR 8/6 to N7), coarse grained, strong HCl reaction, extremely weak to very weak (R0 to R1), trace voids (<3/16"), trace 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'** | Water level: 4.4' below ground surface on 5/31/07 |
| | | | 2 | 117.5' - Fracture, horizontal, rough, planar to stepped, 1/8" relief | | | |
| | | | 4 | 117.6-117.85' - Fracture, 50 deg, rough, undulating, 1/8" relief 118.05' - Fracture, horizontal, rough, undulating, tight, 1/16" relief | | | Driller's Remark: Still no circulation |
| 120 -78.3 | 121.0 | | NR | 118.4-118.8' - Fracture zone | | | R12: 4 minutes |

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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 ORIENTATION : Vertical

WATER LEVELS : 4.2 ft bgs on 5/30/07 START : 5/23/2007 END : 5/31/2007 LOGGER : T. Stewart, P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | 2 | 121.85, 121.9' - Mechanical break (2)<br>121.5-123.0' - Fracture zone | | **Limestone**<br>121.0-121.55' - moderate yellowish brown, (10YR 5/4), medium grained, mild HCl reaction, weak (R2), 10-15% surface coverage of voids up to 1/8", trace casts/cavities up to 1-3/16"x3/8" | SC-2 collected at 121.0-121.9'<br>Driller's Remark: No fluid circulation |
| | | | >10 | | | | |
| | R13-NQ<br>5 ft<br>92% | 36 | 3 | 123.3' - Fracture, horizontal, rough, undulating, 3/16" relief<br>123.95' - Fracture, 20 deg, rough, undulating, 1/8" relief | | 121.55-124.7' - Same as 121.0-121.55' except 10-20% surface coverage of casts/cavities up to 1-3/16"x3/8", with trace carbonate infill/recrystallization | |
| | | | 3 | | | | |
| 125<br>-83.3 | | | 2 | 124.35' - Fracture, <10 deg, rough, undulating<br>124.45-124.7' - Fracture, 60 deg, rough, undulating | | 124.7-125.6' - Same as 121.0-121.55'<br>**No Recovery 125.6-126.0'** | R13: 5 minutes |
| | 126.0 | | NR | | | | |
| | | | 0 | 124.85' - Fracture, 60 deg, rough, undulating, 3/16" relief<br>124.85-125.2' - Mechanical break, 60 deg<br>125.25' - Mechanical break | | **Limestone**<br>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 to 9/16"x9/16"<br>**No Recovery 126.1-131.0'** | Driller's Remark: No fluid circulation |
| | R14-NQ<br>5 ft<br>2% | 0 | NR | | | | |
| 130<br>-88.3 | | | | | | | R14: 3 minutes |
| | 131.0 | | | | | | |
| | | | 8 | 131.1, 131.2, 131.25, 131.45, 131.6' - Fractures (5), horizontal, smooth to rough, planar | | **Limestone**<br>131.0-133.9' - Same as 121.0-121.55' except coarse grained, 50-60% surface coverage of voids up to 3/16" at 132.1-132.3', and medium gray (N5) mottling at 133.2-133.9' | |
| | | | 5 | 131.7, 131.75, 131.95' - Fractures (3), <5 deg, rough, undulating | | | Driller's Remark: No fluid circulation |
| | R15-NQ<br>5 ft<br>58% | 7 | 4 | 132.1, 132.2, 132.25, 132.55, 132.95' - Fractures (5), <10 deg, rough, undulating<br>133.2, 133.4, 133.6, 133.65' - Fractures (4), <10 deg, rough, undulating | | **No Recovery 133.9-136.0'** | |
| 135<br>-93.3 | | | NR | | | | R15: 4 minutes |
| | 136.0 | | | | | | |
| | | | 4 | 136.1, 136.9' - Fractures (2), <5 deg, rough, undulating, 1/8" relief<br>136.75, 137.5' - Fractures (2), 15-20 deg, rough, undulating, 3/8" relief | | **Limestone**<br>136.0-136.9' - Same as 121.0-121.55'<br>136.9-140.1' - medium light gray and very pale orange, (N6 and 10YR 8/2), fine grained, mild to moderate HCl reaction, medium strong to strong (R3 to R4), trace voids up to 3/16", 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' | |
| | | | >10 | 137.25- 137.5' - Fracture zone, <10 deg, rough, undulating, 4 fractures | | | Driller's Remark: No fluid circulation |
| | R16-NQ<br>5 ft<br>82% | 28 | 3 | 137.6-138.15' - Fracture zone | | | SC-3 collected at 138.15-139.05' |
| | | | 5 | 139.05, 139.1, 139.4, 139.7, 139.9' - Fractures (5), <10 deg, rough, undulating, <1/16" relief, black stains on 80% of surface | | | |
| 140<br>-98.3 | | | 0 | | | **No Recovery 140.1-141.0'** | R16: 14 minutes |
| | 141.0 | | NR | | | | |

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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 ORIENTATION : Vertical

WATER LEVELS : 4.2 ft bgs on 5/30/07 START : 5/23/2007 END : 5/31/2007 LOGGER : T. Stewart, P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R17-NQ 5 ft 40% | 33 | 2 | 141.1' - Fracture, horizontal, rough, undulating, 3/8" relief | | **Limestone** 141.0-141.9' - grayish orange to pale yellowish brown, (10YR 7/4 to 10YR 6/2), fine grained, mild HCl reaction, medium strong (R3), trace (<5%) surface coverage of voids up to 1/16", trace cavities up to 9/16"x3/8" | |
| | | | 1 | 141.85' - Fracture, 15 deg, rough, undulating, 1/8" relief<br>142.05' - Fracture, horizontal, rough, undulating | | | |
| | | | NR | | | 141.9-142.05' - Same as 121.0-121.55'<br>142.05-142.8' - Same as 141.0-141.9'<br>142.8-143.0' - moderate yellowish brown, (10YR 5/4), medium grained, mild HCl reaction, weak (R2), 60-70% surface coverage of voids up to 3/16", 10-15% casts/cavities up to 3/4"x3/8" | Driller's Remark: Very soft at 143.3-145.0'<br>R17: 7 minutes |
| 145<br>-103.3 | | | | | | | |
| 146.0 | | | | | | **No Recovery 143.0-146.0'** | |
| | R18-NQ 5 ft 64% | 42 | 2 | 146.35, 146.55' - Fractures (2), horizontal, rough, planar | | **Limestone** 146.0-146.55' - Same as 142.8-143.0' | |
| | | | 3 | 147.05, 147.25' - Fractures (2), <15 deg, rough, undulating, tight<br>147.75' - Fracture, <15 deg, rough, undulating, tight | | 146.55-148.5' - Same as 141.0-141.9'<br>148.5-149.2' - Same as 142.8-143.0' | SC-4 collected at 147.75-148.60' |
| | | | 3 | 148.65-149.05' - Fracture zone | | | |
| | | | 1 | 148.65' - Fracture, <15 deg, rough, undulating, tight | | **No Recovery 149.2-151.0'** | |
| 150<br>-108.3 | | | NR | | | | R18: 7 minutes |
| 151.0 | | | | | | Bottom of Boring at 151.0 ft bgs on 5/31/2007 | 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 |

# SOIL BORING 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

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 bgs on 5/03/07 START : 5/2/2007 END : 5/6/2007 LOGGER : D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.2 | 0.0 – 1.5 | 1.4 | SS-1 | 2-4-4 (8) | **Poorly Graded Sand With Silt (SP-SM)** 0.0-0.45" - dark gray, (N3), moist, loose, fine grained, no HCl reaction, silica sand to 1/32", 15% fines, predominately organics, roots | | |
| | 1.5 – 5.0 | | | | **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 | | |
| 5 37.2 | 5.0 – 6.5 | 0.4 | SS-2 | 2-5-3 (8) | **Silty Sand (SM)** 5.0-5.9' - light brownish gray with medium gray mottling, (5YR 6/1 with N4), wet, loose, very fine grained, medium to high plasticity, no HCl reaction, silica sand to <1/32", 30-40% fines, trace roots | | Water level 2.4' below ground surface on 5/03/07 |
| 10 32.2 | 10.0 – 11.5 | 1.2 | SS-3 | 1-6-6 (12) | **Silt (ML)** 10.0-11.2' - yellowish gray, (5Y 7/2), wet, medium stiff, nonplastic, very rapid dilatancy, moderate to strong HCl reaction, trace very fine sand-sized, carbonate | | |
| 15 27.2 | 15.0 – 16.5 | 1.5 | SS-4 | 0-21-35 (56) | **Sandy Silt (ML)** 15.0-16.5' - yellowish gray, (5Y 5/2), wet, hard, medium dense, nonplastic, very rapid dilatancy, moderate HCl reaction, 25-30% fine to coarse sand-sized, 2-3 limestone lenses to 1" thick, carbonate derived | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-30 SHEET 2 OF 9 |

# SOIL BORING 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

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 bgs on 5/03/07 START : 5/2/2007 END : 5/6/2007 LOGGER : D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.2 | 20.0 – 21.5 | 0.4 | SS-5 | 6-6-6 (12) | **Silty Sand With Limestone Fragments (SM)** 20.0-20.9' - light olive gray, (5Y 5/2), wet, medium dense, fine to coarse grained, moderate HCl reaction, 35% fine to coarse gravel-sized limestone fragments, 30% plastic fines, all carbonate | | |
| 25 | 25.0 | | | | | | |
| 17.2 | 25.0 – 26.5 | 0.6 | SS-6 | 4-2-8 (10) | **Sandy Silt (ML)** 25.0-25.6' - dusky yellow, (5Y 6/4), wet, stiff, medium dense, fine to medium grained, low plasticity, rapid dilatancy, moderate to strong HCl reaction, 35-40% fine to medium sand, 10-15% fine gravel-sized limestone fragments, all carbonate | | |
| 30 | 30.0 | | | | | | |
| 12.2 | 30.0 – 31.5 | 0.9 | SS-7 | 12-8-15 (23) | **Sandy Silt With Limestone Fragments (SM)** 30.0-30.85' - Same as 25.0-25.6' except very stiff, 15% fine to coarse gravel-sized limestone fragments | | |
| 35 | 35.0 | | | | | | |
| 7.2 | 35.0 – 35.2 | 0.2 | SS-8 | 50/2 (50/2") | **Limestone Fragments** 35.0-35.2' - light olive gray, (5Y 5/2), mild to moderate HCl reaction, very poor recovery, two limestone fragments, to 1/2" | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-30 SHEET 3 OF 9 |

# SOIL BORING 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

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 bgs on 5/03/07 START : 5/2/2007 END : 5/6/2007 LOGGER : D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: 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 -2.8 | 45.0 45.2 | 0.2 | SS-10 | 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<br>Begin Rock Coring at 45.0 ft bgs<br>See the next sheet for the rock core log | | |
| 50 -7.8 | | | | | | | |
| 55 -12.8 | | | | | | | |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-30 SHEET 4 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 ORIENTATION : Vertical

WATER LEVELS : 2.4 ft bgs on 5/03/07 START : 5/2/2007 END : 5/6/2007 LOGGER : D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -2.8 | 45.0 | | | | | | Begin rock coring at 45' |
| | R1-NQ 5 ft 70% | 33 | 1 | 45.0-45.5' - Fracture, 85 deg, rough, undulating | | **Limestone** 45.0-48.5' - moderate olive brown, (5Y 4/4), mild to moderate HCl reaction, extremely weak to very weak (R0 to R1), very fine to medium grained voids to 1/16", 25-30% casts/molds up to 3/8" over 5-10% of surface, trace black (N1) carbonaceous inclusions | |
| | | | >10 | 46.6' - Fracture, horizontal, rough, undulating, open | | | |
| | | | 3 | 46.7-46.9' - Fracture zone, <5-90 deg, rough, undulating, open | | | |
| | | | 2 | 47.1' - Fracture, horizontal, rough, undulating, open | | | |
| | | | NR | 47.5' - Fracture, 15-25 deg, rough, undulating, tight<br>47.8-48.4' - Fracture, 85-90 deg, rough, undulating, tight | | **No Recovery 48.5-50.0'** | R1: 4 minutes |
| 50 | 50.0 | | | | | | |
| -7.8 | R2-NQ 5 ft 90% | 23 | >10 | 48.1' - Fracture, horizontal, rough, stepped, tight<br>48.4' - Fracture, 10 deg, rough, undulating, tight | | **Limestone** 50.0-51.4' - moderate olive brown, (5Y 4/4), moderate HCl reaction, weak to medium strong (R2 to R3), very fine to fine grained, carbonate, voids to 1/16" over 20-25%, cavities to 3/8" over <5%, sparsely fossiliferous<br>51.4-54.5' - moderate olive brown, (5Y 4/4), fine to medium grained, moderate HCl reaction, extremely weak to very weak (R0 to R1), friable, becoming very weak (R1) at 54.0' and below, black carbonaceous/organic lenses/laminae (1/16") very abundant at 53.5', voids (<1/16") over 20-25%, cavities (<3/8") over 5% of surface, poorly fossiliferous | |
| | | | 3 | 50.0-50.2' - Fracture zone, angular gravel-sized limestone fragments | | | |
| | | | 3 | 50.55-50.8' - Fracture, 45 deg, rough, undulating, tight<br>51.0-51.35' - Fracture, 80-85 deg, rough, undulating, open | | | |
| | | | >10 | 51.7' - Fracture, horizontal, rough, undulating, open | | | |
| | | | 1 | 51.9-52.1' - Fracture, 70-75 deg, rough, undulating, open | | | R2: 6 minutes |
| 55 | 55.0 | | NR | 52.3' - Fracture, 20 deg, rough, undulating, semi-tight | | | |
| -12.8 | R3-NQ 5 ft 54% | 17 | 4 | 52.6, 52.8, 53.1, 53.3,' - Fractures (4), horizontal, rough, undulating, semi-tight<br>53.4-53.8' - Fracture zone, horizontal | | **No Recovery 54.5-55.0'**<br>**Limestone** 55.0-56.8' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, weak (R2), low density, thin black carbonaceous laminae at 55.0-55.2' with discontinuous carbonaceous laminae below, voids (generally <1/16") over 15-20% of surface, some cavities (<1/16"), fossil mold/casts sparse | |
| | | | 3 | 54.0' - Fracture, 50 deg, rough, undulating, open | | | |
| | | | 4 | 55.25' - Fracture, <5-70 deg, rough, stepped, open | | | |
| | | | NR | 55.42' - Fracture, <5 deg, rough, stepped, open, black carbonaceous stain over 30% of surface<br>55.54' - Fracture, 10 deg, smooth, planar to stepped, open, black carbonaceous film over 20%<br>55.68' - Fracture, <5 deg, rough, stepped, open, black carbonaceous film over 5% | | | R3: 9 minutes<br>Hit pocket at 60' |
| 60 | 60.0 | | | | | | |
| -17.8 | R4-NQ 5 ft 9% | 0 | 1 | 56.0' - Fracture, <5 deg, rough, undulating, tight | | 56.8-57.7' - yellowish gray, (5Y 7/2), dense, mild HCl reaction, medium strong (R3), voids (1/16" or less) unevenly distributed across 10-15% of rock surface, cavities rare, fossil molds/casts sparse<br>**No Recovery 57.7-60.0'**<br>**Limestone** 60.0-60.45' - yellowish gray, (5Y 7/2), dense, mild to moderate HCl reaction, medium strong to strong (R3 to R4), black, thin, carbonaceous laminae common, voids/cavities <1% surface, fossil molds/casts sparse to absent | Losing sample core kicked over sideways, no way of knowing orientation of core Rock re-ordered rock into more logical sequence during field review |
| | | | NR | 56.52' - Fracture, horizontal, rough, planar, tight<br>56.82' - Fracture, 0-60 deg, rough, stepped, open<br>57.25' - Fracture, <5 deg, smooth, undulating, open<br>57.35' - Fracture, <5 deg, smooth, planar, open, carbonaceous staining/film over 10%<br>57.5-57.6' - Fracture zone, gravel-sized rock fragments, rounded to angular<br>60.25' - Fracture, horizontal, smooth, undulating, tight, black carbonaceous film covering 20% of rock surface | | | No recovery due to blocked core barrel<br>R4: 16 minutes |
| 65 | 65.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-30 SHEET 5 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 ORIENTATION : Vertical

WATER LEVELS : 2.4 ft bgs on 5/03/07 START : 5/2/2007 END : 5/6/2007 LOGGER : D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -22.8 | R5-NQ 5 ft 96% | 13 | 2 | 65.1' - Fracture, horizontal, rough, undulating, open | | **No Recovery 60.45-65.0'** **Limestone** 65.0-68.8' - light olive gray, (5Y 5/2), very fine to fine grained, mild HCl reaction, extremely weak (R0), friable, nonplastic silt along fractures, voids to 1/16" over 10%, casts/molds up to 3/8" over <5% of surface | |
| | | | 4 | 65.9, 66.1, 66.2' - Mechanical break (3) | | | |
| | | | 3 | 66.5' - Fracture, 5-10 deg, smooth, undulating, tight<br>66.7' - Fracture, 10 deg, rough, undulating, tight | | | |
| | | | 3 | 67.1' - Fracture, horizontal, rough, undulating, open<br>67.3' - Fracture, 45-50 deg, smooth, stepped, open | | | |
| | | | 1 | 67.6' - Fracture, 45 deg, rough, undulating to stepped, open | | 68.8-69.8' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, very weak to weak (R1 to R2), voids to 1/16", molds/casts to 3/8", on 5-10% of surface, occasional carbonaceous laminae on 1-3% of surface | R5: 10 minutes |
| 70 | 70.0 | | NR | 68.3' - Fracture, 0-5 deg, rough, undulating, open | | | |
| -27.8 | R6-NQ 5 ft 94% | 53 | 2 | 68.4' - Fracture, 0-5 deg, rough, undulating, open | | **No Recovery 69.8-70.0'** **Limestone** 70.0-70.7' - moderate olive brown, (5Y 4/4), fine to medium grained, moderate to strong HCl reaction, medium strong (R3), voids to 1/16"on 35-40% of surface, casts/molds to 3/8" over 5%, fossiliferous (molds/casts) | |
| | | | 0 | 68.8' - Fracture, 0-5 deg, rough, undulating, tight | | | |
| | | | 3 | 69.5' - Fracture, horizontal, rough, undulating, open<br>70.7' - Fracture, 0-5 deg, rough, undulating, open | | | |
| | | | >10 | 70.75' - Fracture, horizontal, rough, undulating, open | | | |
| | | | 2 | 72.2' - Fracture, 10 deg, rough, stepped, open | | 70.7-73.6' - light olive gray, (5Y 5/2), moderate to strong HCl reaction, medium strong (R3), voids to 1/16" over 3-5% of surface, sparsely distributed throughout interval and concentrated in possible cavity infillings, fossils rare to absent, casts/molds to 3" on 10% of surface, silty sand along fractures | R6: 10 minutes |
| 75 | 75.0 | | NR | 72.6-72.8' - Fracture, 60-65 deg, rough, undulating, open | | | |
| -32.8 | R7-NQ 5 ft 94% | 48 | 3 | 72.8-73.6' - Fracture, 85-90 deg, rough, undulating, tight | | | |
| | | | 0 | 73.6-73.9' - Fracture zone, 0-90 deg, rough, stepped to undulating, open<br>74.2, 74.3' - Fractures (2), horizontal, smooth, planar, open | | | SC-1 collected at 75.8-76.7' |
| | | | >10 | 75.1' - Fracture, 0-10 deg, rough, stepped, open<br>75.2-75.3, 75.4-75.5' - Fractures (4), 30 deg, rough, undulating, tight | | 73.6-74.3' - Same as 70.7-73.6' except yellowish gray, (5Y 7/2), extremely weak (R0), becoming coarser grained, with very soft clay along fractures, friable, sandy texture | |
| | | | 0 | 77.2' - Fracture, 0-5 deg, smooth, stepped, open | | 74.3-74.7' - Same as 70.7-73.6 except yellowish gray, (5Y 7/2) | |
| | | | 3 | 77.4' - Fracture, 0-15 deg, smooth, stepped, open | | **No Recovery 74.7-75.0'** **Limestone** | R7: 9 minutes |
| 80 | 80.0 | | NR | 77.5-78.0' - Fracture zone, 0-70 deg, rough, stepped to undulating, open, gravel sized limestone rock fragments | | | |
| -37.8 | R8-NQ 5 ft 58% | 30 | >10 | 78.6-78.7' - Mechanical break | | 75.0-77.2' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl reaction, very weak to weak (R1 to R2), voids to 1/4" over 3-5%, cavities to 3/8" over <1% of surface, poorly fossiliferous | |
| | | | 1 | 79.0-79.3' - Fracture, 50-60 deg, rough, undulating, tight<br>79.45' - Fracture, horizontal, rough, undulating, tight | | | |
| | | | 3 | 79.6' - Fracture, 50 deg, rough, stepped, open | | 77.2-77.7' - yellowish gray, (5Y 7/2), mild to moderate HCl reaction, extremely weak (R0), nonfossiliferous, very thin discontinuous black carbonaceous laminae, rounded to subrounded clast-like inclusions (3/8"-3/4") of moderate olive brown (5Y 4/4), extremely weak (R0) limestone | |
| | | | NR | 80.0-80.2' - Fracture zone, gravel-sized limestone rock fragments<br>80.35-80.5' - Fracture, 70-80 deg, rough, undulating, open<br>80.5-80.7' - Fracture zone, rough, planar to stepped, horizontal to high angle, open | | | R8: 7 minutes |
| 85 | 85.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-30 SHEET 6 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 ORIENTATION : Vertical

WATER LEVELS : 2.4 ft bgs on 5/03/07 START : 5/2/2007 END : 5/6/2007 LOGGER : D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -42.8 | R9-NQ 5 ft 88% | 37 | 2<br>>10<br>1<br>0<br>NR | 81.3-81.6' - Fracture, 30-80 deg, rough, undulating, orientation angle increasing with depth<br>82.0' - Fracture, horizontal, rough, undulating, tight<br>82.35-82.5' - Fracture, 20-30 deg, rough, undulating, tight<br>82.8' - Fracture, 0-5 deg, rough, undulating, open<br>85.1' - Fracture, 0-10 deg, rough, undulating, open<br>85.35-85.4' - Fracture, 5-10 deg, rough, undulating, open<br>86.1' - Fracture, horizontal, rough, undulating, tight<br>86.5-87.2' - Fracture zone<br>87.5' - Fracture, 5 deg, rough, undulating, open | | **Limestone**<br>77.7-79.7' - yellowish gray, (5Y 7/2), very fine grained, moderate to strong HCl reaction, medium strong (R3), voids to 1/16" on 20-25%, cavities to 3/4" on 1-2%, occasional hair-line incipient fracture traces<br>**No Recovery 79.7-80.0'**<br>**Limestone**<br>80.0-82.9' - light olive gray, (5Y 5/2), fine grained, mild HCl reaction, medium strong (R3), voids to 1/16" on 20-25%, cavities 1-3/16"-3/4"except at 80.9-81.0', larger cavities 1-3/16x1-3/16x3/8" on >5% , trace fossil molds/casts<br>**No Recovery 82.9-85.0'**<br>**Limestone**<br>85.0-86.6' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids to 1/16" on 15-18%, cavities to 3/4" on <5%, fossiliferous (molds and casts)<br>86.6-88.1' - pale olive brown, (5Y 5/6), fine grained, weak to medium strong (R2 to R3), void spaces over 25% of surface, solution cavities over 15-20%, trace organics, iron oxide patina on some cavities, fossiliferous (molds/casts)<br>**No Recovery 88.1-103.0'** | Driller's Remark: (87.0-90.0') open hole in rock, rods dropped one more foot when released<br>87-88' void<br>88-89.5' solid<br>89.5-91' void<br>Driller's Remark: Lost circulation at 87.0'<br>R9: 9 minutes |
| 90 | 90.0 | | | | | | |
| -47.8 | R10-NQ 5 ft 0% | 0 | NR | | | | Driller's Remark: 91.0-95.0' open, minimal resistance as sporadic stringers of rock, or small breccia clasts, yield rig chatter<br>R10: 2 minutes |
| 95 | 95.0 | | | | | | |
| -52.8 | R11-NQ 5 ft 0% | 0 | NR | | | | Driller's Remark: 95.0-103.0', rods were apparently sitting on a small piece of rock; when connection was made the rods free fell to 103.0' with no recovery<br>R11: Run time not recorded |
| 100 | 100.0 | | | | | | |
| -57.8 | R12-NQ 5 ft 14% | 0 | NR<br>0<br>NR | | | | Actual recovery was from 103.0-103.7'<br>R12: 3 minutes |
| 105 | 105.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-30 SHEET 7 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 ORIENTATION : Vertical

WATER LEVELS : 2.4 ft bgs on 5/03/07 START : 5/2/2007 END : 5/6/2007 LOGGER : D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -62.8 | R13-NQ 5 ft 64% | 27 | 0 | 105.1' - Fracture, horizontal, rough, undulating, open | | **Limestone** 103.0-103.7' - yellowish gray, (5Y 7/2)), strong HCl reaction, extremely weak to very weak (R0 to R1), medium grained, sandy texture, voids (<1/16") over 1-2% of surface, fossils absent | |
| | | | 0 | 105.25' - Fracture, 0-5 deg, rough, undulating, open<br>105.5' - Fracture, horizontal, rough, undulating, open | | | SC-2 collected at 105.9-107.2' |
| | | | 5 | 105.6-105.8' - Fracture zone<br>107.05' - Fracture, 5 deg, rough, undulating, tight | | **No Recovery 103.7-105.0'**<br>**Limestone** 105.0-105.6' - Same as 103.0-103.7' 105.6-108.2' - light olive gray to pale yellowish brown, (5Y 5/2 to 10YR 6/2), mild to moderate HCl reaction, weak (R2), voids (<1/16") over 5% of surface, cavities (3/8" to 3/16") <1%, trace fossil molds/casts | |
| | | | 1 | 107.4' - Fracture, 40 deg, rough, undulating, open | | | |
| | | | NR | 107.5' - Fracture, 0-5 deg, rough, undulating, open<br>107.7' - Fracture, 0-2 deg, rough, undulating, open | | | R13: 12 minutes |
| 110 | 110.0 | | | | | | |
| -67.8 | R14-NQ 5 ft 0% | 0 | NR | 108.0' - Fracture, 0-2 deg, rough, undulating, open | | **No Recovery 108.2-120.0'** | Water level 1.9' below ground surface 5/5/07 |
| | | | | | | | R14: 4 minutes |
| 115 | 115.0 | | | | | | |
| -72.8 | R15-NQ 5 ft 0% | 0 | NR | | | | No recovery, pulled cutter casing and found core fragment which may have been blocking inner core barrel; problem may be due to inner barrel not locking properly<br>Solution: Lift outer barrel off bottom of hole before locking in inner barrel |
| | | | | | | | R15: 5 minutes |
| 120 | 120.0 | | | | | | |
| -77.8 | R16-NQ 5 ft 20% | 0 | >10 | 120.2' - Fracture, 0-80 deg, smooth, stepped, open | | **Limestone** 120.0-120.5' - light olive gray, (5Y 5/2), very fine to fine grained, moderate HCl reaction, medium strong to strong (R3 to R4), voids to 1/16" over <5% of surface, casts to 3/16" over <5%, fossils absent 120.5-121.0' - yellowish gray, (5Y 7/2), medium grained, strong HCl reaction, extremely weak to very weak (R0 to R1), sandy texture, very similar to 103.0-103.7' | |
| | | | NR | 120.3' - Fracture, horizontal, rough, stepped, open<br>120.3-120.5' - Fracture zone, angular to subrounded gravel-sized rock fragments<br>120.5-120.75' - Fracture zone, 80 deg, rough, undulating, tight, fracture plane bounded on either end by horizontal, stepped to undulating, rough, open bedding planes<br>120.75-121.0' - Fracture zone, subrounded gravel-sized rock fragments | | **No Recovery 121.0-125.0'** | R16: 4 minutes |
| 125 | 125.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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 ORIENTATION : Vertical

WATER LEVELS : 2.4 ft bgs on 5/03/07 START : 5/2/2007 END : 5/6/2007 LOGGER : D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -82.8 | R17-NQ 5 ft 58% | 42 | 2 | 125.25' - Fracture, 0-5 deg, rough, stepped, tight | | **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'** | Water level 2' below ground surface on 5/6/07 |
| | | | 3 | 125.6' - Fracture, 0-5 deg, rough, undulating, open | | | |
| | | | 3 | 126.3' - Fracture, horizontal, rough, undulating, open | | | |
| | | | NR | 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 | | | R17: 6 minutes |
| | | | | 127.75-127.9' - Fracture, 45-50 deg, rough, undulating, semi tight | | | |
| 130 | 130.0 | | | | | | |
| -87.8 | R18-NQ 5 ft 84% | 45 | 4 | 130.1' - Fracture, 10-15 deg, rough, undulating, open | | **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" <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 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 (<1/16") 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 carbonaceous laminae seen at 133.0-134.2' **No Recovery 134.2-135.0'** | |
| | | | 2 | 130.2' - Fracture, 5-10 deg, rough, undulating, open | | | |
| | | | 3 | 130.4-130.5' - Fracture, 30-35 deg, rough, undulating, open | | | |
| | | | 4 | 130.8' - Fracture, 0-5 deg, rough, undulating, open | | | SC-3 collected at 132.7-133.5' |
| | | | | 131.2' - Fracture, 5-10 deg, rough, undulating, open | | | |
| | | | 3 | 131.5' - Fracture, 0-5 deg, smooth, undulating, semi tight | | | R18: 5 minutes |
| | | | | 131.9' - Fracture, horizontal, smooth, stepped | | | |
| | | | NR | 132.1' - Fracture, horizontal, rough, planar, open | | | |
| 135 | 135.0 | | | | | | |
| -92.8 | R19-NQ 5 ft 76% | 22 | 3 | 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 | | | |
| | | | 3 | 132.7' - Mechanical break | | | |
| | | | | 133.5' - Fracture, 10 deg, rough, undulating, tight | | | |
| | | | 3 | 133.6-133.75' - Fracture zone, 0-50 deg, smooth to rough, planar to stepped | | | |
| | | | 5 | 133.75' - Fracture, 0-5 deg, rough, undulating, open | | | |
| | | | | 135.1' - Fracture, 0-60 deg, rough, stepped, open | | | R19: 16 minutes |
| | | | NR | 135.4' - Fracture, 10 deg, smooth, stepped, open | | | |
| 140 | 140.0 | | | | | | |
| -97.8 | R20-NQ 5 ft 58% | 20 | 4 | 135.9' - Fracture, 5 deg, smooth, stepped, tight | | | |
| | | | | 136.3-136.7' - Fracture, 70-75 deg, rough, undulating, tight | | | |
| | | | 4 | 136.4' - Fracture, 5-10 deg, rough, undulating, tight | | | |
| | | | >10 | 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 | | | |
| | | | NR | 137.4-137.55' - Fracture, 60 deg, rough, undulating, open | | | R20: 11 minutes |
| 145 | 145.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-30 SHEET 9 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 ORIENTATION : Vertical

WATER LEVELS : 2.4 ft bgs on 5/03/07 START : 5/2/2007 END : 5/6/2007 LOGGER : D. Roraback

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -102.8 | R21-NQ 5 ft 92% | 57 | 2 | 137.7' - Fracture, horizontal, rough, undulating, open<br>138.0' - Fracture, horizontal, smooth, undulating, open | | **Limestone**<br>135.0-138.2' - variegated dusky yellow to grayish yellow to light gray to medium gray, (5Y 6/4 to 5Y 8/4 to N7 to N5), very fine grained, strong HCl reaction, medium strong to strong (R3 to R4), voids (<1/16") over 5% of rock surface, cavities up to 3-1/8" in length near bottom of section, some lined with black amorphous coating (possibly hematite), large (5") cavity at 135.5-135.8', poorly fossiliferous (mold and casts) | SC-4 collected at 146.7-147.3' |
| | | | 0 | 138.2' - Fracture, horizontal, smooth, undulating, tight | | | |
| | | | 4 | 138.3' - Fracture, 5 deg, smooth, undulating, tight<br>138.75' - Fracture, horizontal, smooth, planar, tight | | | |
| | | | 3 | 138.8' - Fracture, horizontal, smooth, planar, tight | | | |
| | | | 2 | 140.1' - Fracture, 5-10 deg, smooth, planar, tight | | | R21: 11 minutes |
| 150 | 150.0 | | NR | 140.3-140.5' - Fracture, 45-50 deg, smooth, planar, tight | | **Limestone**<br>138.2-138.8' - yellowish gray to dusky yellow to olive gray, (5Y 7/2 to 5Y 6/4 to 5Y 3/2), fine grained, strong HCl reaction, weak to medium strong (R2 to R3), laminated, voids rare to absent, rare cavities (<1/16-1/8" diameter)<br>**No Recovery 138.8-140.0'**<br>**Limestone**<br>140.0-141.9' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), very fine to fine grained, strong HCl reaction, very weak to medium strong (R1 to R3), voids to 1/16' over <1% of rock surface, cavities (3/8"x1/8"x3/16") rare<br>141.9-142.9' - moderate olive brown, (5Y 4/4), fine grained, moderate HCl reaction, weak to very weak (R2 to R1), voids to 1/16" over 35-40%, cavities to 3/4" over <5%, some fossils (molds/casts)<br>**No Recovery 142.9-145.0'**<br>**Limestone**<br>145.0-145.1' - moderate yellowish brown, (10YR 5/4), fine grained, strong HCl reaction, extremely weak (R0), friable<br>145.1-147.9' - Same as 140.0-141.9'<br>147.9-149.2' - variegated very light gray to yellowish gray, (N8 to 5Y 7/2), strong HCl reaction, extremely weak to very weak (R0 to R1), very thinly laminated with possibly carbonaceous or clayey material from 147.9-148.35', voids (<1/16") over 2-3% rock, cavities rare to absent, trace fossil echinoderms<br>149.2-149.6' - dusky yellow, (5Y 6/4), mild HCl reaction, medium strong (R3), voids (<1/16") over 1-2%, cavities (1/16-1/8") rare, fossils rare to absent<br>**No Recovery 149.6-150.0'** | Bottom of boring at 150.0' below ground surface |
| -107.8 | | | | 140.55, 140.65' - Fractures (2), horizontal, rough, planar, open<br>141.2' - Fracture, 5-10 deg, rough, undulating, tight<br>141.3' - Fracture, 0-5 deg, rough, stepped, open<br>141.8' - Fracture, horizontal, rough, undulating, open<br>141.9-142.2' - Fracture zone, angular to subangular rock fragments<br>142.4, 142.6' - Fractures (2), horizontal, rough, undulating, open<br>142.7' - Fracture, horizontal, rough, undulating, tight<br>145.1' - Fracture, horizontal, rough, undulating, open<br>145.9-146.1' - Fracture, 60 deg, rough, undulating, tight<br>147.3' - Fracture, horizontal, rough, undulating, semi tight<br>147.7' - Fracture, 0-5 deg, rough, undulating, tight<br>147.8' - Fracture, horizontal, rough, undulating, open<br>147.9-147.8' - Fracture zone, horizontal, rough, undulating<br>148.1' - Fracture, horizontal, rough, stepped, open<br>148.2, 148.9, 149.27, 149.3' - Fractures (4), horizontal, rough, undulating, open<br>149.4' - Fracture, horizontal, smooth, planar, open | | Bottom of Boring at 150.0 ft bgs on 5/6/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-30A SHEET 1 OF 6 |

# SOIL BORING 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

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 bgs on 6/12/07 START : 6/12/2007 END : 6/13/2007 LOGGER : D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.5 | | | | | See B-30 for shallow soils; no logging/coring until 25.0' | | 0.0-10.0': Drilled with 5-7/8" tricone bit with no sampling or coring (EZ Mud) |
| 5 / 37.5 | | | | | | | Driller's Remark: Encountered water at 6.0' |
| 10 / 32.5 | | | | | | | Driller's Remark: Hole has deviated at 10.0'<br>10.0-25.0': 5" (PW) surface casing installed with rock devil bit and cleaned out with 3-7/8" tricone bit<br>10.0-15.0': 30 minutes to drill |
| 15 / 27.5 | | | | | | | 15.0-20.0': 14 minutes to drill |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | B-30A SHEET 2 OF 6 |

# SOIL BORING 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

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 bgs on 6/12/07 START : 6/12/2007 END : 6/13/2007 LOGGER : D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.5 | | | | | | | 20.0-25.0': 4 minutes to drill |
| 25 / 17.5 | 25.0 – 26.5 | 1.2 | SS-1 | 9-19-22 (41) | **Sandy Silt (ML)** 25.0-26.2' - grayish orange, (10YR 7/4), moist, hard, very fine to coarse grained, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 35% very fine to coarse sand-sized, 10% fine gravel-sized, all carbonate | | |
| 30 / 12.5 | 30.0 – 31.5 | 1.0 | SS-2 | 22-16-27 (43) | **Sandy Silt (ML)** 30.0-31.0' - Same as 25.0-26.2' | | |
| | | | | | | | Driller's Remark: Firm drilling, no chatter |
| | | | | | | | Driller's Remark: Easier drilling, no chatter |
| | | | | | | | Driller's Remark: Trip out to begin HQ rock coring |
| | | | | | Begin Rock Coring at 34.0 ft bgs<br>See the next sheet for the rock core log | | |
| 35 / 7.5 | | | | | | | |
| 40 | | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: 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

CORING METHOD AND EQUIPMENT : CME 75 S/N 252437, mud rotary, HQ tools, PW casing ORIENTATION : Vertical

WATER LEVELS : 6.0 ft bgs on 6/12/07 START : 6/12/2007 END : 6/13/2007 LOGGER : D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 34.0 | | 1 | 34.05' - Fracture, <5 deg, rough, undulating, tight | | **Limestone** | Rock coring begins at 34' |
| 35 7.5 | R1-HQ 3.5 ft 100% | 90 | 0 | 34.1-34.3' - Fracture, sandy silt | | 34.0-37.5' - moderate yellowish brown, with lineations of gray to dark yellowish brown, (10YR 5/4, 10YR 4/2), fine grained, mild HCl reaction, weak (R2), 1/16-1/8" pebbles in matrix where gray, 20% 1/16" voids, crumbles to silt to sand-sized particles from 34.1-34.3', cavities up to 3/4" from 35.9-37.5' | |
| | | | 0 | | | | |
| | | | 1 | 36.5' - Fracture, 0-20 deg, rough, undulating | | | R1: 13 minutes |
| | 37.5 | | | | | | |
| | | | 0 | | | 37.5-40.8' - Same as 34.0-37.5' except dark yellowish brown, (10YR 4/2), 30% voids up to 1/16" and 2" x 1" cavities at 37.7', extremely weak (R0) at 38.5-39.3', voids up to 3/16" from 40.3-40.8' | |
| | | | 2 | 38.5-39.3' - Fracture zone, bounded by horizontal to 20 deg rough and undulating surfaces | | | |
| 40 2.5 | R2-HQ 5 ft 66% | 57 | 2 | 39.4' - Fracture, rough, undulating, tight | | | |
| | | | 0 | 40.2' - Fracture, 30 deg, rough, undulating | | | |
| | | | NR | | | **No Recovery 40.8-42.5'** | R2: 2 minutes |
| | 42.5 | | | | | | |
| | | | 0 | | | **Limestone** 42.5-46.5' - dusky yellow, (5YR 6/4), fine grained, mild HCl reaction, very weak (R1), 10% gray pebbles up to 1/4", 30% voids 1/16" with voids up to 3/16", many large voids are linear | |
| | | | 0 | | | | |
| 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 | | | |
| | | | NR | 46.1' - Fracture, 50 deg, rough, undulating, tight to healed | | **No Recovery 46.5-47.5'** | R3: 7 minutes |
| | 47.5 | | | | | | |
| | | | 1 | 47.8' - Fracture, 75 deg, rough, undulating, stepped | | **Limestone** 47.5-51.7' - dusky yellow to moderate yellowish brown, (5YR 6/4 to 10YR 5/4), fine grained, moderate HCl reaction, strong (R4), very weak (R1) from 48.5-48.3', 15-25% 1/16" voids decreasing to 5-10% below 49.5' | |
| | | | 3 | 48.5, 48.8' - Fractures (2), horizontal, smooth, undulating, open | | | |
| 50 -7.5 | R4-HQ 5 ft 84% | 75 | 0 | 49.45' - Fracture, horizontal, smooth, undulating, open | | | |
| | | | 1 | 50.6' - Mechanical break, 10 deg, rough, undulating, tight | | | SC-1 collected at 50.6-51.7' |
| | | | NR | | | **No Recovery 51.7-52.5'** | R4: 8 minutes |
| | 52.5 | | | | | | |
| | | | 3 | 53.0-54.4' - Fracture or bedding plane, horizontal, rough, undulating, multiple fractures | | **Limestone** 52.5-53.0' - Same as 47.5-51.7' except with 1/16" voids increasing to 25% | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 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

CORING METHOD AND EQUIPMENT : CME 75 S/N 252437, mud rotary, HQ tools, PW casing ORIENTATION : Vertical

WATER LEVELS : 6.0 ft bgs on 6/12/07 START : 6/12/2007 END : 6/13/2007 LOGGER : D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | 6 | | | **Limestone** | |
| 55 -12.5 | R5-HQ 5 ft 80% | 50 | 0 | | | 53.0-54.1' - dusky yellow to moderate yellowish brown, (5YR 6/4 to 10YR 5/4), extremely weak (R0), increasing to very weak (R1) with depth, horizontal laminations/bedding planes 1/16" thick, often fractured along organic rich zones, some infilled with silts and clays | Driller's Remark: Softer drilling at 52.5-57.5' compared to previous |
| | | | 1 | 55.65' - Mechanical break, 10 deg, smooth, planar | | | |
| | | | NR | 56.4' - Mechanical break, 60 deg | | | R5: 3 minutes |
| | 57.5 | | | | | 54.1-56.5' - Same as 52.5-53.0' except with increasing voids to 30-40% with depth | |
| | | | 2 | 57.6-57.9' - Fracture or bedding plane, horizontal, multiple fractures/bedding planes, infill of clay along one fracture | | **No Recovery 56.5-57.5'** | |
| | | | 3 | 58.5' - Fracture, 40 deg, rough, undulating, low angle, fracture through undulating wavy zone (3/4") of dark black organics (lignite) organics clayey and "forky" on fracture surface | | **Limestone** 57.5-60.3' - Same as 52.5-53.0' except strong HCl reaction, few organic laminations (minor) throughout, extremely weak to very weak (R0 to R1) and easily broken at 59.1-60.2, | |
| 60 -17.5 | R6-HQ 5 ft 92% | 47 | 5 | 59.3-60.1' - Bedding plane, multiple fractures | | | |
| | | | 2 | 60.1' - sharp discontinuity between silty limestone material with organic and medium dark gray dense limestone | | 60.3-61.0' - light olive gray, (5YR 5/2), very fine grained, strong HCl reaction, strong (R4), 1-2" angular fragments, 5% voids (1/16") | Driller's Remark: Loss of water at 61.0' |
| | | | 1 | 60.4-60.9' - Fracture, limestone fragments | | | 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 reaction, strong (R4), 5% voids (1/16") increasing with depth to 25% with depth, several 1/4" voids | |
| | | | 1 | 61.0' - Fracture, 60 deg, rough, undulating | | | |
| | | | 2 | 63.0' - Mechanical break, vertical, rough, non planar<br>63.6' - Fracture, 35 deg, rough, undulating, semi-planar | | **No Recovery 62.1-62.5'** | SC-2 collected at 63.6-64.9' |
| 65 -22.5 | R7-HQ 5 ft 100% | 43 | 0 | 63.7' - Mechanical break, horizontal, rough, undulating | | **Limestone** 62.5-67.5' - yellowish gray, (5Y 7/2), moderate to strong HCl reaction, medium strong (R3), shallow 1/16" voids over 5%, some irregular black laminations, dark yellowish brown (10YR 4/2) and extremely weak (R0) at 65.8-65.9', extremely weak (R0) to weak (R1) from 65.9-67.5', increasingly competent with depth | |
| | | | 0 | 65.8' - Fracture, horizontal, carbonate silt, friable | | | |
| | | | 1 | 66.8' - Fracture, 50 deg, rough, undulating, semi-planar fracture | | | R7: 4 minutes |
| | 67.5 | | | | | | |
| | | | 2 | 67.5-67.7' - Fracture zone, horizontal, rough, undulating<br>68.3' - Fracture, horizontal | | 67.5-71.5' - dark yellowish brown, (10YR 4/2), fine grained, moderate HCl reaction, extremely weak to very weak (R0 to R1), friable, increasing % of 1/16" voids (up to 40%) at 68.7-71.7', fine organic laminations at 69.4' and 70.3' | |
| | | | 3 | 68.8, 68.95, 69.3, 70.0' - Bedding plane, horizontal, organics | | | |
| 70 -27.5 | R8-HQ 5 ft 100% | 70 | 1 | 69.9' - Fracture, 10 deg, rough, undulating, open | | | |
| | | | 1 | 70.9' - Fracture, friable, open | | | |
| | | | 2 | 71.5-71.7' - Fracture zone, friable | | 71.5-72.5' - Same as 67.5-71.5' except light olive gray, (5Y 5/2), moderate HCl reaction, weak (R2), small 1/16" voids decrease to 5%, also several 1/2" voids to cavities | R8: 10 minutes |
| | 72.5 | | | | | | |
| | | | 1 | 72.9' - Fracture, 30 deg, rough, undulating, includes several 1/2 to 1" elongated cavities | | | |

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# 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

CORING METHOD AND EQUIPMENT : CME 75 S/N 252437, mud rotary, HQ tools, PW casing ORIENTATION : Vertical

WATER LEVELS : 6.0 ft bgs on 6/12/07 START : 6/12/2007 END : 6/13/2007 LOGGER : D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | 0 | | | **Limestone** | |
| 75 -32.5 | R9-HQ 5 ft 100% | 70 | 4 | 74.6, 74.8, 75.1, 75.3' - Fractures (4), horizontal, rough, undulating, open | | 72.5-78.0' - light olive gray, (5Y 5/2), fine grained, strong HCl reaction, weak to medium strong (R2 to R3), shallow 1/16" voids over 5%, 1/2" to 1" cavities, numerous small (1/8") casts/molds, extremely weak (R0) silt-sized carbonate material and trace organics at 74.6-75.3', fewer large cavities at 75.3-77.5' | |
| | | | 2 | 75.7-75.9' - Fractures (2), horizontal and vertical, rough, undulating to stepped, silt-sized infilling | | | |
| | | | 3 | 76.6' - Fracture, 50 deg, rough, undulating | | | R9: 9 minutes |
| | 77.5 | | | 77.3' - Fracture, horizontal and 60 deg, rough, stepped | | | |
| | | | 3 | 77.5' - Fracture, horizontal, smooth, undulating | | 78.0-78.5' - moderate yellowish brown, (10YR 5/4), moist, mild HCl reaction | |
| | | | 1 | 77.6' - Fracture, horizontal, smooth, undulating, tight | | | |
| 80 -37.5 | R10-HQ 5 ft 92% | 53 | 0 | 78.0-78.5' - angular fragment 1/2" with fines infilled<br>79.2' - Fracture, 30 deg, rough, undulating, tight, 1/16" relief | | 78.5-82.1' - moderate yellowish brown, (10YR 5/4), fine grained, strong HCl reaction, medium strong (R3), 20% 1/16" voids, fossiliferous with some cavities up to 1/2" | |
| | | | 2 | 80.0-80.2' - Mechanical break<br>80.9' - Fracture, 20 deg, rough, undulating, 3/8" relief | | | |
| | | | 1 | 81.4, 81.9' - Fractures (2), horizontal and 40 deg, rough, angular fragments to 1-1/2", open | | | R10: 6 minutes |
| | 82.5 | | NR | | | **No Recovery 82.1-82.5'** | |
| | | | 2 | 83.1' - Fracture, 75 deg, rough, undulating | | **Limestone**<br>82.5-86.6' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, medium strong (R3), 25% 1/16" voids, many up to 1/4" cavities and 1" cavities with mold at 83.8' | |
| | | | 0 | 83.2' - Fracture, 10 deg, rough, undulating, organics | | | |
| 85 -42.5 | R11-HQ 5 ft 82% | 53 | 3 | 84.8, 85.1' - Fractures (3), rough, undulating, 1/16" thick, organic laminations<br>84.9' - Fracture, 30 deg | | | Driller's Remark: Rods dropped at 84.5-85.5' |
| | | | 3 | 86.0' - Fracture, 75 deg, rough, undulating, minor black/gray staining on fracture surface | | | Driller's Remark: Losing fluid at 86.0-87.5' |
| | | | NR | 86.3, 86.4' - Fractures (2), horizontal, rough, undulating | | **No Recovery 86.6-87.5'** | R11: 10 minutes |
| | 87.5 | | | | | | Driller's Remark: Rods dropped at 87.5-87.9', rods dropped before drilling |
| | | | 1 | 87.7' - Fracture, horizontal, rough, undulating | | **Limestone**<br>87.5-88.7' - Same as 82.5-86.6' except yellowish gray, (5Y 7/2), with voids up to 1/4" diameter over 10% and many up to 3/4" cavities (still 10% small voids), rock becomes fractured at 88.5', fragments covered with fine grained material, no sediment infilling in molds/cavities | |
| | | | 2 | 88.5' - Fracture, horizontal, rough, undulating, iron staining | | | |
| | | | | 88.6' - Fracture, horizontal, rough, undulating | | | |
| 90 -47.5 | R12-HQ 5 ft 24% | 13 | NR | | | **No Recovery 88.7-93.5'** | Driller's Remark: Rods dropped at 90.5-92.5' |
| | | | | | | | R12: 2 minutes |
| | 92.5 | | | | | | Driller's Remark: Difficulty setting core barrel due to sediment in drill pipe |
| | | | NR | | | | |
| | | | | 93.5-94.5' - Fracture, traces of lignite | | | |

| PROJECT NUMBER: | BORING NUMBER: |
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# 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

CORING METHOD AND EQUIPMENT : CME 75 S/N 252437, mud rotary, HQ tools, PW casing ORIENTATION : Vertical

WATER LEVELS : 6.0 ft bgs on 6/12/07 START : 6/12/2007 END : 6/13/2007 LOGGER : D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | >10 | | | **Limestone** | Driller's Remark: Logged hole before starting at 93.5' (6 inches past where previous run ended) |
| 95 -52.5 | R13-HQ 5 ft 80% | 45 | 0 | 94.7' - Fracture, 10 deg, rough, undulating, open | | 93.5-97.5' - yellowish gray, (5Y 5/2), fine grained, strong HCl reaction, very weak (R1), weakly cemented, friable, voids 1/16" over 10%, fossiliferous with voids/cavities from 1/4" to 1/2" | |
| | | | 3 | 96.0, 96.2, 96.3' - Fractures (3), horizontal and 50 deg, rough, undulating, open | | | |
| | | | 1 | 97.0' - Fracture, 45 deg, rough, undulating, open | | | R13: 1 minute |
| | 97.5 | | | | | | |
| | | | 1 | 97.5-97.8' - Fracture, angular 1"-2" fragment<br>97.9' - Fracture, 50 deg, rough, undulating | | 97.5-100.2' - Same as 93.5-97.5' except 1/16" voids increase to 15%, unconsolidated, silt-sized, carbonate material at 100.0-100.2' | |
| | | | 2 | 98.9' - Fracture (2), 40 deg and vertical, rough, undulating | | | |
| 100 -57.5 | R14-HQ 5 ft 54% | 28 | 5 | 99.4-100.0' - Fracture zone, horizontal and vertical, non planar, friable | | | |
| | | | NR | | | **No Recovery 100.2-105.1'** | R14: 1 minute |
| | 102.5 | | | | | | |
| | | | NR | | | | |
| 105 -62.5 | R15-HQ 5 ft 48% | 22 | >10 | 105.1-105.8' - Fracture zone | | **Limestone**<br>105.1-108.7' - pale greenish yellow, yellowish gray, (10Y 8/2, 5Y 7/2), strong HCl reaction, no voids except for one 1/16" fossil mold, extremely weak (R0) and friable at 105.8-106.3', very weak (R1) and friable with several elongate fossil molds at 106.3-108.7' | |
| | | | >10 | 105.7' - Fracture, horizontal, rough, undulating, tight | | | |
| | | | 0 | 106.3' - Fracture, horizontal, open, does not fit together | | | R15: 2 minutes |
| | 107.5 | | | | | | |
| | | | 2 | | | | |
| | | | 2 | | | 108.7-110.8' - light olive gray, (5Y 5/2), fine grained, no to mild HCl reaction, medium strong (R3), 5% voids (1/16" in size), less consolidated (R1) at fractures from 110.0-110.4' at fractures | |
| 110 -67.5 | R16-HQ 5 ft 100% | 38 | 4 | | | | |
| | | | >10 | | | 110.8-112.3' - Same as 108.7-110.8' except friable and broken | |
| | | | >10 | | | 112.3-112.5' - Same as 108.7-110.8' except with several elongate fossils | R16: 6 minutes |
| | 112.5 | | | | | | |
| | | | | | | Bottom of Boring at 112.5 ft bgs on 6/13/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING LOG

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 START : 12/2/2007 END : 12/3/2007 LOGGER : T. Borton, J. Schaeffer

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 43.4 | 0.0 | 1.1 | SS-1 | 1-1-2 (3) | **Topsoil** 0.0-0.25' - 80-90% organics | | |
| | 1.5 | | | | **Poorly Graded Sand (SP)** 0.25-1.1' - very light gray, white and light brownish gray, (N8, N9 and 5YR 6/1), dry to moist, very loose, very fine to fine grained, silica sand, 15% organics, trace nonplastic fines | | |
| 5 | 5.0 | | | | | | |
| 38.4 | | 1.0 | SS-2 | 2-3-4 (7) | **Sandy Lean Clay (CL)** 5.0-5.3' - mottled very light gray, grayish yellow, and dark yellowish orange, (N8, 5Y 8/4, and 10YR 6/6), moist, medium stiff, medium plasticity, slow dilatancy, 25-30% very fine silica sand | | |
| | 6.5 | | | | **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 | 10.0 | | | | | | |
| 33.4 | | 0.9 | SS-3 | 3-5-6 (11) | **Interbedded Poorly Graded Sand And Silt (SP-SM)** 10.0-10.85' - very pale orange, pale yellowish brown, dark yellowish brown, (10YR 8/2, 10YR 6/2, 10YR 4/2), wet, medium dense, very fine to fine grained, 5-15% nonplastic fines, varies in beds | | |
| | 11.5 | | | | | | |
| 15 | 15.0 | | | | | | |
| 28.4 | | 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 | | |
| | 16.5 | | | | | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING LOG

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 START : 12/2/2007 END : 12/3/2007 LOGGER : T. Borton, J. Schaeffer

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 23.4 | 20.0 – 21.5 | 1.1 | SS-5 | 6-5-5 (10) | **Silty Sand (SM)** 20.0-21.05' - Same as 15.0-16.0' except 15-20% nonplastic fines | | |
| 25 | 25.0 – 26.5 | 0.9 | SS-6 | 3-4-6 (10) | **Poorly Graded Sand With Silt (SP-SM)** 25.0-25.9' - very pale orange, pale yellowish brown, (10YR 8/2, 10YR 6/2), wet, loose, very fine to fine grained, silica sand, 7% nonplastic fines | | |
| 18.4 | | | | | | | |
| 30 | 30.0 – 31.5 | 1.1 | SS-7 | 4-4-6 (10) | **Silty Sand (SM)** 30.0-31.05' - very light gray, (N8), moist to wet, loose, very fine to fine grained, silica sand, 15-20% nonplastic fines, trace organics | | |
| 13.4 | | | | | | | |
| 35 | 35.0 – 36.5 | 1.2 | SS-8 | 2-2-2 (4) | **Silty Sand (SM)** 35.0-36.2' - Same as 30.0-31.05' except very loose | | |
| 8.4 | | | | | | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING LOG

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 START : 12/2/2007 END : 12/3/2007 LOGGER : T. Borton, J. Schaeffer

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 3.4 | 40.0 – 41.5 | 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) |
| 45 -1.6 | 45.0 – 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 – 51.5 | 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 HCl reaction | | |
| | | | | | **Silty Sand With Fat Clay (SM)** 50.0-51.5' - yellowish gray, (5Y 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 -11.6 | 55.0 – 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 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | CT-01 SHEET 4 OF 7 |

# SOIL BORING LOG

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 START : 12/2/2007 END : 12/3/2007 LOGGER : T. Borton, J. Schaeffer

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -16.6 | 60.0 – 61.5 | 1.4 | SS-13 | 3-4-6 (10) | **Interbedded Clayey Sand And Fat Clay (SC-CH)** 60.0-60.6' - Same as 50.0-51.5 and 55.0-56.5' except 60% clayey sand (SC), mottled yellowish gray and light olive gray (5YR 7/2 and 5Y 5/2), moist, loose, very fine to fine grained, 35% medium plastic fines, 40% fat clay (CH), pale green (10G 6/2), moist, medium stiff, highly plastic, no dilatancy, no HCl reaction | | |
| | | | | | **Organic Soil (OL)** 60.6-61.0' - dusky brown, (5YR 2/2), moist, medium stiff, medium plasticity, slow dilatancy, shiny, flaky appearance, 1/4" sand lens at 60.9' | | |
| | | | | | **Silty Sand With Organics (SM)** 61.0-61.4' - light olive gray, (5Y 5/2), wet, loose, fine grained, 20% nonplastic fine organics, 1/2" lens of sandy organic soil (OL) at 61.3-61.4' 25% fine silica sand, no HCl reaction | | Driller's Remark: Hard at 64.0' |
| 65 | 65.0 | | | | | | |
| -21.6 | 65.0 | 0.0 | SS-14 | 50/0 (50/0") | **No Recovery At 65.0'** | | Switch to 2-7/8" tricone bit at 65.0' |
| 70 | 70.0 | | | | | | |
| -26.6 | 70.0 – 71.5 | 1.5 | SS-15 | 22-16-19 (35) | **Silty Sand And Limestone Fragments (SM)** 70.0-71.5' - yellowish gray, (5Y 7/2), wet, dense, fine to coarse grained, 25% low plastic fines, 40-45% fine gravel-sized limestone fragments, strong HCl reaction | | |
| 75 | 75.0 | | | | | | |
| -31.6 | 75.0 | 0.0 | SS-16 | 50/0 (50/0") | **No Recovery At 75.0'** few limestone fragments | | |
| 80 | | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: CT-01 | SHEET 5 OF 7 |
|---|---|---|

# SOIL BORING LOG

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 START : 12/2/2007 END : 12/3/2007 LOGGER : T. Borton, J. Schaeffer

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -36.6 | 80.0<br>81.1 | 1.1 | SS-17 | 4-46-50/1 (96/7") | **Sandy Silt And Limestone Fragments (ML)**<br>80.0-81.1' - grayish yellow, (5Y 8/4), wet, fine to coarse grained, rapid dilatancy, strong to very strong HCl reaction, 20-25% fine to coarse carbonate sand, 45-55% limestone fragments to 1" subangular, strong to very strong HCl reaction<br>Begin Rock Coring at 81.0 ft bgs<br>See the next sheet for the rock core log | | Switch to rock coring at 81.0' |
| 85<br>-41.6 | | | | | | | |
| 90<br>-46.6 | | | | | | | |
| 95<br>-51.6 | | | | | | | |
| 100 | | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: CT-01 | SHEET 6 OF 7 |
|---|---|---|

# ROCK CORE LOG

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

CORING METHOD AND EQUIPMENT : CME 45B S/N 351574, mud rotary, NQ tools, NW casing ORIENTATION : Vertical

WATER LEVELS : 9.5 ft bgs on 12/3/07 START : 12/2/2007 END : 12/3/2007 LOGGER : T. Borton, J. Schaeffer

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | 81.0 | | | | | | Begin rock coring at 81.0' |
| | R1-NQ 5 ft 66% | 17 | 3 | 81.1' - Mechanical break or bedding plane, <5 deg, rough, undulating, tight | | **Limestone** 81.0-84.3' - yellowish gray, (5Y 7/2), fine to coarse grained, strong HCl reaction, very weak (R1), voids to 1" (predominately <1/16") approximately 20% of core, fossiliferous (casts and molds) | |
| | | | >10 | 81.4' - Fracture, 15 deg, rough, undulating, tight<br>81.6' - Mechanical break or bedding plane, <5 deg, smooth, planar, open <1/16" | | | |
| | | | >10 | 82.5' - Mechanical break, <5 deg, rough, undulating, tight | | | |
| | | | 1 | 82.5-82.7' - Fracture zone, <5 deg, fragments to 2", angular | | | |
| 85 -41.6 | | | NR | 83.4' - Bedding plane, <5 deg, rough, undulating, open <1/16"<br>83.6-84.0' - Fracture zone, horizontal, fragments from <1/8" to 2" angular to subangular | | **No Recovery 84.3-86.0'** | R1: 11 minutes |
| | 86.0 | | | | | | Core run times not recorded below run R1 |
| | R2-NQ 5 ft 100% | 78 | >10 | 84.15' - Fracture, 70-80 deg, rough, undulating, tight | | **Limestone** 86.0-91.0' - yellowish gray, (5Y 7/2), very fine to medium grained, strong HCl reaction, weak (R2), zone from 88.3-89.6' medium stong to strong rock (R3/R4) | |
| | | | 2 | 86.0-86.1' - Fracture zone, no visible orientation fragments to 1/2"<br>86.6' - Mechanical break, <5 deg, rough, undulating, tight | | | |
| | | | 1 | 87.4' - Bedding plane, <5 deg, smooth, planar, open 1/2", fine infilling | | | |
| | | | 0 | 87.8' - Bedding plane, <5 deg, rough, planar, tight<br>88.0' - Bedding plane, <5 deg, rough, planar, open, <1/16" | | | |
| 90 -46.6 | | | 3 | 90.0' - Fracture, <5 deg, rough, undulating, open, <1/16", fine infill | | | |
| | 91.0 | | | | | | |
| | R3-NQ 5 ft 92% | 35 | 5 | 90.6, 90.8' - Fractures (2), 5-10 deg, rough, undulating, open, <1/16"<br>91.15, 91.25' - Fractures (2), <5 deg, rough, undulating, open to 1/4" | | 91.0-92.35' - grayish yellow, (5Y 8/4), fine to coarse grained, strong HCl reaction, very weak to weak (R1 to R2), voids to <1/6", 5-15% of core | |
| | | | 3 | 91.5' - Mechanical break or bedding plane, <5 deg, rough, undulating, tight | | **Sandy Fat Clay (CH)** 92.35-92.5' - light olive gray, (5Y 5/2), moist, high plasticity, no dilatancy | |
| | | | 1 | 91.8, 91.95, 92.1, 92.15' - Mechanical break or bedding plane (4), <5 deg, rough, undulating, open to 1/4"<br>92.35-92.5' - Fracture or bedding plane, <5 deg, smooth, planar, fine infilling | | **Limestone** 92.5-93.5' - Same as 91.0-92.35' | |
| | | | >10 | 93.75, 94.1' - Mechanical break (2), <5 deg, rough, undulating, tight | | 93.5-95.6' - Same as 91.0-92.35' except medium to coarse grained, voids to <1/16" approximately 15-25% of core | |
| 95 -51.6 | | | >10 | 94.5-95.6' - Fracture zone, no visible orientation, fragments to 2" angular, dark gray to black staining on some fragments | | | |
| | 96.0 | | NR | | | **No Recovery 95.6-96.0'** | |
| | R4-NQ 5 ft 100% | 33 | 1 | 96.15' - Bedding plane, <5 deg, rough, undulating, open <1/16" | | **Limestone** 96.0-101.0' - yellowish gray to grayish yellow, (5Y 7/2 to 5Y 8/4), fine to coarse grained, strong HCl reaction, very weak to medium strong (R1 to R3), fining with depth, voids to <1/16" 5-10% of core | |
| | | | 2 | 96.6-97.7' - Mechanical break, vertical, rough, undulating, tight | | | |
| | | | 2 | 97.77' - Bedding plane, <5 deg, rough, undulating, tight<br>98.5' - Fracture, 45-55 deg, rough, undulating, tight | | | |
| | | | 2 | 98.8' - Fracture, 45-55 deg, rough, undulating, open 1/8" | | | |
| 100 -56.6 | | | 2 | 99.6' - Mechanical break or bedding plane, <5 deg, rough, undulating, open 1/8" | | | |
| | 101.0 | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: CT-01 SHEET 7 OF 7 |
|---|---|

# ROCK CORE LOG

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

CORING METHOD AND EQUIPMENT : CME 45B S/N 351574, mud rotary, NQ tools, NW casing ORIENTATION : Vertical

WATER LEVELS : 9.5 ft bgs on 12/3/07 START : 12/2/2007 END : 12/3/2007 LOGGER : T. Borton, J. Schaeffer

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R5-NQ 5 ft 100% | 100 | 0 | | | **Limestone** 101.0-106.0' - yellowish gray, (5Y 7/2), very fine to medium grained, strong HCl reaction, weak to medium strong (R2 to R3), voids to 1/8" (predominately <1/16") over approximately 15% of core, trace organics | |
| | | | 1 | 102.0' - Mechanical break, <5 deg, rough, undulating, tight | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| 105 -61.6 | | | 0 | | | | |
| | 106.0 | | | | | | |
| | R6-NQ 5 ft 100% | 57 | 1 | 106.3, 107.35, 107.6' - Mechanical break (3), <5 deg, rough, undulating, open 1/8" | | 106.0-111.0' - Same as 101.0-106.0' except weak (R2), irregular wavy bedding from 106.5-107.45', fossiliferous zone from 107.7-108.7' with voids to 1/8" over 10-12% of the core | Water level = 9.5' below ground surface |
| | | | 2 | | | | |
| | | | 1 | 108.45' - Fracture, 5-10 deg, rough, undulating, tight | | | |
| | | | 1 | 109.15, 110.35' - Fractures (2), 20-30 deg, rough, undulating, tight | | | |
| 110 -66.6 | | | 1 | | | | |
| | 111.0 | | | | | | Total depth of boring is 111.0' |
| | | | | | | Bottom of Boring at 111.0 ft bgs on 12/3/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | CT-02 SHEET 1 OF 4 |

# SOIL BORING 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

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

WATER LEVELS : 6.1 ft bgs on 11/30/07 START : 11/29/2007 END : 12/1/2007 LOGGER : D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.3 | 0.0 | 1.2 | SS-1 | 2-3-3 (6) | **Topsoil** 0.0-0.15' - Poorly graded sand with organics | | |
| | 1.5 | | | | **Poorly Graded Sand With Silt (SP-SM)** 0.15-1.15' - pale yellowish brown grading to dark yellowish brown, (10YR 6/2 to 10YR 4/2), moist, loose, fine grained, no HCl reaction, silica sand, trace to 10% nonplastic fines | | |
| 5 | 5.0 | | | | | | |
| 37.3 | | 1.3 | SS-2 | 4-3-32 (35) | **Clayey Sand (SC)** 5.0-5.75' - moderate yellowish brown to light greenish gray, (10YR 5/4 to 5G 8/1), moist, dense, fine grained, slow dilatancy, no HCl reaction, 30% medium to high plasticity fines, some organics | | Driller's Remark: Hard drilling at 6.0' |
| | 6.5 | | | | **Silt (ML)** 5.75-6.3' - grayish orange to moderate yellowish brown, (10YR 7/4 to 10YR 5/4), moist, hard, nonplastic, very rapid dilatancy, mild to moderate HCl reaction, 5-10% very fine sand, carbonate materials, trace organics | | |
| 10 | 10.0 | | | | | | |
| 32.3 | | 0.9 | SS-3 | 3-4-50/3.5 (54/9.5") | **Silt With Limestone Fragments (ML)** 10.0-10.85' - grayish orange to dark yellowish orange, (10YR 7/4 to 10YR 6/6), wet, hard, nonplastic, high dilatancy, mild to moderate HCl reaction, 10% very fine sand, 50% limestone lenses (angular limestone fragments up to 1" diameter), trace black organic staining | | Driller's Remark: Lost 50% circulation at 10.0' |
| | 11.3 | | | | | | Driller's Remark: Hard drilling at 12.0' |
| | | | | | | | Driller's Remark: Losing circulation, soft, possible void space at 14-14.5' |
| 15 | 15.0 | | | | | | |
| 27.3 | 15.4 | 0.3 | SS-4 | 50/4.5 (50/4.5") | **Silty Sand With Limestone Fragments (SM)** 15.0-15.3' - Same as 10.0-10.85' except 34% nonplastic fines, 66% limestone fragments, no organics | | Driller's Remark: Hard drilling, 100% circulation loss at 15.0' |
| | | | | | | | 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 | | | | | | 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'** | | |
| 20 | | | | | | | |
| | | | | | Begin Rock Coring at 20.0 ft bgs<br>See the next sheet for the rock core log | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
| 338884.FL | 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 ORIENTATION : Vertical

WATER LEVELS : 6.1 ft bgs on 11/30/07 START : 11/29/2007 END : 12/1/2007 LOGGER : D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 22.3 | 20.0 R1-NQ 1.5 ft 73% 21.5 | 50 | 1 | 20.1' - Fracture, horizontal, rough, undulating, bedding plane fracture, half of fracture surface open, <1/16" silt infill | | **Limestone** 20.0-21.1' - grayish orange to dark yellowish orange, (10YR 7/4 to 10YR 6/6), fine grained, mild HCl reaction, weak (R2), voids to 1/16" diameter over 30% of rock, 5-10% cavities up to 1/4" diameter, poorly fossiliferous, trace recrystallization in pore space | Water level is 6.1' below ground surface on 11/30/07 at 07:50 Begin rock coring at 20' R1: 8 minutes 08:50-10:15 Changing out damaged drill bit |
| | | | 2 | 20.85' - Fracture, 10 deg, smooth to rough, undulating, open, <1/16" fine sand and silt infill | | **No Recovery 21.1-21.5'** | |
| | | | NR | | | **Limestone** 21.5-24.75' - dark yellowish orange, (10YR 6/6), fine grained, moderate HCl reaction, weak (R2), voids to 1/16" diameter over 40% of core surface, 5-10% spherical and elongated cavities up to 1/4" diameter, highly fossiliferous (molds/casts) | Driller's Remark: Soft drilling at 23.0', hard at 24.0' |
| | R2-NQ 5 ft 65% | 45 | >10 | 20.91' - Fracture, 65 deg, rough, undulating, trace of fine sand infill, open | | | |
| | | | 4 | 21.65' - Fracture, 75 deg, rough, undulating, open | | | |
| | | | 1 | 22.1-23.0' - Fracture zone, horizontal, angular limestone fragments with trace of silt infill | | | |
| 25 | | | 0 | 22.6' - Fracture, 5 deg, rough, undulating, tight | | | |
| 17.3 | | | NR | 22.75' - Fracture, 75 deg, smooth, undulating, open to tight (other surface in fragments but fits tight on surface) | | | R2: 23 minutes |
| | 26.5 | | | 22.85' - Fracture, 20 deg, rough, undulating to stepped, open | | **No Recovery 24.75-26.5'** | |
| | | | >10 | 23.5' - Fracture, 20 deg, rough, undulating, tight | | **Limestone** 26.5-27.15' - dark yellowish orange to moderate yellowish brown, (10YR 6/6 to 10YR 5/4), fine to medium grained, mild HCl reaction, extremely weak (R0), voids to 1/16" cover 40% of core surface, 5-10% cavities up to 1/4" diameter, possible bioturbation at 26.9'; trace silt infill, trace recrystallization in void space, poorly fossiliferous | Driller's Remark: Soft drilling at 27-28' |
| | | | >10 | 24.15' - Fracture, 70 deg, rough, undulating, 1/4" open | | | |
| | | | >10 | 26.75' - Fracture, 10 deg, rough, undulating, open | | | |
| | R3-NQ 5 ft 48% | 0 | | 26.9-27.15' - Fracture zone, subangular limestone rock fragments up to 1-1/2" diameter | | | |
| 30 | | | | 27.9-28.4' - Fracture zone, fragments from coarse sand size to 3/4" diameter, subangular to angular | | | |
| 12.3 | | | NR | 28.5' - Fracture, vertical, rough, undulating, tight | | **Silt (ML)** 27.15-27.9' - grayish orange, (10YR 7/4), wet, soft, nonplastic, very rapid dilatancy, moderate HCl reaction, with 10% fine to coarse sand-sized limestone fragments | R3: 8 minutes |
| | 31.5 | | | 28.6-28.7' - Fracture zone, rock fragments | | | |
| | | | 1 | 28.8' - Fracture, 85 deg, rough, undulating | | **Limestone** 27.9-28.75' - Same as 26.5-27.15' 28.75-28.9' - pale yellowish brown to dark yellowish orange, (10YR 6/2 to 10YR 6/6), very fine to fine grained, strong HCl reaction, weak (R2), voids (1/16") over 1% of core surface, poorly fossiliferous | Driller's Remark: Soft at 32.0-32.5', hard at 32.5' |
| | | | | 31.9' - Fracture, 20 deg, smooth to rough, undulating, open | | | |
| | | | 1 | 32.9' - Fracture, 20 deg, rough, undulating, 1/2" open | | | |
| | R4-NQ 5 ft 91% | 82 | 3 | 33.7, 34.0' - Fractures (2), 20 deg, rough, undulating to stepped, open up to 1/2", <1/16" sand infill | | | |
| 35 | | | 1 | 34.45' - Fracture, 10 deg, smooth, planar, tight | | **No Recovery 28.9-31.5'** | |
| 7.3 | | | | | | **Limestone** 31.5-32.15' - yellowish gray to moderate yellow, (5Y 7/2 to 5Y 7/6), very fine to fine grained, mild HCl reaction, very weak (R1), small voids (1/16") over 2% of core surface, 2 possible cavities up to 3/4" diameter, very poorly fossiliferous, black staining covers 40% of surface, also trace iron staining orange-red yellow color | |
| | | | 1 | 35.6' - Fracture, horizontal, rough, undulating, open up to 1" | | | R4: 21 minutes |
| | 36.5 | | NR | 36.0' - Fracture, 70 deg, rough, undulating, open (missing half of fracture surface) | | | |
| | | | >10 | 36.65-36.85' - Fracture zone, subangular to subrounded rock fragments with rough to smooth and undulating surfaces | | | Driller's Remark: Soft drilling from 36.5-38', hard at 38.0', soft at 38-38.5', hard at 38.5' |
| | | | >10 | 37.3' - Fracture, 20 deg, rough, undulating, up to 1/4" open | | | |
| | R5-NQ 5 ft 42% | 16 | 0 | 37.35, 37.5, 37.7' - Fractures (3), 25 deg, rough, undulating, open up to 1/2", trace sand infill | | | |
| | | | NR | | | | |
| 40 | | | | 37.85' - Fracture zone, rock fragments | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
| 338884.FL | 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 ORIENTATION : Vertical

WATER LEVELS : 6.1 ft bgs on 11/30/07 START : 11/29/2007 END : 12/1/2007 LOGGER : D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 2.3 | | | NR | 38.0' - Fracture, 20 deg, rough, undulating, up to 1/2" open<br>38.15' - Fracture, 20 deg, rough, undulating<br>38.2' - Fracture, 10 deg, rough, undulating | | **Limestone**<br>32.15-36.05' - light olive gray, (5Y 2/2), fine to medium grained, moderate HCl reaction, weak (R2), voids 1/16" diameter cover 10% of core surface, 5-10% cavities up to 1" diameter, highly fossiliferous (molds/casts) | R5: 7 minutes |
| 41.5 | R6-NQ 5 ft 40% | 25 | 2 | | | **No Recovery 36.05-36.5'** | |
| | | | >10 | 42.25' - Fracture, 20 deg, rough, undulating, tight<br>42.35' - Fracture, horizontal, rough, undulating, up to 1" open | | **Limestone**<br>36.5-38.6' - moderate olive brown, (5Y 4/4), fine to medium grained, mild HCl reaction, extremely weak (R0), voids up to 1/16" diameter over 50% of core surface, 10% cavities up to 1/4", moderately fossiliferous (fossils), trace molds and casts, 5% silt infill in void space, 5% recrystallization, trace black material (possible fossils or organics) | |
| 45<br>-2.7 | | | NR | 42.9' - Fracture, 20 deg, rough, undulating, trace sand infill<br>43.15-43.5' - Fracture zone, fine to coarse gravel-sized subangular to subrounded rock fragments | | | R6: 7 minutes |
| 46.5 | R7-NQ 5 ft 92% | 40 | 2 | 46.8' - Fracture, horizontal, rough, undulating, tight to 1/4" open, trace black staining on surfaces | | **No Recovery 38.6-41.5'**<br>**Limestone**<br>41.5-43.5' - Same as 36.5-38.6'<br>**No Recovery 43.5-46.5'**<br>**Limestone**<br>46.5-47.65' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, weak (R2), voids (1/16") over up to 30% of core surface, 10% cavities up to 1/2" size, highly fossiliferous (molds) | |
| | | | 4 | 47.5, 47.65' - Fracture (2), horizontal, rough, undulating, tight to 1/4" open, black organic staining covers 5% fracture surfaces | | | |
| | | | >10 | 47.95' - Fracture, 40 deg, rough, undulating to stepped, eroding fracture surface | | | |
| 50<br>-7.7 | | | >10 | 47.95-48.7' - Fracture zone, horizontal, many bedding plane fractures, fissile/easily broken material | | | |
| | | | 1 | 48.7' - Fracture, 70 deg, smooth to rough, undulating, eroding fracture surface | | **Silty Sand (SP)**<br>47.65-48.0' - moderate yellowish brown, (10YR 5/4), wet, fine to coarse grained, medium plasticity | R7: 11 minutes |
| 51.5 | | | NR | 48.7-49.25' - Fracture zone, sand to coarse gravel-sized rock fragments | | | |
| | R8-NQ 5 ft 62% | 38 | >10 | 49.15' - Fracture, vertical, rough, stepped, open | | **Limestone**<br>48.0-49.1' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, extremely weak (R0), voids (1/16") over 5% of core surface, mostly poorly competent with silt infill<br>49.1-51.1' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, very weak (R1), small (1/16") voids over 2% of core surface, many cavities up to 3/4", moderately fossiliferous (molds) | Driller's Remark: Hard drilling at 52' |
| | | | 0 | 49.8' - Fracture, 80 deg, rough, stepped, open<br>49.8-50.2' - Fracture zone, silt to fine gravel-sized rock fragments | | | |
| | | | 3 | 50.2' - Fracture, 80 deg, rough, stepped, open | | | |
| 55<br>-12.7 | | | 0 | 50.6' - Fracture, 10 deg, rough, stepped, tight to 1/4"open, <1/16" silt infill | | | |
| | | | NR | 51.5-52.2' - Fracture zone, rock fragments from fine to coarse gravel-sized, subangular to subrounded | | | R8: 16 minutes |
| 56.5 | R9-NQ 5 ft 98% | 70 | 0 | 52.2' - Fracture, 0-10 deg, rough, undulating, open<br>53.7' - Fracture, horizontal, smooth to rough, planar, tight | | **No Recovery 51.1-51.5'**<br>**Limestone**<br>51.5-52.2' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), fine grained, mild HCl reaction, extremely weak to very weak (R0 to R1), voids (1/16") over 5% of core surface, cavities up to 3/4"x1/2", fossiliferous, trace molds, trace organic staining (2% coverage) | |
| | | | 1 | 54.05' - Fracture, 10 deg, rough, undulating, tight<br>54.25' - Fracture, horizontal, rough, undulating, fossil prints in black staining on fracture surface | | | |
| | | | 3 | 58.4' - Fracture, horizontal, rough, undulating, open, 1" sand and silt infill, black staining on 1% of fracture surface | | | |
| 60 | | | | | | | |

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# 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 ORIENTATION : Vertical

WATER LEVELS : 6.1 ft bgs on 11/30/07 START : 11/29/2007 END : 12/1/2007 LOGGER : D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -17.7 | | | >10 | 58.9' - Fracture, horizontal, rough, undulating, tight to 1/4" open | | **Limestone** 52.2-53.7' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), very fine to fine grained, moderate to strong HCl reaction, weak (R2), small voids (1/16") cover 5% of core surface, poorly fossiliferous, 2% black staining, 5% recrystallization | Driller's Remark: Hard drilling at 59.5' |
| | | | 0 | 59.15' - Fracture, horizontal, rough, undulating, fissile surfaces, tight | | | R9: 11 minutes |
| | 61.5 | | NR | 59.25' - Fracture or mechanical break, rough, stepped, tight | | | |
| | | | 1 | 59.6' - Fracture, horizontal, rough, undulating, 1/4" open | | | |
| | | | 1 | 59.8' - Fracture, horizontal, rough, undulating, 1" of silt and sand infill between the two fracture surfaces | | 53.7-54.2' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), fine grained, strong HCl reaction, extremely weak (R0), poorly fossiliferous | |
| | R10-NQ 5 ft 100% | 100 | 1 | 60.2' - Fracture, horizontal, rough, stepped, tight | | | |
| 65 -22.7 | | | 1 | 62.1' - Fracture, 10 deg, smooth, undulating, tight to 1/4"open | | 54.2-54.6' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), fine grained, strong HCl reaction, very weak (R1), voids (1/16") cover 10% of core surface, cavities up to 1/2" diameter, moderately fossiliferous with black fossils, 2% black staining | |
| | | | | 63.05' - Fracture or mechanical break, horizontal, smooth, undulating, tight | | | |
| | | | 1 | 64.0' - Mechanical break | | | R10: 11 minutes |
| | 66.5 | | | 64.35' - Fracture, 45 deg, rough, undulating, tight, black fossils 2% coverage | | | |
| | | | | 65.35' - Fracture, 0-20 deg, rough, undulating, tight | | **No Recovery 54.6-56.5'** | |
| | | | | 65.9' - Fracture, horizontal, rough, undulating, tight, coral mold on fracture surface | | **Limestone** 56.5-59.15' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), fine grained, strong HCl reaction, very weak (R1), voids (1/16") cover 40% of core surface, very fossiliferous, with cavities up to 3/4" diameter, black fossils and fossil molds, trace fossil casts, silt with sand-sized limestone fragments at 58.4-58.5' and 57.8-57.9' | |
| | | | | | | 59.15-59.9' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), fine grained, strong HCl reaction, extremely weak (R0), no voids, trace cavities, moderately fossiliferous with black fossils | |
| | | | | | | 59.9-60.4' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), fine to very fine grained, strong HCl reaction, weak (R2), voids (1/16") cover 15% of core surface, cavities up to 3/4"x1/2", moderately fossiliferous (molds) | |
| | | | | | | 60.4-61.4' - Same as 59.9-60.4' except no voids or cavities, black staining over 15% of core | |
| | | | | | | **No Recovery 61.4-61.5'** | |
| | | | | | | **Limestone** 61.5-61.9' - Same as 60.4-61.4' | |
| | | | | | | 61.9-66.5' - Same as 56.5-59.15' except more fossiliferous (molds), more large cavities (up to 1"x1-1/2"), increasing with depth | |
| | | | | | | Bottom of Boring at 66.5 ft bgs on 12/1/2007 | |

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# SOIL BORING 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

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

WATER LEVELS : 3.0 ft bgs on 12/03/07 START : 12/2/2007 END : 12/5/2007 LOGGER : D. Whitaker, T. Borton

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 40.8 | 0.0 – 1.5 | 1.2 | SS-1 | 1-2-2 (4) | **Topsoil** 0.0-0.4' - brownish black, (5YR 2/1), organics<br>**Poorly Graded Sand (SP)** 0.4-1.15' - yellowish gray, (5Y 7/2), moist, very loose, very fine to fine grained, no HCl reaction, silica sand, 5% organics, trace nonplastic fines | | |
| 5 / 35.8 | 5.0 – 6.5 | 0.0 | SS-2 | 3-2-3 (5) | **No Recovery 5.0-6.5'** | | |
| | 6.5 – 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'<br>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 – 10.5 | 0.2 | SS-4 | 50/5.5 (50/5.5") | **Silt (ML)** 10.0-10.2' - moderate yellow to dusky yellow, (5Y 7/6 to 5Y 6/4), mild to moderate HCl reaction, 70% nonplastic fines | | Driller's Remark: Moderate chatter and hard at 10.0'<br>Driller's Remark: Light chatter at 13.5-15.0' |
| 15 / 25.8 | 15.0 – 16.5 | 1.2 | SS-5 | 27-13-14 (27) | **Sandy Silt And Limestone Fragments (ML)** 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 coarse grained sand and gravel size limestone fragments | | Driller's Remark: 19.5-20.0' soft |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
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| 338884.FL | CT-03 SHEET 2 OF 4 |

# SOIL BORING 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

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

WATER LEVELS : 3.0 ft bgs on 12/03/07 START : 12/2/2007 END : 12/5/2007 LOGGER : D. Whitaker, T. Borton

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 20.8 | 20.0–20.8 | 0.7 | SS-6 | 3-50/3.5 (53/9.5") | **Silty Sand And Limestone Fragments (SM)** 20.0-20.7' - dusky yellow, (5Y 6/4), wet, very dense, fine to coarse grained, mild to moderate HCl reaction, 30% nonplastic fines; 40% fine gravel-sized limestone fragments, carbonate sand | | Driller's Remark: Very hard at 20.5' |
| | | | | | | | 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 | 25.0–26.1 | 0.7 | SS-7 | 9-30-50/1.5 (80/7.5") | **Silty Gravels (GM)** 25.0-25.7' - dark yellowish orange, (10YR 6/6), wet, very dense, fine to coarse grained, moderate HCl reaction, carbonate sand, 24% nonplastic fines, 20% gravel-sized limestone fragments | | Driller's Remark: Dropped 3 inches from 25.5-25.75' (soft or possible void) |
| 30 | 30.0 | | | | | | |
| 10.8 | 30.0–30.8 | 0.6 | SS-8 | 29-50/3.5 (79/9.5") | **Limestone With Silty Sand** 30.0-30.6' - dusky yellow, (5Y 6/4), wet, very dense, mild to moderate HCl reaction, gravel sized grains, 30% silty sand (SM) similar to 25.0-25.7' | | |
| | | | | | | | Driller's Remark: Heavy Chatter at 31.5' |
| | | | | | | | Driller's Remark: Heavy chatter at 32.5' |
| | | | | | | | Driller's Remark: Soft at 33.0-34.5' |
| 35 | 35.0 | | | | | | Driller's Remark: Heavy chatter at 34.5' |
| 5.8 | 35.0–35.6 | 0.5 | SS-9 | 40-50/0.75 (90/6.75") | **Limestone With Silty Sand** 35.0-35.5' - Same as 30.0-30.6 | | Driller's Remark: Loss of circulation at 35.0' |
| | | | | | Begin Rock Coring at 35.5 ft bgs<br>See the next sheet for the rock core log | | Water level is 3.0' below ground surface at 07:53 on 12/3/07 |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
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# 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 ORIENTATION : Vertical

WATER LEVELS : 3.0 ft bgs on 12/03/07 START : 12/2/2007 END : 12/5/2007 LOGGER : D. Whitaker, T. Borton

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | 35.5<br>R1-NQ<br>1.5 ft<br>80%<br>37.0 | 50 | >10<br>1<br>NR | 35.5-35.85' - Fracture zone, fine to coarse angular gravel sized fragments<br>35.85' - Fracture, 60 deg, rough, undulating, open<br>36.6' - Fracture, 70 deg, rough, undulating, open 1/16"-1/8", organic infilling | | **Limestone**<br>35.5-36.7' - dusky yellow to light olive gray, (5Y 6/4 to 5Y 5/2), very fine to fine grained, mild HCl reaction, weak (R2), voids 1/16" diameter over 1% core surface, 2 cavities up to 1/2"x1-1/2" possibly both fossil molds, black staining over 15% core surface<br>**No Recovery 36.7-37.0'** | Begin rock coring at 35.5'<br>R1: 8 minutes |
| | R2-NQ<br>5 ft<br>96% | 78 | 3<br>0<br>1<br>1<br>2<br>NR | 37.0-37.15' - Fracture zone, angular fine gravel sized fragments<br>37.65' - Fracture, horizontal, smooth, undulating, 1/4" open<br>37.75' - Fractures (3), 40-50 deg, smooth, undulating, 2 open, 1 tight<br>39.1' - Fracture, horizontal, rough, planar, open up to 1/4"<br>39.5, 40.25' - Mechanical break (2)<br>40.6' - Fractures, horizontal, rough, stepped, tight<br>41.35, 41.7' - Fractures (2), horizontal, rough, undulating, fissile up to 1/2" open | | **Limestone**<br>37.0-41.0' - light olive gray to dusky yellow, (5Y 2/2 to 5Y 6/4), very fine to fine grained, mild to moderate HCl reaction, weak (R2), voids 1/16" diameter over 2% core surface from 37.0-38.5' to over 5% from 38.5-40.0' and 10% from 40.0-41.0', grain size coarsening with depth, number and size of cavities increasing with depth, up to 1"x1- 1/2", highly fossiliferous - molds/casts, trace possible black fossils | R2: 18 minutes |
| 40<br>0.8 | R3-NQ<br>5 ft<br>45%<br>42.0 | 11 | 3<br>>10<br>1<br>NR | 42.1' - Fracture, 15 deg, rough, undulating, tight, fissile<br>42.7, 42.8' - Fractures (2), horizontal, rough, undulating, open up to 1/2", fissile<br>43.0, 43.3' - Fractures (2), 0-10 deg, rough, undulating, open up to 1/2"<br>43.4-43.55' - Fracture zone, coarse sand to fine gravel size subrounded fragments<br>43.8, 44.0, 44.3' - Fractures (3), horizontal, rough, undulating, tight to 1/2" open | | 41.0-41.8' - dusky yellow, (5Y 6/4), fine to medium grained, mild HCl reaction, extremely weak (R0), voids 1/16" over 30% of core surface, cavities up to 3/4"x1-1/2", highly fossiliferous with molds and casts, 1% organics<br>**No Recovery 41.8-42.0'** | |
| 45<br>-4.2 | R4-NQ<br>5 ft<br>24%<br>47.0 | 16 | 2<br>0<br>NR | 47.15' - Fracture, horizontal, rough, undulating, open<br>47.41' - Fracture, horizontal, smooth to rough, undulating, open up to 1/2" | | **Limestone**<br>42.0-44.25' - Same as 41.0-41.8' except moderate yellowish brown, (10YR 5/4), number of cavities increasing with depth<br>**No Recovery 44.25-47.0'**<br>**Limestone**<br>47.0-48.2' - dusky yellow to light olive gray, (5Y 6/4 to 5Y 5/2), fine grained, mild HCl reaction, weak (R2), voids 1/16" over 40% of core surface; 10-20% cavities up to 1/2" diameter, highly fossiliferous with molds, casts and fossils, 10% recrystallization in 1/16" voids<br>**No Recovery 48.2-52.0'** | R3: 3 minutes |
| 50<br>-9.2 | R5-NQ<br>5 ft<br>40%<br>52.0 | 0 | 5<br>>10 | 52.15' - Fracture, horizontal, rough, planar to rough stepped, open up to 1/2", organic infilling, 1/16" thick<br>52.4' - Fracture, horizontal, rough, stepped, tight, organic infilling, 1/16" thick<br>52.6' - Fracture, horizontal, rough, undulating, open up to 1/2", silt infilling<br>52.8-52.9' - Fracture zone, 0-10 deg, rough, undulating, open | | **Limestone**<br>52.0-52.55' - dusky yellow, (5Y 6/4), fine grained, mild HCl reaction, weak (R2), black organic laminations 1/32"-1/2" thick cover over 40% of surface, most are 1/32" thick, poorly fossiliferous | R4: 18 minutes<br>Water level 3' 2" below ground surface at 07:20 on 12/4/07 |
| 55<br>-14.2 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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 ORIENTATION : Vertical

WATER LEVELS : 3.0 ft bgs on 12/03/07 START : 12/2/2007 END : 12/5/2007 LOGGER : D. Whitaker, T. Borton

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | NR | 53.15' - Fracture, 70 deg, rough, undulating, open<br>53.15-53.5' - Fracture zone, gravel sized rock fragments | | **Limestone**<br>52.55-54.0' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, extremely weak to very weak (R0 to R1), strength decreases with depth, voids cover 5% of core surface, cavities that are 1/8"-1/4" diameter, 5% recrystallization (white), 1% black organics, 5% linear 2"x1/16" thick, gray material from 52.8-53.2' | R5: 7 minutes |
| | 57.0 | | | | | | |
| | R6-NQ<br>5 ft<br>50% | 30 | >10<br>>10<br>1<br>NR | 53.65' - Fracture, horizontal, rough, undulating, tight<br>57.0-57.35' - Fracture zone, coarse sand to coarse gravel size subangular rock fragments with black organic material on fracture surfaces<br>58.45-58.8' - Fracture zone, coarse sand to coarse gravel size subangular to subrounded rock fragments, fracture surface are 20 deg at 58.45' and 70 deg at 58.8', rough, undulating to stepped<br>59.25' - Fracture, 15 deg, rough, undulating, tight | | **No Recovery 54.0-57.0'**<br>**Limestone**<br>57.0-59.5' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, weak to extremely weak (R2 to R0), voids 1/16" cover 20% of core surface, cavities up to 3/4" diameter and 1-1/2"x2", highly fossiliferous with molds and casts, 1% black organic material throughout core | Driller's Remark: Soft at 57-59.6', hard at 59.5-62'<br>R6: 8 minutes |
| 60<br>-19.2 | | | | | | | |
| | 62.0 | | | | | | |
| | R7-NQ<br>5 ft<br>100% | 88 | 1<br>0<br>3<br>0<br>1 | 62.4' - Mechanical break or bedding plane, <5 deg, rough, undulating, tight<br>64.55' - Bedding plane, <5 deg, smooth, undulating, tight<br>64.65' - Bedding plane, <5 deg, smooth, undulating, open to <1/16", fine infilling<br>64.9' - Mechanical break, <5 deg, rough, undulating, tight<br>66.25' - Mechanical break or bedding plane, <5 deg, rough, undulating, tight | | **No Recovery 59.5-62.0'**<br>**Limestone**<br>62.0-64.5' - medium light gray to yellowish gray mottled, (N6 to 5Y 7/2), medium to fine grained, moderate to strong HCl reaction, medium strong (R3), voids <1/10"-1/2"<br>**Silty Limestone**<br>64.5-64.65' - yellowish gray to olive gray, (5Y 7/2 to 5Y 3/2), very fine to fine grained, mild HCl reaction, weak (R2) | Original boring CT-03 abandoned at 62' due to casing problems; replacement boring located 5' north of original boring Replacement boring blind drilled to 62'<br>R7: 19 minutes |
| 65<br>-24.2 | | | | | | | |
| | 67.0 | | | | | | |
| | R8-NQ<br>5 ft<br>84% | 57 | 3<br>0<br>1<br>2<br>NR | 67.25, 67.67, 67.8' - Mechanical break (3), <5 deg, rough, undulating, tight<br>69.1' - Mechanical break or bedding plane, <5 deg, rough, planar, open <1/16"<br>70.0' - Fracture, 5-10 deg, rough, undulating, tight<br>70.9' - Mechanical break or bedding plane, <5 deg, rough, undulating, open 1/8" | | **Limestone**<br>64.65-67.0' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), medium to coarse grained, moderate HCl reaction, very weak to weak (R1 to R2), voids <1/16" over 30-40% of core surface, trace organics, irregular bedding with depth<br>67.0-71.2' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), medium to coarse grained, mild HCl reaction, voids up to 1/2" over 5% of core surface predominately from 68.8-69.8', voids <1/16" over 45-55% of core surface, trace organics, moderately to highly fossiliferous (casts/molds) | R8: 6 minutes<br>Total depth of boring 72.0' |
| 70<br>-29.2 | | | | | | | |
| | 72.0 | | | | | **No Recovery 71.2-72.0'**<br>Bottom of Boring at 72.0 ft bgs on 12/5/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | CT-04 SHEET 1 OF 3 |

# SOIL BORING 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

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 bgs on 11/30/07 START : 11/29/2007 END : 11/30/2007 LOGGER : T. Borton

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 40.8 | 0.0 – 1.5 | 0.8 | SS-1 | 0-2-2 (4) | **Topsoil** 0.0-0.2' - brownish black, (5YR 2/1), organics (roots, wood) | | |
| | | | | | **Poorly Graded Sand (SP)** 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 | | |
| 5 | 5.0 | | | | | | |
| 35.8 | 5.0 – 6.5 | 0.9 | SS-2 | 1-2-3 (5) | **Lean Clay With Sand (CL)** 5.0-5.6' - greenish gray and light olive gray, (5G 6/1 and 5Y 6/1), mottled, moist, firm, low to medium plasticity, slow dilatancy, 15-20% very fine to fine silica sand, trace rootlets | | |
| | | | | | **Silty Gravel (limestone) With Sand (GM)** 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 | 10.0 | | | | | | |
| 30.8 | 10.0 – 11.5 | 1.3 | SS-3 | 14-34-50 (84) | **Silty Sand And Limestone (SM)** 10.0-11.3' - yellowish gray, (5Y 8/1), moist, very dense, fine to coarse grained, strong HCl reaction, 15-20% nonplastic fines, 40-50% fine to coarse limestone fragments, 50-60% SM, all carbonate | | Driller's Remark: 50% water loss at 10' |
| 15 | 15.0 | | | | | | |
| 25.8 | 15.0 – 16.5 | 1.3 | SS-4 | 13-30-33 (63) | **Silt (ML)** 15.0-16.3' - grayish yellow, (5Y 8/4), moist to wet, hard, nonplastic, slow dilatancy, mild HCl reaction, 10% fine to medium sand-sized, <5% limestone fragments to 1/2", all carbonate materials | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | CT-04 SHEET 2 OF 3 |

# SOIL BORING 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

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 bgs on 11/30/07 START : 11/29/2007 END : 11/30/2007 LOGGER : T. Borton

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 20.8 | 20.0 – 21.5 | 1.2 | SS-5 | 24-32-30 (62) | **Silt With Sand And Limestone (ML)** 20.0-21.2' - grayish yellow, (5Y 8/4), wet, hard, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 15% fine to medium sand-sized, 15-20% fine rounded limestone grains, some are knobby connections, carbonate materials | | |
| 25 / 15.8 | 25.0 – 25.3 | 0.0 | SS-6 | 50/3 (50/3") | **No Recovery 25.0-25.3'** | | |
| 30 / 10.8 | 30.0 – 31.5 | 1.3 | SS-7 | 38-51-45 (96) | **Silty Sand (SM)** 30.0-31.3' - grayish yellow, (5Y 8/4), wet, very dense, fine to coarse grained, moderate HCl reaction, 30% nonplastic fines, 10-15% fine limestone fragments and grains, carbonate materials | | |
| 35.0 – 35.1 | | 0.0 | SS-8 | 50/1.5 (50/1.5") | **No Recovery 35.0-35.1'** | | |
| 35 / 5.8 | | | | | Begin Rock Coring at 35.0 ft bgs<br>See the next sheet for the rock core log | | 11/30/07 08:00 continue drilling<br>Water level 4.0' below ground surface |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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

WATER LEVELS : 4.0 ft bgs on 11/30/07 START : 11/29/2007 END : 11/30/2007 LOGGER : T. Borton

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 5.8 | 35.0 R1-NQ 1 ft 90% 36.0 | 42 | >10 | 35.45-35.65' - Fracture zone, fine infilling (20-30% of zone) | | **Limestone** 35.0-35.45' - yellowish gray, (5Y 7/2), fine to coarse grained, mild HCl reaction, very weak to weak (R1 to R2), voids to 1/8" (predominantly <1/16") over 20-30% of surface, fossiliferous (casts/molds) | Begin rock coring at 35.0' R1: 2 minutes |
| | R2-NQ 5 ft 78% | 28 | 3 | 35.7' - Bedding plane, <5 deg, <1/16" open 35.8' - Bedding plane, <5 deg, <1/16" open 36.2' - Fracture, <5 deg, rough, undulating, open to 1/4" | | 35.45-35.9' - Same as 35.0-35.45' except extremely weak (R0) **No Recovery 35.9-36.0'** | |
| | | | 2 | 36.6' - Bedding plane, <5 deg, rough, undulating, tight | | **Limestone** 36.0-39.9' - yellowish gray, (5Y 7/2), fine to coarse grained, mild HCl reaction, very weak to weak (R1 to R2), with zones of extremely weak (R0) rock at 36.5-36.6' and 37.5-38.15', voids to <1/16" over 15-25% of surface, fossiliferous (casts/molds), <5% possible laminar bedding planes | |
| | | | 3 | 36.75' - Fracture, 70-75 deg, rough, undulating, tight 36.9' - Mechanical break or fracture, <5 deg, rough, undulating, tight | | | |
| | | | 0 | 37.25' - Bedding plane, <5 deg, rough, undulating, fine to coarse sand sized infill, no opening, open 1/8"-1/2" | | | |
| 40 0.8 | | | NR | 37.7' - Bedding plane, <5 deg, rough, undulating, tight | | | R2: 8 minutes |
| | 41.0 | | | | | **No Recovery 39.9-41.0'** | |
| | R3-NQ 5 ft 84% | 53 | >10 | 38.2' - Bedding plane, <5 deg, rough, undulating, open 3/16", fine to coarse sand-sized infill, 100% of opening filled | | **Limestone** 41.0-41.55' - Same as 36.0-39.9' except moderately fossiliferous 41.55-45.2' - yellowish gray transitioning to pale olive with depth, (5Y 7/2 to 10YR 6/2), very fine to fine grained, strong to moderate HCl reaction, weak to medium strong (R2 to R3), trace voids (<1/16"), fossiliferous (casts and molds), burrow or solution cavity (3/16" diameter) at 42.28' | Driller's Remark: 100% water loss at 42' |
| | | | 2 | 38.55' - Fracture, 60-70 deg, rough, undulating, open 38.9' - Mechanical break | | | |
| | | | 0 | 41.15' - Bedding plane, <5 deg, rough, undulating, open <1/16" 41.3-41.55' - Fracture zone, fragments to 1" (predominately <1/2") | | | |
| | | | 0 | 42.1' - Fracture, 65-70 deg, smooth, planar | | | |
| 45 -4.2 | | | 1 NR | 42.3' - Mechanical break or bedding plane, <5 deg, rough, undulating, open to 1/16", trace fine infilling | | | R3: Run time not recorded |
| | 46.0 | | | | | **No Recovery 45.2-46.0'** | |
| | R4-NQ 5 ft 94% | 62 | 2 | 45.1' - Mechanical break, 65-75 deg, rough, undulating, tight 45.2' - Fracture, 5 hairline fractures from 45.2' to end of core | | **Limestone** 46.0-50.0' - Same as 41.55-45.2' except zone of weak (R2) rock from 46.8-46.95', voids (<1/16") increasing with depth, 1" solution cavities at 47.35' and 47.7', trace irregular bedding planes | |
| | | | 3 | 46.85' - Bedding plane, <5 deg, rough, planar, trace fine infilling, open 1/4" | | | |
| | | | 0 | 46.95' - Mechanical break, <5 deg, rough, undulating, tight 47.45' - Fracture, 5-15 deg, rough, undulating, open | | | |
| | | | 1 | 47.75' - Fracture, <5 deg, closed, does not go all the way through | | | |
| 50 -9.2 | | | 2 | 47.85' - Mechanical break or bedding plane, <5 deg, rough, undulating, tight 49.55' - Mechanical break or bedding plane, <5 deg, rough, undulating, open <1/16" | | 50.0-50.7' - yellowish gray, (5Y 7/2), medium to coarse grained, mild HCl reaction, very weak to weak (R1 to R2), voids <1/16" over 30-40% of surface, fossiliferous (casts and molds) | R4: Run time not recorded |
| | 51.0 | | NR | 50.0-50.1' - Fracture or bedding plane, <5 deg, rough, undulating, open, one large 0.1' angular fragment 50.5' - Mechanical break or bedding plane, <5 deg, rough, undulating, open <1/16" | | **No Recovery 50.7-51.0'** Bottom of Boring at 51.0 ft bgs on 11/30/2007 | Total depth of boring is 51.0' Driller's Remark: Water level is 3.5' below ground surface |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | CT-05 SHEET 1 OF 5 |

# SOIL BORING 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

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 bgs on 11/14/07 START : 11/12/2007 END : 11/14/2007 LOGGER : J. Schaeffer, T. Borton

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 41.5 | 0.0 – 1.5 | 0.9 | SS-1 | 1-1-2 (3) | **Poorly Graded Sand With Organics (SP)** 0.0-0.9' - pale yellowish brown, (10YR 6/2), moist, very loose, very fine to fine grained, no HCl reaction, silica sand, trace nonplastic fines, 5-10% organics and roots | | Begin drilling on 11/12/07 at 16:00<br>Surface is recently cleared tree plantation |
| 5 | 5.0 | | | | | | |
| 36.5 | 5.0 – 6.5 | 1.0 | SS-2 | 2-2-2 (4) | **Poorly Graded Sand With Clay (SP-SC)** 5.0-5.5' - dark yellowish orange, (10YR 6/6), moist to wet, very loose, fine grained, 9% moderate plasticity fines, silica sand<br>**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 | | 5.0-5.5' SS-2A<br>5.5-6.0' SS-2B |
| 10 | 10.0 | | | | | | |
| 31.5 | 10.0 – 11.5 | 0.9 | SS-3 | 2-3-5 (8) | **Silty Sand (SM)** 10.0-10.2' - light greenish gray, (5GY 8/1), wet, loose, fine to coarse grained, strong HCl reaction, sand is predominately fossil fragments, 20% nonplastic fines<br>**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 HCl reaction in fossil materials | | 10.0-10.2 SS-3A<br>10.2-10.9 SS-3B |
| 15 | 15.0 | | | | | | |
| 26.5 | 15.0 – 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 HCl reaction in the limestone, all carbonate materials | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | CT-05 SHEET 2 OF 5 |

# SOIL BORING 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

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 bgs on 11/14/07 START : 11/12/2007 END : 11/14/2007 LOGGER : J. Schaeffer, T. Borton

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 21.5 | 20.0<br>20.5 | 0.4 | SS-5 | 26-50/0.5<br>(76/6.5") | **Silt And Limestone (ML)**<br>20.0-20.4' - grayish orange, (10YR 7/4), wet, hard, nonplastic, rapid dilatancy, mild HCl reaction, 60% silt and 40% limestone, limestone is fine to coarse sand-sized fragments, friable, mild HCl reaction, one 1/2" iron concretion | | Resume drilling at 08:12 on 11/13/07<br>Driller's Remark: 100% circulation loss<br><br>08:47 3" NW casing installed to 20.0' |
| 25 | 25.0 | | | | | | |
| 16.5 | 26.5 | 1.2 | SS-6 | 29-45-27<br>(72) | **Silt With Sand And Limestone (ML)**<br>25.0-26.2' - grayish orange, (10YR 7/4), wet, hard, nonplastic, rapid dilatancy, mild HCl reaction, 15-25% fine to medium sand-sized varies throughout sample, 25% fine gravel-sized limestone fragments, carbonate materials | | Possible slough top of sample, 3 angular to subangular fragments up to 1.0", strong HCl reaction |
| 30 | 30.0 | | | | | | |
| 11.5 | 31.5 | 0.5 | SS-7 | 20-0-4<br>(4) | **Limestone Fragments And Silt (ML)**<br>30.0-30.4' - grayish orange, (10YR 7/4), 75% limestone in fine to coarse gravel-sized fragments, mild HCl reaction, 25% silt which is wet, soft, nonplastic, rapid dilatancy, mild HCl reaction, carbonate<br>**Assumed Cavity 30.4-31.4'**<br>**Sandy Silt (ML)**<br>31.4-31.5' - grayish orange, (10YR 7/4), wet, soft, nonplastic, rapid dilatancy, mild HCl reaction, 35% fine to coarse sand-sized, carbonate materials | | 20 blows first 6.0" then rods fell 11.0", 4 blows last inch<br>Driller's Remark: Cavity in rod drop zone<br>Soil descriptions for sample SS-7 assumes cavity at 30.4-31.4' based on soil sample appearance and driller's note<br><br>10:03 Casing advanced to 30' |
| 35 | 35.0 | | | | | | |
| 6.5 | 36.2 | 1.2 | SS-8 | 23-51-50/2.5<br>(101/8.5) | **Silty Sand With Limestone (SM)**<br>35.0-35.5' - grayish orange, (10YR 7/4), wet, very dense, fine to coarse grained, moderate HCl reaction, 26% nonplastic fines, 32% fine to coarse gravel-sized limestone fragments, all carbonate materials<br>**Silty Sand (SM)**<br>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 | | 10:35 Casing advanced to 35.0'<br>35.0-35.5' SS-8A<br>35.5-36.2' SS-8B<br><br>Driller's Remark: 100% water loss at 38.0' |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | CT-05 SHEET 3 OF 5 |

# SOIL BORING 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

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 bgs on 11/14/07 START : 11/12/2007 END : 11/14/2007 LOGGER : J. Schaeffer, T. Borton

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 1.5 | 40.0 – 41.5 | 1.3 | SS-9 | 15-8-6 (14) | **Silty Sand (SM)** 40.0-41.3' - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to 10YR 4/2), wet, medium dense, fine to coarse grained, mild to moderate HCl reaction, 25% nonplastic fines, 10-15% fine gravel-sized limestone fragments, all carbonate materials | | Driller's Remark: Chatter at 43.5' |
| 45 / -3.5 | 45.0 – 45.2 | 0.0 | SS-10 | 50/2.5 (50/2.5") | **No Recovery 45.0-45.2'** Begin Rock Coring at 45.0 ft bgs See the next sheet for the rock core log | | |
| 50 / -8.5 | | | | | | | |
| 55 / -13.5 | | | | | | | |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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

WATER LEVELS : 4.4 ft bgs on 11/14/07 START : 11/12/2007 END : 11/14/2007 LOGGER : J. Schaeffer, T. Borton

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | RQD (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -3.5 | 45.0 R1-NQ 1 ft 100% 46.0 | 33 | 3 | 45.35, 45.58' - Mechanical break (2), 10-15 deg, rough, undulating, tight | | **Limestone** 45.0-46.5' - light olive gray, (5Y 6/1), fine to medium grained, moderate HCl reaction, weak (R2), strong HCl reaction where pulverized, highly fossiliferous (casts/molds over 40-50% of sample), voids (up to 1/16") over 10-15% of surface, trace voids up to 1/2" | Casing set at 45.0' Begin coring with NQ, hard formation bit Driller's Remark: Water level approximately 7.0' below ground surface 08:11 Begin drilling first run on 11/14/07 First run only 1 foot to set stroke R1: 4 minutes |
| | R2-NQ 5 ft 90% | 57 | >10 | 45.76' - Bedding plane, <5 deg, rough, planar, open <1/16" 46.15-46.3' - Fracture zone, subangular limestone fragments (up to 1-1/2") | | | |
| | | | 1 | 46.45' - Bedding plane, <5 deg, rough, undulating | | | |
| | | | 2 | 46.8' - Fracture, 80-90 deg, rough, undulating 47.1' - Mechanical break or bedding plane, <5 deg, smooth, stepped | | 46.5-50.5' - Same as 45.0-46.5' except fine grained, very weak (R1), transitions to yellowish gray (5Y 5/2) with depth (by 48.9'), 15-25% fossils (casts/molds), voids (up to 1/16") over 5-10% of surface increasing to 15-25% with depth | |
| | | | 3 | 48.1, 48.5, 48.85' - Mechanical break (3), <10 deg, rough, undulating | | | |
| 50 -8.5 | | | 2 | 49.0' - Mechanical break or bedding plane, <10 deg, rough, undulating | | | Driller's Remark: Softer at 49.5' R2: 27 minutes |
| | 51.0 | | NR | 49.5, 49.6' - Mechanical break or bedding plane (2), <10 deg, rough, undulating | | **No Recovery 50.5-51.0'** | |
| | R3-NQ 5 ft 57% | 39 | 0 | 50.0' - Fracture, 5-15 deg, rough, undulating 50.4' - Mechanical break, 5-10 deg, rough, undulating | | **Limestone** 51.0-53.85' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine to medium grained, mild to moderate HCl reaction, very weak (R1), fossiliferous (casts/molds), voids (up to 1/16") over 15-25% of surface | |
| | | | 2 | 52.5' - Mechanical break, <5 deg, rough, undulating, tight | | | Driller's Remark: Soft at 52.0' |
| | | | >10 | 52.75' - Mechanical break or bedding plane, <5 deg, rough, undulating, tight | | | |
| | | | NR | 53.15-53.75' - Fracture zone, general orientation 75-85 deg with multiple breaks <5 deg, possibly many mechanical breaks or bedding planes along a long fracture, limestone fragments up to 2-1/2" | | **No Recovery 53.85-56.0'** | |
| 55 -13.5 | | | | | | | R3: 9 minutes Driller's Remark: Harder at 55.0', no circulation |
| | 56.0 | | | | | | |
| | R4-NQ 5 ft 100% | 62 | 2 | 56.1, 56.5' - Bedding plane (2), <5 deg, rough, undulating, tight to open <1/16" | | **Limestone** 56.0-61.0' - yellowish gray, (5Y 7/2), fine to medium grained, mild to moderate HCl reaction, very weak to weak (R1 to R2), weak (R1) rock at 58.5-58.8', fossiliferous (casts and trace molds), voids (up to 1/16") over 5-15% of surface decreasing with depth | |
| | | | 2 | | | | |
| | | | 2 | 57.7' - Mechanical break, 1-5 deg, rough, undulating, tight 57.9' - Bedding plane, <5 deg, rough, planar, tight | | | |
| | | | 2 | 58.3' - Fracture, 5-10 deg, smooth, planar, open <1/16", trace infill (fines) | | | |
| 60 -18.5 | | | 3 | 58.9' - Mechanical break, <5 deg, rough, undulating, tight 59.55' - Bedding plane, 5-10 deg, rough, undulating, open 1/8" | | | R4: 11 minutes |
| | 61.0 | | | | | | |
| | R5-NQ 5 ft 100% | 52 | 2 | 59.75' - Mechanical break or bedding plane, <5 deg, rough, undulating, tight 60.1' - Fracture, <5 deg, rough, undulating, open 1/8" | | 61.0-66.0' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine to medium grained, mild to moderate HCl reaction, very weak to weak (R1 to R2), very weak (R1) rock transitions with depth to weak (R2) rock, voids (up to 1/16") over 5-15% of surface decreasing with depth, trace fossils (casts/molds) | |
| | | | 5 | 60.3' - Mechanical break, <5 deg, rough, undulating, tight | | | Driller's Remark: Water level at 4.4' |
| | | | 2 | 60.8' - Fracture or bedding plane, <5 deg, rough, undulating, open 1/4"-1/2", less than 1/2" fragment in opening | | | |
| | | | >10 | 61.07' - Mechanical break or bedding plane, 1-5 deg, rough, undulating, open <1/16" | | | |
| 65 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | CT-05 SHEET 5 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

WATER LEVELS : 4.4 ft bgs on 11/14/07 START : 11/12/2007 END : 11/14/2007 LOGGER : J. Schaeffer, T. Borton

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -23.5 | | | 0 | 61.8' - Mechanical break, <5 deg, rough, undulating, tight<br>62.1' - Mechanical break or bedding plane, <5 deg, rough, undulating, tight<br>62.25' - Mechanical break, <5 deg, rough, undulating, tight<br>62.9, 63.0' - Mechanical break or bedding plane (2), <5 deg, rough, undulating, tight<br>63.15' - Bedding plane, <5 deg, rough, undulating, tight<br>63.7, 64.1' - Mechanical break (2), <5 deg, rough, undulating, tight<br>64.43' - Mechanical break or bedding plane, <5 deg, rough, undulating, open 1/8"<br>64.72-65.05' - Fracture zone, no orientation, limestone fragments up to 1/2" | | | R5: 10 minutes |
| | 66.0 | | | | | Bottom of Boring at 66.0 ft bgs on 11/14/2007 | Total depth of boring 66.0', work plan criteria met |
| | | | | | | | Total 20 bags Portland Type I/II coated bentonite chips from 23.0-16.0' below ground surface<br>3/4 bag bentonite, 100 gallons of water<br><br>17:11 Grout to surface |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | CT-06 SHEET 1 OF 7 |

# SOIL BORING 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

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

WATER LEVELS : 0.5 ft bgs on 11/13/07 START : 11/12/2007 END : 11/14/2007 LOGGER : P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 41.4 | 0.0 | 1.5 | SS-1 | 3-4-6 (10) | **Topsoil** 0.0-0.2' - wood chips, no roots, silica sand | | |
| | 1.5 | | | | **Poorly Graded Sand (SP)** 0.2-1.5' - pale yellowish brown, (10YR 8/2), moist, loose, fine grained, no HCl reaction, silica sand, trace nonplastic fines, organic matter at 0.2-0.4' | | |
| 5 | 5.0 | | | | | | |
| 36.4 | | 1.1 | SS-2 | 3-4-5 (9) | **Poorly Graded Sand (SP)** 5.0-6.1' - very pale orange to grayish orange, (10YR 8/2 to 10YR 7/4), wet, loose, fine grained, no HCl reaction, silica sand, trace nonplastic fines, trace roots | | |
| | 6.5 | | | | | | |
| 10 | 10.0 | | | | | | |
| 31.4 | | 1.4 | SS-3 | 4-4-5 (9) | **Poorly Graded Sand (SP)** 10.0-11.4' - yellowish gray, (5Y 8/1), wet, loose, fine grained, no HCl reaction, silica sand, trace nonplastic fines | | |
| | 11.5 | | | | | | |
| 15 | 15.0 | | | | | | |
| 26.4 | | 1.3 | SS-4 | 4-5-6 (11) | **Sand Silt (ML)** 15.0-16.3' - light gray, (N7), wet, stiff, nonplastic, no HCl reaction, 38% fine grained silica sand | | |
| | 16.5 | | | | | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | CT-06 SHEET 2 OF 7 |

# SOIL BORING 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

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

WATER LEVELS : 0.5 ft bgs on 11/13/07 START : 11/12/2007 END : 11/14/2007 LOGGER : P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 21.4 | 20.0 – 21.5 | 1.3 | SS-5 | 3-4-2 (6) | **Sandy Fat Clay (CH)** 20.0-20.5' - very light gray with very pale blue mottling, (N8 with 5B 8/2), wet, medium stiff, high plasticity, no dilatancy, no HCl reaction, 25-30% very fine to fine grained silica sand | | Stop SPT for the day 11/12/07 at 17:00<br>Resume SPT on 11/13/07 at 08:00<br>Water level 0.5' below ground surface |
| | | | | | **Silty Sand (SM)** 20.5-21.3' - very light gray, (N9), wet, loose, fine grained, no HCl reaction, silica sand, 30% low plasticity fines | | |
| 25 | 25.0 | | | | | | |
| 16.4 | 26.5 | 0.6 | SS-6 | 0-0-0 (0) | **Fat Clay (CH)** 25.0-25.6' - pale brown, (5YR 5/2), wet, soft, medium to high plasticity, slow dilatancy, no HCl reaction, trace fine grained silica sand, final 0.05' of sample consists of compacted silica sand or fine grain sandstone | | Weight of hammer drove SS-6 (25.0-25.6') through all 18" for SPT<br>Driller's Remark: 25% loss of circulation at 27.5', some drill chatter |
| 30 | 30.0 | | | | | | |
| 11.4 | 30.9 | 0.6 | SS-7 | 31-50/4.5 (81/10.5") | **Silt (ML)** 30.0-30.6' - grayish orange, (10YR 7/4), wet, hard, nonplastic, rapid dilatancy, mild HCl reaction, 7% fine to medium sand sized, all carbonate materials | | |
| 35 | 35.0 | | | | | | |
| 6.4 | 36.5 | 0.7 | SS-8 | 25-32-29 (61) | **Silty Sand (SM)** 35.0-35.7' - grayish orange, (10YR 7/4), wet, dense, fine to coarse grained, mild to moderate HCl reaction, 25% nonplastic fines, 5-10% fine gravel-size limestone fragments, all carbonate material | | |
| | 40.0 | | | | | | End SPT soil sampling<br>Switching to rock coring at 09:20 (refusal blow count, limestone fragments) |
| | 40.3 | 0.1 | SS-9 | 50/3.5 (50/3.5") | **Limestone Fragments** 40.0-40.1' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, fragments up to 1/2" | | |
| 40 | | | | | | | |
| | | | | | Begin Rock Coring at 40.0 ft bgs<br>See the next sheet for the rock core log | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | CT-06 SHEET 3 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 ORIENTATION : Vertical

WATER LEVELS : 0.5 ft bgs on 11/13/07 START : 11/12/2007 END : 11/14/2007 LOGGER : P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 1.4 | 40.0 R1-NQ 1.5 ft 40% 41.5 | 29 | 1<br>NR | 40.2' - Mechanical break<br>40.4-40.8' - Fracture, 80 deg, rough, undulating, open | | **Limestone**<br>40.0-40.8' - grayish orange, (10YR 7/4), fine grained, moderate HCl reaction, weak (R2), voids (1/16") over 10% of core surface, trace casts to 1/4"<br>**No Recovery 40.8-46.5'** | Begin coring from 40.0' at 10:30, 11/13/07 (depth of coring start adjusted to remove 0.5' of slough counted on the field log)<br>R1: 8 minutes<br>Driller's Remark: No resistance to drilling at 41.5-46.5', no circulation loss<br>Driller's Remark: Stop to clean mud at 11:30, too much silt/fines |
| 45<br>-3.6 | R2-NQ 5 ft 0% 46.5 | 0 | NR | | | | R2: 3 minutes |
| 50<br>-8.6 | R3-NQ 5 ft 40% 51.5 | 13 | 5<br>4<br>NR | 46.6' - Mechanical break<br>46.7-46.8' - Fracture, 45 deg, rough, undulating, open<br>47.1-47.2' - Fracture (3), horizontal, rough, undulating, loose fragments 1" in size, open<br>47.4' - Fracture, 30 deg, rough, planar, 1/4" open<br>47.7' - Fracture, horizontal, smooth, undulating, <1/16", open, related to cavity at 47.7'<br>47.9' - Fracture, horizontal, rough, undulating, open<br>47.9-48.1' - Fracture, 60 deg, rough, undulating, 1/8" relief<br>48.4' - Fault, horizontal, smooth, planar to undulating, <1/8" relief | | **Limestone**<br>46.5-48.5' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, weak to medium strong (R2 to R3), trace to 10% voids up to 1/16", trace cavities up to 3/4"x1-9/16", partly infilled with fossiliferous carbonate material<br>**No Recovery 48.5-56.5'** | Driller's Remark: Soft at 47.0-48.5', 100% circulation lost at 47.0'<br>R3: 16 minutes |
| 55<br>-13.6 | R4-NQ 5 ft 0% 56.5 | 0 | NR | | | | Driller's Remark: Soft throughout run R4, still no circulation<br>R4: 4 minutes |
| 60 | R5-NQ 5 ft 18% | 0 | 3<br>NR | 56.65' - Fracture, horizontal, rough, undulating, 1/8" open<br>56.9' - Fracture, 10 deg, rough, undulating, 1/8" open<br>57.0' - Mechanical break<br>57.1-57.3' - Fracture, 60 deg, rough, undulating to planar, black staining over 80% of surface | | **Limestone**<br>56.5-57.4' - grayish orange, (10YR 7/4), fine to medium grained, mild HCl reaction, weak (R2), voids to 1/16" over 15% of core surface, trace fossil casts and cavities up to 3/8" at 56.5-56.8'<br>**No Recovery 57.4-61.5'** | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: CT-06 | SHEET 4 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 ORIENTATION : Vertical

WATER LEVELS : 0.5 ft bgs on 11/13/07 START : 11/12/2007 END : 11/14/2007 LOGGER : P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -18.6 | | | | | | | R5: 10 minutes |
| 61.5 | | | | | | | |
| | R6-NQ 5 ft 28% | 0 | 0<br>0<br>NR | | | **Silt With Sand (ML)**<br>61.5-62.9' - grayish orange, (10YR 7/4), wet, hard, nonplastic, mild HCl reaction, 15% fine to very fine sand-sized particles, all carbonate material<br>**No Recovery 62.9-71.5'** | No SPT taken |
| 65<br>-23.6 | | | | | | | R6: 8 minutes<br>Stop for day 11/13/07 at 17:00<br>Resume coring on 11/14/07 at 8:00; depth is 66.5'<br>Water level 4.0' below ground surface<br>Casing advanced to 65.0'<br>Driller's Remark: Circulation returned |
| 66.5 | | | | | | | |
| | R7-NQ 5 ft 0% | 0 | NR | | | | |
| 70<br>-28.6 | | | | | | | R7: 26 minutes<br>Driller's Remark: Rock fragments lodged in core barrel, likely destroyed sample<br>Driller's Remark: Soft at 71.5-74.5', increased resistance from 74.5-76.5' |
| 71.5 | | | | 71.1' - Fracture, horizontal, rough, undulating, 1/4" open | | | |
| | R8-NQ 5 ft 80% | 0 | >10<br>2<br>2<br>0<br>NR | 71.8-72.0' - Fracture zone, rock fragments<br>72.3' - Mechanical break<br>72.8' - Fracture, horizontal, rough, undulating, 1/2" open<br>73.1' - Mechanical break<br>73.2' - Fracture, 0-30 deg, rough, undulating, tight, variable angle<br>73.9' - Fracture, horizontal, rough, undulating, tight<br>74.0' - Fracture, horizontal, rough, undulating, tight<br>74.8' - Mechanical break<br>74.9' - Mechanical break | | **Limestone**<br>71.5-75.5' - grayish orange, (10YR 7/4), medium grained, mild HCl reaction, extremely weak (R0), no visible voids or cavities | |
| 75<br>-33.6 | | | | | | **No Recovery 75.5-76.5'** | R8: 10 minutes |
| 76.5 | | | | | | | |
| | R9-NQ 5 ft 62% | 23 | 2<br>>10<br>2<br>0 | 76.7' - Fracture, horizontal, rough, undulating, 1/8" open<br>77.45' - Fracture, 10 deg, rough, undulating, 1/8" open<br>77.7-77.85' - Fracture zone, fine to coarse sand-sized and gravel-sized fragments<br>78.3' - Fracture, horizontal, rough, undulating, 1/4" open | | **Limestone**<br>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"<br>78.2-79.6' - grayish orange, (10YR 7/4), fine to medium grained, mild HCl reaction, extremely weak (R0), no visible voids or cavities<br>**No Recovery 79.6-81.5'** | Driller's Remark: Circulation loss (100%) at 76.0'<br>Driller's Remark: Medium resistance from 76.5-78.5'<br>Driller's Remark: Hard at 78.5-81.8'<br>Driller's Remark: Soft at 81.5-83.0'<br>Driller's Remark: Hard at 83.0-84.5' |
| 80 | | | | | | | |

| 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 ORIENTATION : Vertical

WATER LEVELS : 0.5 ft bgs on 11/13/07 START : 11/12/2007 END : 11/14/2007 LOGGER : P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -38.6 | | | NR | 78.9' - Fracture, horizontal, rough, undulating, tight<br>79.5' - Fracture, 20 deg, rough, undulating, 1/8" open | | | R9: 11 minutes |
| | 81.5 | | | | | | |
| | R10-NQ<br>5 ft<br>32% | 8 | >10<br>1<br>NR | 81.5-82.1' - Fracture zone, fine to coarse sand-sized and fine to coarse gravel fragments<br>82.1-82.4' - Fracture, 70 deg, rough, undulating, opposing face fractured<br>82.4-82.5' - Fracture, 45 deg, rough, undulating, 1/4" open<br>83.0' - Mechanical break | | **Limestone**<br>81.5-83.1' - grayish orange, (10YR 7/4), fine grained, mild HCl reaction, weak (R2), trace voids to 1/16"<br>**No Recovery 83.1-86.5'** | |
| 85<br>-43.6 | | | | | | | Driller's Remark: Soft at 84.5-85.5'<br>R10: 6 minutes<br>Driller's Remark: Hard at 85.5-86.5' |
| | 86.5 | | | | | | |
| | R11-NQ<br>5 ft<br>74% | 32 | >10<br>1<br>>10<br>0<br>NR | 86.5-87.1' - Fracture zone, two dominant 60 deg fractures, at 86.5-86.7' and 86.7-87.0', rough and undulating surfaces, multiple fragments of fine gravel size<br>88.05' - Fracture, horizontal, rough, undulating, opposite face at 60º; open<br>88.5-88.8' - Fracture zone, several medium gravel-sized fragments, terminates at 60 deg face<br>89.1-89.4' - Fracture zone, medium to coarse gravel-sized fragments | | **Limestone**<br>86.5-90.2' - grayish orange, (10YR 7/4), fine grained, moderate HCl reaction, weak (R2), 10-15% coverage of voids up to 1/16", trace cavities up to 3/8"x-9/16", cavities increasing in frequency with depth<br>**No Recovery 90.2-91.5'** | Driller's Remark: Medium drilling at 86.5-88.0'<br>Driller's Remark: Hard at 88.0-91.5'<br>R11: 15 minutes |
| 90<br>-48.6 | | | | | | | |
| | 91.5 | | | | | | |
| | R12-NQ<br>5 ft<br>20% | 0 | >10<br>NR | 91.5-91.9' - Fracture zone, medium to coarse gravel-sized fragments<br>92.2' - Fracture, horizontal, rough, undulating, 1/4" open | | **Limestone**<br>91.5-92.5' - grayish orange, (10YR 7/4), fine grained, moderate HCl reaction, weak (R2), 15% coverage of voids up to 1/16", trace cavities/fossil molds up to 1/4"x3/16"<br>**No Recovery 92.5-96.5'** | |
| 95<br>-53.6 | | | | | | | R12: 6 minutes |
| | 96.5 | | | | | | |
| | R13-NQ<br>5 ft<br>86% | 35 | >10<br>NR<br>1<br>>10 | 96.7-97.2' - Fracture zone, coarse gravel-sized fragments<br>98.1' - Fracture, 10 deg, rough, undulating, open<br>98.6' - Fracture, horizontal, smooth, undulating, 1/4" open | | **Limestone**<br>96.5-96.7' - Same as 91.5-92.5'<br>96.7-97.2' - very pale orange, (10YR 8/2), fine grained, mild HCl reaction, medium strong (R3)<br>**No Recovery 97.2-97.9'**<br>**Limestone**<br>97.9-99.3' - Same as 96.7-97.2' except 2 large cavities (3-7/8"x3/8") at 98.9-99.2' | Driller's Remark: Rock fragments stuck in core barrel at 98.0'; removed barrel to clear, resumed coring 98.0-101.5'<br>Core loss assumed to be 97.2-97.9'; lithologic description intervals adjusted accordingly |
| 100 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | CT-06 SHEET 6 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 ORIENTATION : Vertical

WATER LEVELS : 0.5 ft bgs on 11/13/07 START : 11/12/2007 END : 11/14/2007 LOGGER : P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | RQD (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -58.6 | | | >10 | 99.1-99.3' - Fracture zone, fine to large gravel-sized fragments | | **Limestone** 99.3-101.5' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, weak (R2), 15% coverage of voids to 1/16", trace casts/cavities to 3/8x1-3/16" 101.5-105.5' - pale yellowish brown, (10YR 6/2), fine grained, mild HCl reaction, weak (R2), trace to 10% coverage of voids up to 1/8", trace cavities up to 1/4x1/4", large (2-3/8x1-9/16") cavity at 101.8 to 102.0' | R13: 15 minutes |
| | | | 1 | 99.7-99.9' - Fracture zone, gravel-sized fragments | | | |
| | 101.5 | | | | | | |
| | R14-NQ 5 ft 80% | 28 | 1 | 100.3' - Fracture, 30 deg, rough, undulating, tight | | | |
| | | | >10 | 101.9' - Fracture, horizontal, rough, undulating, 1/8" open | | | |
| | | | 3 | 102.8-102.9' - Fracture zone, gravel-sized fragments | | | |
| | | | >10 | 103.1' - 30 deg, rough, undulating, 1/8" open | | | |
| 105 -63.6 | | | NR | 103.1-103.4' - Fracture, vertical, rough, undulating, 1/8" open | | **No Recovery 105.5-106.5'** | R14: 9 minutes |
| | | | | 103.4' - Fracture, horizontal, rough, undulating, 1/4" open | | | |
| | | | | 103.8' - Fracture, 40 deg, rough, undulating, 1/8" open | | | |
| | 106.5 | | | 104.0' - Fracture, 40 deg, rough, undulating, 1/8" open | | | |
| | R15-NQ 5 ft 54% | 17 | >10 | 104.2' - Mechanical break | | **Limestone** 106.5-109.2' - grayish orange, (10YR 7/4), fine grained, mild HCl reaction, weak (R2), 10% coverage of voids up to 3/16", trace cavities 3/8"x2-3/8" | |
| | | | 2 | 104.5' - Fracture, 10 deg, rough, undulating, 1/8" open | | | |
| | | | >10 | 104.8-105.0' - Fracture zone, coarse gravel-sized fragments | | | |
| 110 -68.6 | | | NR | 105.1-105.3' - Fracture, 60 deg, rough, undulating, tight | | **No Recovery 109.2-111.5'** | R15: 5 minutes |
| | | | | 106.5-107.4' - Fracture zone, gravel-sized fragments | | | |
| | | | | 107.5-107.6' - Fracture, 60 deg, rough, undulating, 1/8" open | | | |
| | | | | 108.4' - Fracture, horizontal, rough, undulating, open | | | |
| | | | | 108.7-109.2' - Fracture zone, gravel-sized fragments | | | |
| | 111.5 | | | | | | |
| | R16-NQ 5 ft 22% | 15 | >10 | 111.6-111.7' - Fracture zone | | **Limestone** 111.5-112.6' - grayish orange, (10YR 7/4), fine grained, mild HCl 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 (1-3/16" diameter) at 112.1' **No Recovery 112.6-116.5'** | |
| | | | 0 | 112.1-112.2' - Fracture zone | | | |
| 115 -73.6 | | | NR | | | | R16: 3 minutes |
| | 116.5 | | | | | | |
| | R17-NQ 5 ft 64% | 0 | 0 | 116.5-117.5' - unconsolidated silts/sands | | **Well Graded Sand (SW)** 116.5-117.5' - grayish orange, (10YR 7/4), wet, loose, fine to coarse grained, mild HCl reaction, trace nonplastic fines, all carbonate material | |
| | | | >10 | 117.8' - Fracture, 80 deg, rough, undulating, tight | | **Limestone** 117.5-118.1' - grayish orange, (10YR 7/4), fine grained, mild HCl reaction, weak (R2), trace voids to 1/16" | |
| | | | >10 | 118.0-119.5' - Fracture zone or mechanical break | | | |
| 120 | | | 1 | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: CT-06 SHEET 7 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 ORIENTATION : Vertical

WATER LEVELS : 0.5 ft bgs on 11/13/07 START : 11/12/2007 END : 11/14/2007 LOGGER : P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (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 | | **Limestone**<br>118.1-119.5' - Same as 117.5-118.1' except extremely weak (R0)<br>119.5-119.7' - Same as 117.5-118.1'<br>**No Recovery 119.7-121.5'** | R17: 7 minutes |
| 121.5 | R18-NQ 5 ft 58% | 17 | 3 | 121.7' - Fracture, horizontal, rough, undulating, open | | **Limestone**<br>121.5-124.4' - very pale orange mottled with medium light gray, (10YR 8/2 with N6), fine grained, mild HCl reaction, weak (R2), 10% coverage of voids up to 3/16" at 121.5-122.5', 10% fossil casts (up to 3/16"x3/8") at 123.7-123.9'<br>**No Recovery 124.4-126.5'** | |
| | | | 4 | 122.35' - Fracture, horizontal, rough, undulating, open<br>122.4' - Mechanical break | | | |
| | | | 0 | 122.85' - Fracture, horizontal, rough, undulating, open<br>123.0-123.1' - Fracture, 60 deg, rough, undulating, 1/8" open | | | |
| 125<br>-83.6 | | | NR | 123.1-123.2' - Fracture, 70 deg, rough, undulating, open<br>123.3' - Fracture, 60 deg, rough, undulating, open<br>123.6' - Mechanical break<br>124.0' - Mechanical break | | | R18: 9 minutes<br>Total Depth of boring 126.5' |
| 126.5 | | | | | | Bottom of Boring at 126.5 ft bgs on 11/14/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | CT-07 SHEET 1 OF 5 |

# SOIL BORING 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

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 bgs on 11/27/07 START : 11/16/2007 END : 11/27/2007 LOGGER : P. De Sa'rego, T. Borton

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.0 | 0.0 – 1.5 | 1.4 | SS-1 | 1-1-2 (3) | **Poorly Graded Sand With Organics (SP)** 0.0-1.4' - moist, very loose, brownish gray (5YR 8/1) from 0.0-0.5', very light gray (N5) from 0.5-1.4', fine silica sand, trace nonplastic fines, 20% roots/organic matter over 0.0-0.5' | | |
| 5 | 5.0 – 6.5 | 0.8 | SS-2 | 2-1-1 (2) | **Poorly Graded Sand With Silt (SP-SM)** 5.0-5.8' - grayish orange, (10YR 7/4), wet, very loose, no HCl reaction, fine silica sand, 5-10% nonplastic fines | | |
| 37.0 | | | | | | | |
| 10 | 10.0 – 11.5 | 1.3 | SS-3 | 8-3-6 (9) | **Limestone Fragments With Silty Sand** 10.0-11.3' - very pale orange, (10YR 7/4), silty sand is wet, loose, moderate HCl reaction, fine to coarse sand-sized, 35-40% low plastic fines, all carbonate, 70% fine to coarse gravel-sized limestone fragments, 30% silty sand | | Advanced 15.0' NW casing |
| 32.0 | | | | | | | |
| 15 | 15.0 – 16.5 | 1.0 | SS-4 | 2-2-2 (4) | **Silty Sand (SM)** 15.0-16.0' - yellowish gray, (5Y 8/1), wet, very loose, strong HCl reaction, 20% fines, fine to coarse sand-sized grains, all carbonate materials including one limestone fragment (1") subrounded to subangular | | Continue drilling 11/27/07<br>Driller's Remark: 10:08 water level at 3.5' below ground surface |
| 27.0 | | | | | | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | CT-07 SHEET 2 OF 5 |

# SOIL BORING 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

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 bgs on 11/27/07 START : 11/16/2007 END : 11/27/2007 LOGGER : P. De Sa'rego, T. Borton

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.0 | 20.0 – 21.5 | 1.4 | SS-5 | 2-3-50/5.5 (53/11.5) | **Sandy Clay (CH)** 20.0-20.85' - transitions from light bluish gray to light gray, (5B 7/1 to N7), moist, medium stiff, medium to high plasticity, moderate HCl reaction, 20-25% very fine to fine silica sand | | Tricone bit (3-7/8") SS-5A from 20.0-20.85' SS-5B from 20.85-21.35' |
| | 21.5 – 25.0 | | | | **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 materials | | |
| 25 / 17.0 | 25.0 – 26.5 | 1.5 | SS-6 | 2-15-31 (46) | **Sandy Lean Clay (CL)** 25.0-25.4' - mottled light bluish gray and grayish yellow, (5B 7/1 and 5Y 8/4), wet, stiff, medium plasticity, slow dilatancy, mild to moderate HCl reaction in grayish yellow areas, 20% very fine to fine silica sand, 10% fine to medium carbonate sands | | SS-6A from 25.0-25.4' SS-6B from 25.4-26.45' |
| | 26.5 – 30.0 | | | | **Silt (ML)** 25.4-26.45' - grayish yellow, (5Y 8/4), moist, hard, nonplastic, rapid dilatancy, mild HCl reaction, 5-10% fine to medium sand-sized grains, all carbonate materials | | |
| 30 / 12.0 | 30.0 – 31.5 | 1.0 | SS-7 | 7-12-22 (34) | **Silty Sand (SM)** 30.0-31.0' - grayish yellow, (5Y 8/4), moist, dense, mild HCl reaction, fine to coarse sand-sized, 30-35% nonplastic fines, 10-15% fine gravel-sized limestone fragments, all carbonate materials | | |
| 35 / 7.0 | 35.0 – 35.8 | 0.7 | SS-8 | 18-50/3 (68/9") | **Sandy Silt (ML)** 35.0-35.7' - Same as 30.0-31.0' except nonplastic, rapid dilatancy, 35-40% fine to coarse sand-sized | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

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 bgs on 11/27/07 START : 11/16/2007 END : 11/27/2007 LOGGER : P. De Sa'rego, T. Borton

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.0 | 40.0 – 41.4 | 1.4 | SS-9 | 19-26-50/5 (76/11) | **Sandy Silt (ML)** 40.0-41.4' - grayish yellow, (5Y 8/4), moist, hard, nonplastic, rapid dilatancy, mild HCl reaction, 40-45% fine to coarse sand-sized, 5% fine gravel-sized limestone fragments, carbonate materials | | |
| 45 -3.0 | 45.0 – 45.0 | 0.0 | SS-10 | 50/0.5 (50/0.5") | **Limestone Fragments** 45.0-45.05' - about ten limestone fragments (<1/4") recovered<br>Begin Rock Coring at 45.0 ft bgs<br>See the next sheet for the rock core log | | Driller's Remark: Hard at 44.5'<br>Switch to rock coring at 45.0' |
| 50 -8.0 | | | | | | | |
| 55 -13.0 | | | | | | | |
| 60 | | | | | | | |

| PROJECT NUMBER: 338884.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 ORIENTATION : Vertical

WATER LEVELS : 3.5 ft bgs on 11/27/07 START : 11/16/2007 END : 11/27/2007 LOGGER : P. De Sa'rego, T. Borton

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -3.0 | 45.0 | | | | | | 13:45 Begin rock coring |
| | R1-NQ 1.5 ft 67% | 67 | 0 | | | **Limestone** 45.0-46.0' - light olive gray, (5Y 4/4), fine to medium grained, moderate HCl reaction, weak (R2), fossiliferous (10-20%) casts and molds, voids up to 1/8" (predominantly <1/16") over 5-15% of surface, one void at 45.2' (1"x1/8") | R1: 7 minutes |
| | 46.5 | | NR | | | **No Recovery 46.0-46.5'** | |
| | R2-NQ 5 ft 55% | 55 | 3 | 46.55' - Fracture, <5 deg, rough, undulating, open 1/8" | | **Limestone** 46.5-49.25' - light olive gray with zones of yellowish gray from 47.25-47.4' and from 48.9-49.4', (5Y 5/2 with 5Y 8/4), fine to coarse grained, mild to moderate HCl reaction, weak to medium strong (R2 to R3), voids (<1/16") over 10-20% of core, moderately fossiliferous (casts and molds) | |
| | | | 2 | 46.8' - Fracture, 10-15 deg, rough, undulating, tight | | | |
| | | | 1 | 47.4' - Fracture, 0-10 deg, rough, undulating, open 1/2" with fragments up to 1/2", subrounded to subangular | | | |
| 50 -8.0 | | | NR | 48.1' - Bedding plane or mechanical break, <5 deg, rough, undulating, open <1/16" 48.25' - Mechanical break, <5 deg, rough, undulating, tight 49.1' - Bedding plane, <5 deg, rough, planar, tight | | | R2: 7 minutes |
| | 51.5 | | | | | **No Recovery 49.25-56.5'** | |
| | R3-NQ 5 ft 0% | 0 | NR | | | | Driller's Remark: 51.5-56.5' soft Started to get soft at 50.0' |
| 55 -13.0 | | | | | | | R3: 2 minutes |
| | 56.5 | | | | | | |
| | R4-NQ 5 ft 72% | 32 | 1 | 57.3, 57.7' - Mechanical break or bedding plane (2), <5 deg, rough, undulating, tight | | **Limestone** 56.5-58.1' - yellowish gray to grayish yellow, (5Y 7/2 to 5Y8/4), fine to medium grained, mild to moderate HCl reaction, extremely weak to weak (R0 to R2), highly fossiliferous (90% casts and molds <1/16"-3/16"), voids (<1/16") over 20-30% of surface | |
| | | | 2 | 58.1' - Bedding plane, <5 deg, rough, undulating to planar, tight | | | |
| | | | 1 | | | | |
| 60 -18.0 | | | 0 | | | **Sand With Silt (SM)** 58.1-59.0' - yellowish gray to grayish yellow, (5Y 7/2 to 5Y8/4), fine to coarse grained, nonplastic, mild HCl reaction | |
| | | | NR | | | | R4: 4 minutes |
| | 61.5 | | | | | **No Description 59.0-59.6'** | |
| | R5-NQ 5 ft 94% | 18 | 3 | 61.95, 62.1' - Bedding plane (2), <5 deg, rough, planar, tight | | **Sand With Silt (SM)** 59.6-59.8' - Same as 58.1-59.0' | |
| | | | 2 | 62.5' - Fracture or mechanical break, 70-80 deg, rough, undulating, tight | | **Limestone** 59.8-60.1' - Same as 56.5-58.1' except very weak (R1) | |
| | | | 1 | 62.6' - Same as 62.5' except opposite direction of angles 63.3' - Bedding plane, <5 deg, rough, planar, tight | | **No Recovery 60.1-61.5'** | |
| 65 | | | | | | **Sandy Silt (ML)** 61.5-62.2' - yellowish gray, (5Y 7/2), moist, nonplastic, mild HCl reaction | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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 ORIENTATION : Vertical

WATER LEVELS : 3.5 ft bgs on 11/27/07 START : 11/16/2007 END : 11/27/2007 LOGGER : P. De Sa'rego, T. Borton

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -23.0 | | | 3 | 64.3' - Mechanical break or bedding plane, <5 deg, rough, undulating, open 1/2" | | **Limestone** 62.2-63.3' - yellowish gray, (5Y 7/2), fine to medium grained, mild HCl reaction, very weak (R1), fossiliferous (casts and molds), voids (up to <1/16") over 5-10% of surface | R5: 9 minutes |
| | | | 0 | 64.8' - Mechanical break, 70-80 deg, rough, undulating, tight | | **Sandy Silt (ML)** 63.3-64.0' - Same as 61.5-62.2' | |
| | 66.5 | | NR | 65.0' - Bedding plane or mechanical break, <5 deg, rough, undulating, tight | | **Limestone** 64.0-66.2' - Same as 62.2-63.3' except transitions from extremely weak to very weak (R0 to R1) at 64.3' | |
| | | | 2 | 65.5' - Mechanical break or bedding plane, <5 deg, rough, undulating, tight | | | |
| | | | 3 | 66.7' - Mechanical break or bedding plane, <5 deg, rough, undulating, tight | | | |
| | R6-NQ 5 ft 96% | 57 | 1 | 67.15' - Mechanical break or bedding plane, <5 deg, rough, planar, tight | | | |
| | | | | 67.8' - Bedding plane, <5 deg, rough, undulating, tight | | **No Recovery 66.2-66.5'** | |
| 70 -28.0 | | | 1 | 68.0' - Mechanical break or bedding plane, <5 deg, rough, undulating, tight | | **Limestone** 66.5-71.3' - yellowish gray, (5Y 7/2), fine to medium grained, mild HCl reaction, very weak (R1) with zones of weak (R2) rock from 67.1-67.6', 68.1-69.25', and 70.35-71.3', variable voids (<1/16"-3/16") over 10-20% of surface, fossiliferous casts and molds (10-15%), trace organics | |
| | | | 1 | 68.15' - Fracture, 5-10 deg, rough, undulating, tight | | | R6: 8 minutes |
| | 71.5 | | NR | 69.3, 70.2' - Bedding plane (2), <5 deg, rough, planar, tight | | | |
| | | | 0 | 70.8' - Fracture, 20-30 deg, rough, undulating, tight | | | |
| | | | 1 | 72.95' - Bedding plane, <5 deg, rough, undulating, tight | | **No Recovery 71.3-71.5'** | |
| | R7-NQ 5 ft 95% | 68 | >10 | 73.75-73.95' - Fracture zone, one large fragment 2-1/2" with small fragments <3/4", subrounded to subangular | | **Limestone** 71.5-76.25' - yellowish gray to grayish yellow, (5Y 7/2 to 5Y 8/4), very fine to medium grained, mild HCl reaction, very weak (R1), voids (up to <1/16") over 5-10% of surface, fossiliferous (casts and molds) <5%, extremely weak (R0) from 72.5-73.1' with a trace of fines | |
| 75 -33.0 | | | 1 | 74.15' - Bedding plane, <5 deg, rough, undulating, tight | | | |
| | | | 2 | 74.4' - Bedding plane or mechanical break, <5 deg, rough, undulating, tight | | | R7: 11 minutes |
| | 76.5 | | NR | 75.15' - Bedding plane or mechanical break, <5 deg, rough, undulating, open <1/16" | | | Total depth is 76.5' |
| | | | | 75.5-75.6' - Fracture, <5 deg, rough, undulating, open 1.0" with one large fragment | | **No Recovery 76.25-76.5'** | |
| | | | | 75.95' - Mechanical break or bedding plane, <5 deg, rough, undulating, open <1/16" | | Bottom of Boring at 76.5 ft bgs on 11/27/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | CT-08 SHEET 1 OF 4 |

# SOIL BORING 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

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 bgs on 11/16/07 START : 11/15/2007 END : 11/15/2007 LOGGER : T. Borton, P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.2 | 0.0 – 1.5 | 1.1 | SS-1 | 1-2-2 (4) | **Topsoil** 0.0-0.1' - dark gray to grayish black, (N3 to N2) **Poorly Graded Sand With Organics (SP)** 0.1-1.1' - dark gray to medium light gray with depth, (N3 to N6), moist, very loose, very fine to fine grained, 25% organics, rootlets decreasing with depth, sand is silica | | Begin drilling 11/15/07, 09:00 |
| 5 | 5.0 – 6.5 | 1.1 | SS-2 | 2-2-3 (5) | **Silty Sand (SM)** 5.0-6.1' - light olive brown, with <5% very light gray mottling throughout, (5Y 5/6 with N8), moist to wet, very loose, fine grained, no HCl reaction, 19% medium plasticity fines, trace iron concretions, sand is silica | | |
| 37.2 | | | | | | | |
| 10 | 10.0 – 11.5 | 1.0 | SS-3 | 4-6-14 (20) | **Silt (ML)** 10.0-11.0' - grayish yellow, (5Y 8/4), wet, very stiff, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 10-15% very fine to medium sand-sized, all carbonate material | | |
| 32.2 | | | | | | | |
| 15 | 15.0 – 15.4 | 0.4 | SS-4 | 50/5 (50/5") | **Silt (ML)** 15.0-15.42' - yellowish gray, (5Y 8/1), moist, hard, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 4% very fine to medium sand-sized, all carbonate material | | |
| 27.2 | | | | | | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | CT-08 SHEET 2 OF 4 |

# SOIL BORING 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

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 bgs on 11/16/07 START : 11/15/2007 END : 11/15/2007 LOGGER : T. Borton, P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.2 | 20.0 – 21.3 | 1.3 | SS-5 | 26-33-50/4 (83/10") | **Silt (ML)** 20.0-21.25' - Same as 15.0-15.42' except grayish yellow to yellowish gray, (5Y 8/4 to 5Y 8/1) | | 09:44 Installing casing to 20.0' |
| 25 | 25.0 | | | | | | |
| 17.2 | 25.6 | 0.4 | SS-6 | 24-50/1.5 (74/7.5") | **Silt With Sand (ML)** 25.0-25.4' - grayish yellow to yellowish gray, (5Y 8/4 to 5Y 8/1), moist, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 17% fine sand-sized grains, all carbonate materials | | |
| 30 | 30.0 | | | | | | |
| 12.2 | 31.5 | 1.5 | SS-7 | 17-34-51 (85) | **Sandy Silt (ML)** 30.0-31.5' - dark yellowish orange, (10YR 6/6), moist, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 35% fine to coarse sand-sized, trace fine gravel-sized limestone fragments, moderate to strong HCl reaction in fragments, all carbonate materials | | Driller's Remark: Hard drilling at 34.0'; alternating hard/soft zones similar to elsewhere on site |
| 35 | 35.0 | | | | | | |
| 7.2 | 35.3 | 0.0 | SS-8 | 50/3 (50/3") | **No Recovery 35.0-35.3'** few limestone fragments <1/4", subangular, moderate to strong HCl reaction | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | CT-08 SHEET 3 OF 4 |

# SOIL BORING 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

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 bgs on 11/16/07 START : 11/15/2007 END : 11/15/2007 LOGGER : T. Borton, P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.2 | 40.0 | 1.2 | SS-9 | 23-29-50 (79) | **Sandy Silt (ML)**<br>40.0-41.2' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), moist, hard, low plasticity, moderate HCl reaction, 39% fine to coarse grained sand, 6% gravel, trace of gravel-sized limestone fragments, wavy laminar bedding (grayish yellow [5Y 8/4]), all carbonate materials<br>Begin Rock Coring at 41.5 ft bgs<br>See the next sheet for the rock core log | | Stop SPT sampling at 41.5'<br>Changing to rock coring |
| 45<br>-2.8 | | | | | | | |
| 50<br>-7.8 | | | | | | | |
| 55<br>-12.8 | | | | | | | |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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 bgs on 11/16/07 START : 11/15/2007 END : 11/15/2007 LOGGER : T. Borton, P. De Sa'rego

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 41.5 | | 0 | | | **Limestone**<br>41.5-45.6' - pale yellowish brown, (10YR 6/2), fine grained, mild HCl reaction, weak to medium strong (R2 to R3), very weak (R1) at 45.1-45.6', 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' | Begin rock coring at 41.5' |
| | | | 1 | 43.05' - Fracture or mechanical break, horizontal, rough, undulating, <1/8" open | | | |
| | R1-NQ<br>5 ft<br>82% | 68 | 1 | 43.9' - Fracture, 30 deg, rough, undulating, black staining over 100% of surface, open | | | |
| 45<br>-2.8 | | | 2 | 45.1-45.2' - Fracture, 45 deg, rough, undulating, 1/8" open | | | |
| | | | NR | 45.4' - Fracture, 30 deg, rough, undulating, 1/8" open | | **No Recovery 45.6-46.5'** | R1: 40 minutes |
| | 46.5 | | | | | | |
| | | | 3 | 46.6' - Fracture, 10 deg, rough, undulating, open | | **Limestone**<br>46.5-51.0' - pale yellowish brown, (10YR 6/2), fine grained, mild HCl reaction, weak (R2), becoming very weak to weak rock at 49.8-51.5', trace voids up to 3/16" throughout run, 15% voids to 1/8" from 49.4-49.8', 10% cavities up to 1"x3/8" from 49.4-49.8' | |
| | | | >10 | 47.05' - Fracture, 30 deg, rough, undulating, 1/8" open<br>47.2' - Fracture, 30 deg, 1/8" open, fine gravel-sized fragments | | | |
| | R2-NQ<br>5 ft<br>90% | 58 | 0 | 47.55' - Fracture, 10 deg, rough, undulating, tight<br>47.55-47.95' - Fracture, vertical, rough, undulating, 1/8" open | | | |
| 50<br>-7.8 | | | 2 | 47.95-48.35' - Fracture zone, fine gravel-sized fragments | | | |
| | | | 0 | 49.8' - Fracture or mechanical break, horizontal, rough, undulating, tight | | | R2: 12 minutes |
| | 51.5 | | NR | 50.5' - Mechanical break | | **No Recovery 51.0-51.5'** | Total depth of boring 51.5', on 11/15/07 at 16:00 Recovery and RQD criteria met |
| | | | | | | Bottom of Boring at 51.5 ft bgs on 11/15/2007 | 11/16/07 at 08:15, water level is 5.0' below ground surface |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | D-01 SHEET 1 OF 6 |

# SOIL BORING LOG

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 bgs on 5/22/07 START : 5/22/2007 END : 5/23/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 40.8 | 0.0–1.5 | 0.8 | SS-1 | 1-1-3 (4) | **Poorly Graded Sand W/ Organics (SP)** 0.0-0.55' - very light gray to dark yellowish brown, (N8 to 10YR 4/2), moist, very loose, very fine to fine grained, 10% organic matter, less with depth, trace nonplastic fines, silica sand | | Boring offset 11.5' SE of staked location due to fallen tree at location. |
| | 1.5–5.0 | | | | **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. |
| 5 35.8 | 5.0–6.5 | 0.8 | SS-2 | 5-8-8 (16) | **Sand (SP)** 5.0-5.8' - very light gray, (N8), wet, medium, very fine grained, trace nonplastic fines, trace very fine grained black particles | | |
| 10 30.8 | 6.5–11.5 | 1.2 | SS-3 | 5-6-7 (13) | **Clayey Sand (SC)** 10.0-11.2' - yellowish gray, (5Y 7/2), wet, medium, very fine to fine grained, 30% moderate plastic fines, silica sand | | |
| 15 25.8 | 11.5–16.5 | 1.2 | SS-4 | 8-8-10 (18) | **Clayey Sand (SC)** 15.0-16.2' - Same as 10.0-11.2' except 4" sandy clay lens (CH) at 15.6-15.9', moderate plasticity | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | D-01 SHEET 2 OF 6 |

# SOIL BORING LOG

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 bgs on 5/22/07 START : 5/22/2007 END : 5/23/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 20.8 | 20.0 – 21.5 | 0.4 | SS-5 | 4-4-5 (9) | **Clayey Sand (SC)** 20.0-20.45' - light olive green, (5Y 6/1), wet, loose, very fine to fine grained, 40% low to moderate plasticity fines, silica sand | | Rapid, easy drilling. SS-5 is less plastic than SS-3 and SS-4 |
| 25 | 25.0 | | | | | | |
| 15.8 | 26.5 | 1.3 | SS-6 | 5-5-6 (11) | **Silty Sand (SM)** 25.0-26.3' - Same as 20.0-20.45' except 25-30% low plastic fines | | |
| 30 | 30.0 | | | | | | |
| 10.8 | 31.5 | 1.2 | SS-7 | 3-4-4 (8) | **Silty Sand (SM)** 30.0-31.2' - Same as 25.0-26.3' except 40-45% nonplastic to low plastic fines | | |
| 35 | 35.0 | | | | | | |
| 5.8 | 36.5 | 0.4 | SS-8 | 5-3-4 (7) | **Organic Soil With Sand (OH)** 35.0-35.2' - grayish black, (N2), moist, firm, high plasticity, slow dilatancy, 20% very fine to fine silica sand, trace limestone rounded pebbles<br>**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' | | Slightly slower drilling. |
| 40 | | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: D-01 | SHEET 3 OF 6 |
|---|---|---|

# SOIL BORING LOG

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 bgs on 5/22/07 START : 5/22/2007 END : 5/23/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 0.8 | 40.0 – 41.3 | 0.9 | SS-9 | 48-48-50/4 (100) | **Silt With Sand (ML)** 40.0-40.9' - olive gray, (5Y 3/2), moist, hard, low plasticity, rapid dilatancy, moderate HCl reaction, <20% fine to medium-sized limestone fragments, trace fine gravel-sized limestone | | Hard, slow drilling. No chatter. |
| 45 -4.2 | 45.0 – 45.8 | 0.7 | SS-10 | 50-50/3 (100") | **Sandy Silt (ML)** 45.0-45.65' - olive gray, (5Y 3/2), moist, hard, low to moderate plasticity, rapid dilatancy, moderate HCl reaction, 25-30% fine sand-sized limestone fragments | | Very light, intermittent chatter. |
| 50 -9.2 | 50.0 – 50.7 | 0.5 | SS-11 | 48-50/2 (100") | **Sandy Silt And Limestone Lenses (ML)** 50.0-50.5' - olive gray, (5Y 3/2), wet, hard, low to moderate plasticity, moderate HCl reaction, <30% limestone lenses, 35% fine to coarse sand-sized limestone fragments | | |
| 55 -14.2 | 55.0 – 56.0 | 0.8 | SS-12 | 48-50/5.5 (100") | **Silt With Sand (ML)** 55.0-55.8' - light olive gray, (5Y 5/2), moist to wet, hard, low plasticity, rapid dilatancy, moderate HCl reaction, 20% fine to medium sand sized, 40% organics as seams <1/4" thick and laminations, black (N1) | | 100% circulation loss. Removed NWJ rod and 6" tri-cone, set HW casing to 59.0' below ground surface. Regain 100% circulation at 57.5' below ground surface with HW casing. Stop drilling at 17:30 5/22/07 after setting the casing |
| | 60.0 – 60.1 | 0.1 | SS-13 | 50/1.5 (50/1.5") | **Limestone Fragments** 60.0-60.1' - light olive gray, (5Y 5/2), moderate HCl reaction, fragments <1" diameter, voids <1/16" over 40% of surface | | |
| 60 | | | | | Begin Rock Coring at 60.0 ft bgs<br>See the next sheet for the rock core log | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | D-01 SHEET 4 OF 6 |

# ROCK CORE LOG

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 bgs on 5/22/07 START : 5/22/2007 END : 5/23/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -19.2 | 60.0 R1-NQ 1 ft 40% 61.0 | 40 | 0<br>NR | | | **Limestone**<br>60.0-60.4' - yellowish gray, (5Y 7/2), fine grained, weak to moderate HCl reaction, weak (R2), voids 1/16" over 50% of surface, poorly fossiliferous, few cavities <1/4" diameter<br>**No Recovery 60.4-61.0'** | Continue drilling at 0800 5/23/07, water level at 2.2' below ground surface.<br>Clean out HW casing to 59.0' below ground surface, tri-cone with 3-7/8" bit to 60.0'<br>Light Chatter<br>Remove AWT rod and 3-7/8" tri-cone<br>Set NQ tooling to 60.0'<br>Advance HW casing to seat in top of rock at 60.0'<br>R1: 25 seconds |
| | R2-NQ 5 ft 28% | 9 | >10<br>0<br>NR | 61.1, 61.3' - Fracture or mechanical break, <10 deg, rough, undulating, open <1/2"<br>61.4, 61.65, 61.7, 61.75, 61.8, 61.85' - Fractures or mechanical break, 30 deg and 40 deg, rough, undulating, tight, open <1/4"<br>61.9' - Fractures or mechanical break, horizontal, rough, undulating, tight, open <1/4"<br>62.2' - Mechanical break | | **Limestone**<br>61.0-62.4' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids <1/16" over 20-30% of surface, trace cavities <1/4" diameter, poorly fossiliferous, trace organics, trace silts at 62.4', possible soil zone at 62.4-66'<br>**No Recovery 62.4-66.0'** | |
| 65<br>-24.2 | | | | | | | R2: 7 minutes |
| | 66.0 | | | | | | |
| | R3-NQ 5 ft 67% | 25 | 4<br>0<br>NA<br>NR<br>1<br>NA<br>NR | 66.35' - Mechanical break or fracture, 60 deg, rough, undulating, tight, open <1/4"<br>66.45' - Mechanical break or fracture, vertical, rough, undulating, tight<br>66.6' - Fracture or mechanical break, 50 deg, rough, undulating, open <1/4"<br>66.95' - Fracture or mechanical break, horizontal, rough, undulating, open <1/4"<br>67.7-69.6' - poorly indurated silts and limestone fragments (8")<br>69.9' - Fracture or mechanical break, 80 deg, rough, undulating, tight<br>70.45-71.0' - poorly to moderately indurated silt (1") | | **Limestone**<br>66.0-67.7' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids <1/16" over 30-40% of surface, many cavities <1/4" diameter, moderately fossiliferous with molds <1/4" diameter<br>**Silt And Limestone Interbeds (ML)**<br>67.7-70.45' - yellowish gray, (5Y 7/2), hard, fine to medium grained, strong HCl reaction, very weak (R1), limestone interbeds are 1" thick, partial no recovery in interval<br>**Carbonate Silt (ML)**<br>70.45-71.0' - yellowish gray, (5Y 7/2), hard, moderate to strong HCl reaction, friable<br>**No Recovery 71.0-73.6'** | Driller's Remark: 100% circulation loss at 68.0' |
| 70<br>-29.2 | | | | | | | R3: 5 minutes |
| | 71.0 | | | | | | |
| | R4-NQ 5 ft 48% | 34 | NR<br>3<br>4<br>3 | 73.85' - Bedding plane (3), horizontal, smooth, undulating, tight, 3+ bedding plane fractures in indurated silts/extremely weak limestone<br>74.9-75.05' - Fractures or mechanical break (4), rough, undulating, intersecting angles<br>75.7-75.8' - Fractures or mechanical break (3), 50 deg, rough, undulating, tight, 3 intersecting fractures | | **Limestone**<br>73.6-73.85' - yellowish gray, (5Y 7/2), very fine to fine grained, extremely weak (R0), laminated<br>73.85-76.0' - yellowish gray, (5Y 7/2), moderate HCl reaction, strong to medium strong (R4 to R3), voids <1/16" over 30-40% of surface, few cavities <1/2" diameter, poorly fossiliferous<br>76.0-78.0' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, medium strong to strong (R3 to R4), strengthening with depth, voids <1/16" over 30-40% of surface, variable, few cavities <1/4" diameter, poorly fossiliferous<br>**No Recovery 78.0-80.0'** | |
| 75<br>-34.2 | | | | | | | R4: 3 minutes |
| | 76.0 | | | | | | |
| | R5-NQ 5 ft 60% | 28 | >10<br>>10<br>NR | 76.0-76.15' - Fracture zone, rough, undulating, gravel sized fragments <1" diameter<br>76.45' - Fractures or mechanical break (2), 45 deg, rough, undulating, tight<br>76.8' - Fractures or mechanical break (4), 70 deg, rough, undulating, tight, open <1/4"<br>77.75-78.0' - Fracture zone, rough, undulating, gravel sized fragments <2" diameter | | | |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | D-01 SHEET 5 OF 6 |

# ROCK CORE LOG

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 bgs on 5/22/07 START : 5/22/2007 END : 5/23/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -39.2 | | | NA | | | **Fat Clay (CH)**<br>80.0-80.3' - high plasticity, no to slow dilatancy, strong HCl reaction, <10% limestone fragments of medium sand-sized, calcareous clay | R5: 4 minutes |
| | 81.0 | | 5 | | | | |
| | R6-NQ<br>5 ft<br>94% | 70 | >10 | 80.9-81.0' - Fracture zone, rough, undulating, gravel sized fragments <1" diameter<br>81-81.1' - Fracture zone, rough, undulating, gravel sized fragments <1-1/2" diameter | | **Limestone**<br>80.3-81.0' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, extremely weak to very weak (R0 to R1), voids <1/16" over <10-30% of surface, increasing with depth, no cavities <1/2" diameter, poorly fossiliferous | |
| | | | 0 | 81.45' - Fracture or mechanical break, <10 deg, rough, undulating, 3+ gravel sized fragments <1/2" diameter, open <1/2" | | | |
| | | | 0 | 81.75' - Fracture or mechanical break, 40 deg, rough, undulating, open <1/2" | | | |
| | | | 1 | | | 81.0-83.25' - very light gray to moderate yellowish brown, (N8 to 10YR 5/4), very fine to fine grained, medium strong to strong (R3 to R4), voids <1/16" over <5-30% of surface, variable, many cavities <1/2"x1-1/2" diameter, 80% (with secondary recrystallized infill), trace organics, poorly fossiliferous | |
| 85<br>-44.2 | | | 1 | 84.95' - Mechanical break or fracture, <10 deg, rough, undulating, tight | | | R6: 5 minutes |
| | 86.0 | | NR | 85.15' - Fracture or mechanical break, <10 deg, rough, undulating, open <1/4" | | | |
| | R7-NQ<br>5 ft<br>92% | 50 | >10 | | | **Carbonate Silt (ML)**<br>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 HCl reaction | |
| | | | >10 | 86.8' - Fracture or mechanical break, <10 deg, rough, undulating, open <1/2"<br>86.9-87.05' - Fracture zone, rough, undulating, gravel sized fragments <1-1/2" diameter | | | |
| | | | 1 | 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 | | | |
| | | | 3 | 88.5' - Mechanical break, for hardness test | | | |
| 90<br>-49.2 | | | 2 | 89.55, 90.0, 90.2, 90.35' - Mechanical break or fractures, <10 deg, rough, undulating, fractures through cavities, open <1" | | **Limestone**<br>83.35-85.7' - very light gray to moderate yellowish brown, (N8 to 10YR 5/4), very fine to fine grained, 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 organics | R7: 4 minutes |
| | 91.0 | | NR | | | | |
| | R8-NQ<br>5 ft<br>100% | 64 | 0 | | | | |
| | | | 0 | 92.35, 92.55' - Mechanical break or fractures, <10 deg, rough, undulating, tight, open <1/4" | | | |
| | | | 0 | | | **No Recovery 85.7-86.0'** | |
| | | | 1 | | | **Limestone**<br>86.0-90.6' - yellowish gray to dark yellowish brown, (5Y 7/2 to 10YR 4/2), 5b 7/1, fine to medium grained, moderate to weak HCl reaction, weak to strong (R2 to R4), mottled light bluish gray (5B 7/1) at 86.0-87.8', voids <1/16" over 20-30% of surface, many cavities, <2" diameter, poorly to moderately fossiliferous, 1/2" carbonate silt lens at 87.8', trace laminated organics | |
| 95<br>-54.2 | | | 3 | 94.95, 95.05, 95.1, 95.65' - Bedding plane or mechanical break, <10 deg, smooth, undulating, tight | | | R8: 5 minutes |
| | 96.0 | | | | | **No Recovery 90.6-91.0'** | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | D-01 SHEET 6 OF 6 |

# ROCK CORE LOG

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 bgs on 5/22/07 START : 5/22/2007 END : 5/23/2007 LOGGER : R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES | | | SYMBOLIC LOG | LITHOLOGY | COMMENTS |
|---|---|---|---|---|---|---|---|
| | | R Q D (%) | FRACTURES PER FOOT | DESCRIPTION<br>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. |
| | | | | | | **Limestone**<br>91.0-93.3' - pale yellowish brown, (10YR 6/2), strong HCl reaction, medium strong (R3), 20% voids <1/8", many fossil molds up to 1/2" (many elongate), highly fossiliferous<br>93.3-96.0' - yellowish gray, (5Y 7/2), very fine grained, very strong HCl 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 (R1) at 93.3-93.5', 93.85-94.2', and 94.55-94.85'<br>Bottom of Boring at 96.0 ft bgs on 5/23/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | D-02 SHEET 1 OF 3 |

# SOIL BORING LOG

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

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

WATER LEVELS : 1.0 ft bgs on 04/20/07 START : 4/20/2007 END : 4/20/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 41.3 | 0.0 – 1.5 | 1.2 | SS-1 | 1-2-2 (4) | **Topsoil (OL/OH)** 0.0-0.2' - grayish black, (N2), moist<br>**Poorly Graded Sand With Organics (SP)** 0.2-0.6' - medium gray, (N5), moist, very loose, very fine to fine grained, 5% nonplastic fines, 10% organics, roots, sand is silica<br>**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 – 6.5 | 0.8 | SS-2 | 6-7-7 (14) | **Poorly Graded Sand (SP)** 5.0-5.8' - white, (N9), wet, medium dense, very fine to fine grained, trace nonplastic fines, trace black particles, sand is silica | | |
| 36.3 | | | | | | | |
| 10 | 10.0 – 11.5 | 1.2 | SS-3 | 5-4-4 (8) | **Sandy Lean Clay (CL)** 10.0-11.2' - greenish gray w/ pale green and olive gray with pale green and olive gray mottling, (5GY 6/1, 10G 6/2, and 5Y 3/2), wet to moist, stiff, low to medium plasticity, slow dilatancy, 40% very fine silica sand | | Driller's Remark: Hard drilling at 12.0' |
| 31.3 | | | | | | | |
| 15 | 15.0 – 16.5 | 1.3 | SS-4 | 7-4-15 (19) | **Sandy Silt And Limestone (ML)** 15.0-16.3' - grayish yellow, (5Y 8/4), wet, very stiff, low plasticity, rapid dilatancy, mild to moderate HCl reaction, 35-40% fine to coarse sand, 20% fine to coarse gravel-sized limestone fragments; carbonate, all carbonate | | |
| 26.3 | | | | | | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | D-02 SHEET 2 OF 3 |

# SOIL BORING LOG

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

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

WATER LEVELS : 1.0 ft bgs on 04/20/07 START : 4/20/2007 END : 4/20/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 21.3 | 20.0–21.5 | 1.2 | SS-5 | 42-50-38 (88) | **Sandy Silt And Limestone (ML)** 20.0-21.2' - grayish yellow, (5Y 5/4), moist, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 35% fine to coarse sand, 20% fine to coarse gravel-sized limestone fragments, all carbonate, similar to 15.0-16.3' | | 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 (50/2") | **No Recovery 25.0-25.2'** | | |
| 30 / 11.3 | 30.0–31.5 | 1.3 | SS-7 | 22-22-12 (34) | **Sandy Silt (ML)** 30.0-31.3' - dark yellowish orange, (10YR 6/6), wet, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 35% fine to coarse sand, 10% fine gravel-sized limestone fragments, all carbonate | | Driller's Remark: 27.5' soft drilling to 30.0' |
| 35 / 6.3 | 35.0–35.1 | 0.1 | SS-8 | 50/1.5 (50/1.5") | **Limestone Fragments** 35.0-35.1' - light olive gray to moderate olive brown and gray yellowish fragments, (5Y 5/2 to 5Y 4/4 and 5Y 8/4), olive colored fragments have 10-15% black particles, disc shaped<br>Begin Rock Coring at 35.0 ft bgs<br>See the next sheet for the rock core log | | Driller's Remark: Hard again at 34.5' |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | D-02 SHEET 3 OF 3 |

# ROCK CORE LOG

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

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

WATER LEVELS : 1.0 ft bgs on 04/20/07 START : 4/20/2007 END : 4/20/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 6.3 | 35.0 | | | | | | |
| | R1-NQ 5 ft 96% | 96 | 1 | | | **Limestone** 35.0-39.8' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), decreasing to very weak (R1) below 38.5', 5-20% voids <1/16", poorly fossiliferous (clasts up to 3/16"), trace yellowish gray (5Y 7/2) mottling, secondary recrystallization | Driller's Remark: 100% circulation |
| | | | 0 | 35.95' - Fracture, 60 deg, rough, undulating, tight<br>36.6' - Mechanical break, horizontal, rough, undulating, tight | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | R1: 6 minutes |
| 40 | 40.0 | | NR | | | **No Recovery 39.8-40.0'** | |
| 1.3 | | | | | | **Limestone** 40.0-41.5' - light olive gray, (5Y 5/2), moderate to strong HCl reaction, very weak (R1), 5-10% voids <1/16", non-fossiliferous, transitional to 41.0-44.5'<br>41.0-44.5' - light olive gray, (5Y 5/2), fine grained, moderate to strong HCl reaction, very weak (R1), 15-40% voids <1/16" and increasing to <3/16" with depth, poorly fossiliferous with increasing cavities with depth (up to 1/2" elongate), secondary recrystallization | Driller's Remark: Maintained full circulation |
| | R2-NQ 5 ft 90% | 86 | 2 | 40.5' - Fracture or mechanical break, 60 deg, rough, undulating, tight | | | |
| | | | 1 | 40.6' - Fracture or mechanical break, 70 deg, rough, undulating, tight<br>41.4' - Fracture or mechanical break, 0-10 deg, rough, planar, tight | | | |
| | | | >10 | 42.0-42.2' - Fracture zone | | | |
| | | | 0 | 42.4' - Mechanical break, horizontal, rough, undulating, tight | | | R2: 4 minutes |
| | | | 0 | | | | |
| 45 | 45.0 | | NR | | | **No Recovery 44.5-45.0'** | Total Depth at 45.0' on 4/20/07 |
| -3.7 | | | | | | Bottom of Boring at 45.0 ft bgs on 4/20/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | D-03 SHEET 1 OF 4 |

# SOIL BORING 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

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 bgs on 3/24/07 START : 3/24/2007 END : 3/26/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.0 | 0.0 – 1.5 | 1.2 | SS-1 | 1-2-2 (4) | **Topsoil** 0.0-0.55' - dark gray to grayish black, (N3 to N2), 20-25% fine to coarse gravel sized roots and wood fragments<br>**Poorly Graded Sand With Organics (SP)** 0.55-1.2' - very light gray, (N8), moist, very loose, very fine to fine grained, 5% nonplastic fines, 15% roots/organics, silica sand | | 08:45 Start drilling<br>24" split spoon, using N-rod<br>Driller switches to a 6.0" tricone roller drill bit for run between SS-1 to SS-2<br>Mix mud (added 3/4 of 50-lb bag quick Gel brand bentonite) |
| 5 | 5.0 | | | | | | |
| 37.0 | 5.0 – 6.5 | 0.7 | SS-2 | 6-5-4 (9) | **Silty Sand (SM)** 5.0-5.7' - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to 10YR 4/2), wet, loose, very fine to fine grained, silica sand, 15% nonplastic fines, trace very fine to fine sand-sized black particles | | |
| 10 | 10.0 | | | | | | |
| 32.0 | 10.0 – 11.5 | 1.2 | SS-3 | 11-11-11 (22) | **Silt (ML)** 10.0-11.2' - grayish yellow, (5Y 8/4), wet, nonplastic, very rapid dilatancy, moderate HCl reaction, 5-10% very fine to fine sand-sized grains, carbonate materials | | Driller's Remark: Maintaining full mud circulation |
| 15 | 15.0 | | | | | | |
| 27.0 | 15.0 – 16.3 | 1.2 | SS-4 | 18-32-50/4" (82/10") | **Silt (ML)** 15.0-15.9' - Same as 10.0-11.2'<br>**Sandy Silt (ML)** 15.9-16.2' - moderate yellow, (5Y 7/6), moist, nonplastic, rapid dilatancy, moderate HCl reaction, similar to 15.0-15.9', 25% fine to coarse sand-sized limestone fragments, all carbonate | | Driller's Remark: Spoon unseated before measure of last 6", drilled down to 18.0' to install 20.0' of 6" diameter casing, then switched over to 4-7/8" drill bit and continued to 20.0' to take SS-5 (20.0-21.5') Driller's Remark: Only 15.0' of 6" diameter |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | D-03 SHEET 2 OF 4 |

# SOIL BORING 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

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 bgs on 3/24/07 START : 3/24/2007 END : 3/26/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.0 | 20.0 | 0.1 | SS-5 | 50/1 (50/1") | **Limestone Fragments** 20.0-20.1' - grayish yellow to moderate yellow, (5Y 8/4 to 5Y 7/6), moderate HCl reaction, poorly fossiliferous (molds), trace (1/2") dusky yellowish brown (10YR 2/2) concretions | | 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<br>Driller's Remark: Very hard drilling |
| 25 | 25.0 | | | | | | |
| 17.0 | 25.4 | 0.4 | SS-6 | 50/5 (50/5") | **Limestone Fragments** 25.0-25.4' - moderate yellowish brown, (10YR 5/4), moderate HCl reaction, fine to coarse gravel-sized limestone fragments, poorly fossiliferous (casts and molds) | | |
| 30 | 30.0 | | | | | | |
| 12.0 | 30.4 | 0.4 | SS-7 | 50/5 (50/5") | **Silt With Sand (ML)** 30.0-30.4' - dark yellowish orange, (10YR 6/6), wet, nonplastic, rapid dilatancy, moderate HCl reaction, 20-25% fine to medium sand-sized material, all carbonate<br>Begin Rock Coring at 31.0 ft bgs<br>See the next sheet for the rock core log | | Driller's Remark: Hard drilling and a lot of chatter, very slow drilling advancement<br><br>Driller's Remark: 15:25, set 3' NW casing to 30' then switch to core runs<br><br>Driller's Remark: 15:33 tape measured depth of boring is 31.0'<br>NQ core barrel assembly<br>NQ drill bit is a hard rock formation drill bit<br>NW casing advancer w/ retractable tricone roller drill bit accessary (serial # 83963-CN)<br>Switch to rock coring at 31.0' |
| 35<br>7.0 | | | | | | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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

WATER LEVELS : 1.5 ft bgs on 3/24/07 START : 3/24/2007 END : 3/26/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 31.0 R1-NQ 1 ft 20% 32.0 | 0 | >10 NR | 31.0-31.2' - Fracture zone, fragments of core, disc-shaped | | **Limestone** 31.0-31.2' - grayish yellow mottled with minor light olive brown, (5Y 5/4 with 5Y 5/6), moderate to strong HCl reaction, medium strong (R3), gray staining, poorly fossiliferous (casts), spherical voids (up to 1/16") over 10% of surface **No Recovery 31.2-32.0'** | R1: 2 minutes |
| | R2-NQ 5 ft 94% | 84 | 1 | 32.5' - Fracture, 55-90 deg, smooth, undulating, open 1/8" | | **Limestone** 32.0-36.7' - grayish yellow, (5Y 8/4), very fine grained, strong HCl reaction, poorly fossiliferous with several large (up to 1" elongate) cavities/molds, some with secondary infilling, variable voids (<1/16") over 3-20% of surface increasing with depth, medium strong (R3) from 32.0-34.8', abruptly very weak (R1) below 34.8' **No Recovery 36.7-37.0'** | |
| | | | 2 | 33.3' - Fracture, 80 deg, smooth, undulating, open 1/8" | | | |
| 35 7.0 | | | 1 | 33.5' - Fracture or mechanical break, horizontal, rough, undulating, open 1/4" 34.15' - Fracture, 50-60 deg, rough, undulating, tight | | | |
| | | | 1 | 35.5' - Bedding plane or mechanical break, horizontal, rough, undulating | | | |
| | | | 0 | 36.5' - Mechanical break | | | R2: 7 minutes |
| | 37.0 | | NR | | | | |
| | R3-NQ 5 ft 74% | 50 | 3 | 37.55' - Bedding plane, horizontal, rough, undulating, open 1/2" | | **Limestone** 37.0-37.55' - Same as 32.0-36.7' except very weak (R1), voids (<1/16") over 3% of surface 37.55-40.7' - dark yellowish orange, (10YR 6/6), fine grained, moderate HCl reaction, weak (R2), voids (up to 3/16") over 25-35% of surface, trace fine grained organic particles **No Recovery 40.7-42.9'** | |
| | | | 1 | 37.7' - Fracture, 60-70 deg, rough, undulating, tight | | | |
| | | | 0 | 38.0' - Bedding plane or mechanical break, horizontal, rough, undulating, open up to 1" 38.8, 39.5, 39.8, 40.0' - Mechanical break (4) | | | |
| 40 2.0 | | | 2 | 40.25' - Fracture or mechanical break, horizontal, rough, undulating, tight | | | |
| | | | NR | 40.35, 40.6' - Mechanical break or bedding plane (2), horizontal, rough, undulating, tight | | | R3: 4 minutes Stop Drilling for the day at 17:00 Driller's Remark: 1.5' below ground surface water level in 6" casing, 08:05 on 3/25/07 will install 6" diameter casing down to 2.0' increasing circulation around 15.0' of 6" diameter casing, will then install 3" NW casing to 41.0' |
| | 42.0 | | | | | | |
| | | | NR | | | | |
| | R4-NQ 4.5 ft 80% | 0 | NA | | | **Sand With Silt (SM)** 42.9-46.4' - very pale orange, (10YR 8/2), very fine to fine grained, mild HCl reaction, rounded, clean sands, 10-15% pale yellowish orange (10YR 5/6) fine grained particles, abrupt contact at 46.4' | |
| 45 -3.0 | | | | | | | R4: 8 minutes Core barrel locking during run (possible sands) |
| | 46.5 | | | | | | |
| | 47.0 R5-NQ 0.5 ft 100% | 100 | 2 | 46.6' - Bedding plane or mechanical break, horizontal, rough, undulating, tight | | **Limestone** 46.4-46.5' - light olive gray, (5Y 5/2), moderate HCl reaction, medium strong (R3), moderately fossiliferous (few molds, mostly casts), voids (<1/16") over 10-15% of surface, trace black particles up to 1/2" (possibly organics) 46.5-47.0' - Same as 46.4-46.5' | Only 4.5' - unable to reach full 5.0' stroke Install 3" NW casing down to 46.0' R5: 2 minutes |
| | | | 3 | 46.7" - Mechanical break 47.0' - Bedding plane or mechanical break, 40-50 deg, rough, undulating, gray stains on surface, open to tight | | | |
| | R6-NQ 4.5 ft 100% | 30 | 3 | 47.45' - Fracture or mechanical break, vertical, tight | | | |
| | | | >10 | 47.85' - Fracture or mechanical break, horizontal, rough, undulating, tight | | | |
| 50 -8.0 | | | >10 | 48.05' - Bedding plane or mechanical break, horizontal, rough, undulating, tight 48.25, 48.65' - Mechanical break (2) | | | R6: 9 minutes |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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

WATER LEVELS : 1.5 ft bgs on 3/24/07 START : 3/24/2007 END : 3/26/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 51.5 | | >10 | 49.20' - Fracture or mechanical break, horizontal, rough, undulating, tight | | **Limestone** 47.0-51.5' - yellowish gray, (5Y 7/2), mild to moderate HCl reaction, weak (R2), very weak (R1) zone at 50.0', spherical voids (1/16") over 20-30% of surface, poorly fossiliferous, casts/molds (up to 1/2"), up to 15% brownish black particles as laminations (up to 1/16" thick) | |
| | R7-NQ 5 ft 100% | 85 | 0 | 49.25' - Fracture, horizontal and 60-70 deg, rough, undulating, tight | | | |
| | | | 4 | 49.9-50.3' - Fracture zone<br>50.65' - Fracture, 80-90 deg, rough, undulating, tight | | | |
| | | | 0 | 50.95-51.5' - Fracture zone or mechanical break, vertical, tight<br>52.3, 53.0' - Mechanical break (2)<br>53.15-53.35' - Fracture zone | | 51.5-56.5' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), mild to moderate HCl reaction, weak to medium strong (R2 to R3), spherical voids (up to 1/16") over 5-10% of surface, black laminations (<1/16" thick) across entire interval, trace coarse grained black particles (possible organics) | |
| 55<br>-13.0 | | | 2 | 54.9' - Fracture or mechanical break, 40-50 deg, rough, undulating, tight | | | |
| | | | 0 | | | | R7: 16 minutes |
| | 56.5 | | | | | | |
| | R8-NQ 0.5 ft 100% | 100 | 0 | | | | R8: 1 minute |
| | 57.0 | | | | | 56.5-57.0' - Same as 51.5-56.5' | |
| | | | 2 | 57.5, 57.8, 59.0' - Fracture (3), <10 deg, rough, undulating, open 1/4"-1/2" | | 57.0-61.35' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids (<1/16") over 20-30% of surface, few fossil molds and casts up to 1/2" elongate | |
| | | | 0 | | | | |
| | R9-NQ 5 ft 87% | 75 | 2 | 59.5, 59.6' - Mechanical break (2) | | | |
| 60<br>-18.0 | | | 2 | 59.95' - Fracture or mechanical break, 25-35 deg, rough, undulating, open 1/2"<br>60.35' - Fracture, 20-30 deg, rough, undulating, open 1/8" | | | |
| | | | 0 | | | | R9: 10 minutes |
| | | | NR | 60.8' - Fracture or mechanical break, horizontal, smooth, undulating | | **No Recovery 61.35-62.0'** | Complete boring 3/25/07, Total Depth 62.0' |
| | 62.0 | | | | | Bottom of Boring at 62.0 ft bgs on 3/26/2007 | 08:03 3/26/07 water level 2.5' below ground surface to top of mud surface level<br><br>10:00 3/26/207 finished abandonment<br>Grout seeping up out of ground surface 3' away from hole |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | D-04 SHEET 1 OF 5 |

# SOIL BORING 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

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 bgs on 3/28/07 START : 3/28/2007 END : 4/4/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 41.9 | 0.0 | 0.8 | SS-1 | 2-3-2 (5) | **Topsoil (OL)** 0.0-0.2' - black, (N1), moist, roots, wood debris | | Water level: 2.0' below ground surface |
| | 1.5 | | | | **Poorly Graded Sand (SP)** 0.2-0.8' - medium dark gray, (N4), moist, loose, fine grained, silica sand, 10-15% organic material, roots | | |
| 5 | 5.0 | | | | | | |
| 36.9 | | 1.0 | SS-2 | 4-4-4 (8) | **Poorly Graded Sand (SP)** 5.0-5.95' - very light gray grading to light gray, (N8 to N7), wet, loose, fine grained, silica sand, trace nonplastic fines gradually increasing to silty sand (SM) with 25% low plasticity fines | | |
| | 6.5 | | | | | | |
| 10 | 10.0 | | | | | | |
| 31.9 | | 1.3 | SS-3 | 5-22-28 (50) | **Sand With Limestone (SP)** 10.0-10.2' - pale greenish yellow, (10Y 8/2), wet, loose, fine to coarse grained, strong HCl reaction, gravel-sized limestone fragments, 25% fine to coarse sand-sized grains, 15% nonplastic fines | | |
| | 11.5 | | | | **Clayey Sand (SC)** 10.2-10.35' - pale olive, (10Y 6/2), wet, medium dense, fine to medium grained, strong HCl reaction, 25-30% low plastic fines, carbonate | | |
| | | | | | **Silt (ML)** 10.35-11.3' - moderate yellow and grayish yellow, (5Y 7/6 and 5Y 8/4), wet, nonplastic, rapid dilatancy, mild HCl reaction, carbonate | | |
| 15 | 15.0 | | | | | | |
| 26.9 | | 1.2 | SS-4 | 23-33-26 (59) | **Silt (ML)** 15.0-16.2' - Same as 10.35-11.3' except 5-10% very fine sand-sized grains | | |
| | 16.5 | | | | | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | D-04 SHEET 2 OF 5 |

# SOIL BORING 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

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 bgs on 3/28/07 START : 3/28/2007 END : 4/4/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 21.9 | 20.0 | 0.3 | SS-5 | 50/3.5 (50/3.5") | **Silt (ML)** 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 | | |
| 25 | 25.0 | | | | | | |
| 16.9 | 26.5 | 1.2 | SS-6 | 10-13-21 (34) | **Silt With Sand And Limestone (ML)** 25.0-26.2' - grayish yellow, (5Y 7/2), nonplastic, rapid dilatancy, mild to moderate HCl reaction, 20% fine to coarse sand-sized grains, 15% fine to coarse gravel-sized limestone, carbonate | | Driller's Remark: Chatter at 27.5' |
| 30 | 30.0 | | | | | | |
| 11.9 | 31.5 | 1.5 | SS-7 | 24-32-38 (70) | **Silt With Sand (ML)** 30.0-31.45' - Same as 25.0-26.2' except 20-25% very fine to fine sand-sized grains, no gravel-sized fragments | | |
| 35 | 35.0 | | | | | | |
| 6.9 | 36.5 | 1.3 | SS-8 | 13-19-14 (33) | **Sandy Silt (ML)** 35.0-36.3' - light olive brown to moderate olive brown, (5Y 5/6 to 5Y 4/4), wet, low plasticity, rapid dilatancy, mild HCl reaction, 25-30% fine to coarse sand-sized grains, trace fine gravel-sized limestone, carbonate materials | | |
| | 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 4/4 to 5Y 3/2), mild HCl reaction, fine gravel-sized fragments | | Driller's Remark: Chatter at 38.5' |
| 40 | | | | | | | 40.0' switch over to HQ rock coring |
| | | | | | Begin Rock Coring at 40.0 ft bgs<br>See the next sheet for the rock core log | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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

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

WATER LEVELS : 2.0 ft bgs on 3/28/07 START : 3/28/2007 END : 4/4/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 1.9 | 40.0 | | >10 | 40.0-41.0' - Fracture zone | | **Limestone Fragments** 40.0-40.4' - grayish yellow, (5Y 7/2), very fine grained, moderate HCl reaction, very weak to weak (R1 to R2), voids (<1/16") over 10-15% of surface **No Recovery 40.4-41.0'** **Limestone** 41.0-45.0' - light olive gray, (5Y 5/2), moderate HCl reaction, medium strong (R3), voids covering 10-15% of surface increasing to 20-30% below 42.5', partially infilled voids (1/4") from 42.2-42.4', 1-3% cavities (up to 1-9/16"), trace fossils | |
| | | | NR | | | | Driller's Remark: Very hard drilling from 40.0-41.5', 42.5' |
| | R1-NQ 5 ft 88% | 40 | 5 | 41.05' - Fracture, 40-60 deg, rough, planar, open | | | |
| | | | 2 | 41.15' - Fracture, rough, planar and undulating, open 41.4, 41.5' - Fractures (2), 0-60 deg, rough, undulating, open | | | |
| | | | 3 | 41.3' - Fracture, 0-<5 deg, rough, undulating, open | | | |
| | | | 4 | 42.45' - Fracture, 0-60 deg, rough, undulating, open 42.8' - Fracture, rough, planar to undulating, tight | | | R1: 29 minutes |
| 45 -3.1 | 45.0 | | | | | 45.0-45.8' - light olive gray, (5Y 5/2), fine grained, mild HCl reaction, extremely weak (R0), voids covering 5-10% of surface, many cavities up to 3/8" long, very friable **No Recovery 45.8-52.0'** | |
| | | | 1 | 43.3' - Fracture, horizontal, rough, undulating, open | | | |
| | R2-NQ 5 ft 16% | 0 | NR | 43.65' - Fracture, <5 deg, rough, undulating, open 1/2"-3/4" 43.9, 44.05, 44.7' - Fractures (3), <5-60 deg, rough, undulating, open 44.8, 44.95' - Fractures (2), <5 deg, rough, undulating, open 45.8' - Fracture, horizontal, rough, undulating | | | 45.8-50.0' core fell back into borehole, upon recovering there was no core retrieved because of poor quality of rock and being very friable |
| | | | | | | | R2: 3 minutes |
| 50 -8.1 | 50.0 | | | | | | End 4/3/07 at 50.0' Begin 4/4/07 |
| | | | NR | | | | |
| | R3-NQ 5 ft 60% | 0 | NA | | | **Poorly Graded Sand (SP)** 52.0-53.0' - moderate yellow to dusky yellow, (5Y 7/6 to 5Y 6/4), wet, loose, very fine to fine grained, strong HCl reaction, 10% silica, 90% carbonate | |
| | | | 0 | | | **Limestone Fragments** 53.0-54.0' - moderate olive brown, (5Y 4/4), mild HCl reaction, very fine to fine gravel, silt to fine sand-sized with up to 1/8" limestone fragments | R5: 6 minutes |
| | | | 0 | | | | Driller's Remark: Harder drilling at 54.0' bgs |
| 55 -13.1 | 55.0 | | | | | | |
| | | | NR | | | **Limestone** 54.0-55.0' - moderate olive brown to light olive brown, (5Y 4/4 to 5Y 4/6), mild HCl reaction, extremely weak to very weak (R0 to R1), carbonaceous material covering some surfaces, voids covering 30-40% of surface, infilling with sandy texture, fine gravel-sized rock fragments **No Recovery 55.0-58.8'** | |
| | R4-NQ 5 ft 24% | 0 | | | | | Driller's Remark: Hard drilling 57.9 - 60.0' |
| | | | 1 | 58.8' - Fracture, rough, undulating, open | | | |
| | | | >10 | 59.1' - Fracture, 0-60 deg, rough, undulating, open | | | R4: 10 minutes |
| 60 | 60.0 | | | | | | |

| PROJECT NUMBER: 338884.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

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

WATER LEVELS : 2.0 ft bgs on 3/28/07 START : 3/28/2007 END : 4/4/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -18.1 | R5-NQ 5 ft 74% | 28 | 4 | 59.4' - Fracture, 0-40 deg, rough, undulating, open | | **Limestone** 58.8-59.6' - light olive brown, (5Y 5/6), very fine grained, mild HCl reaction, weak (R2), voids over 1-5% of surface, rare 1/16"-1/8" cavities 59.6-60.0' - Same as 58.8-59.6' except very weak (R1), gravel-sized limestone fragments, with carbonaceous material on 30% of surface 60.0-62.0' - light olive brown, (5Y 5/6), mild HCl reaction, extremely weak (R0), friable, voids over 5% of surface 62.0-63.7' - Same as 60.0-62.0' except moderate HCl reaction, very weak to weak (R1 to R2), thin carbonaceous laminae at 62.4', rare elongated cavities (up to 3/8"x3/16"), trace organics, trace fossils, voids increase from 5-20% where rock is stronger **No Recovery 63.7-65.0** **Limestone** 65.0-67.8' - dusky yellow, (5Y 6/4), fine to very fine grained, voids covering up to 15% surface, rare cavities (up to 1-1/4"), thin discontinuous carbonaceous laminae from 65.0-66.0', variable strength increasing with depth from weak (R2) to medium strong (R3) except extremely weak (R0) from 66.1-66.4', trace organic material **No Recovery 67.8-70.0'** **Limestone** 70.0-70.15' - Same as 65.0-67.8' **No Recovery 70.15-71.75'** **Limestone** 71.75-75.0' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine grained, strong HCl reaction, medium strong (R3), voids (up to 1/16") over 20-40% of surface, several cavities (up to 3/4") covering 1-3% of surface predominantly at 73.6' 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' | |
| | | | 2 | 59.6' - Fracture, horizontal, smooth, planar, open | | | |
| | | | 2 | 60.1' - Fracture, horizontal, rough, planar, open | | | |
| | | | 2 | 60.2' - Fracture, 40 deg, rough, undulating, open | | | |
| | | | 2 | 60.65' - Fracture, rough, undulating, open | | | |
| | | | NR | 60.9, 61.7' - Fractures (2), <5 deg, rough, undulating, open 61.9' - Fracture, vertical, rough, tight 62.1' - Fracture, <5 deg, rough, undulating, open | | | |
| 65 | 65.0 | | | 62.8, 63.2' - Fractures (2), <5 deg, rough, undulating, open | | | |
| -23.1 | R6-NQ 5 ft 56% | 17 | 4 | 63.7' - Fracture, <5 deg, rough, stepped, open | | | R5: 5 minutes |
| | | | 4 | 65.25' - Fracture, <5 deg, rough, undulating, open | | | |
| | | | 1 | 65.35' - Fracture, horizontal, rough, undulating, open 65.4-65.7' - Fracture, vertical, rough, undulating, open | | | |
| | | | NR | 65.8' - Fracture, 40 deg, rough, undulating, tight 66.0-66.4' - Fracture zone 66.4-66.8' - Fracture, 70 deg, rough, stepped, tight 66.9' - Fracture, <5 deg, rough, stepped, tight | | | R6: 8 minutes |
| 70 | 70.0 | | | | | | |
| -28.1 | R7-NQ 5 ft 69% | 40 | 0 | 67.8' - Fracture, horizontal, rough, stepped, open | | | |
| | | | NR | | | | |
| | | | 0 | | | | |
| | | | 3 | 72.4' - Fracture, horizontal, rough, undulating, open | | | |
| | | | 1 | 72.4-72.9' - Fracture, 80 deg, rough, stepped, tight | | | |
| | | | 2 | 72.9, 73.4' - Fractures (2), 0-10 deg, rough, undulating, tight to open 74.1-74.6' - Fracture, 70 deg, rough, stepped, tight | | | R7: 7 minutes |
| 75 | 75.0 | | | | | | |
| -33.1 | R8-NQ 5 ft 100% | 86 | 1 | 75.0' - Fracture, 45 deg, rough, undulating | | | |
| | | | 1 | 75.7' - Fracture, <5 deg, rough, stepped, open | | | |
| | | | 0 | 76.6' - Fracture, horizontal, rough, stepped, tight | | | |
| | | | 3 | 78.45, 78.55' - Bedding plane (2), horizontal, smooth, undulating to planar, open | | | |
| | | | 1 | 78.9, 79.1' - Fractures (2), 10 deg, rough, undulating, open | | | R8: 5 minutes |
| 80 | 80.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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

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

WATER LEVELS : 2.0 ft bgs on 3/28/07 START : 3/28/2007 END : 4/4/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -38.1 | | | >10 | 80.0-81.1' - Fractures, 0-90 deg, rough, undulating and stepped, open | | 78.2 - 79.5' - pale yellowish orange to moderate yellow, (10YR 8/6 to 5Y 7/6), fine grained, strong HCl reaction, extremely weak to very weak (R0 to R1), dark gray 1/8" gravel in matrix from 78.5-79.0', 5-10% voids from 78.5-79.0' declining to 0% at 79.0', gradual transition to 79.5-80.0' | |
| | | | 0 | | | 79.5-80.0' - pale yellowish orange, (10YR 8/6), fine grained, strong HCl reaction, very weak (R1), voids (1/16") over 18% of surface, homogeneous appearance | |
| | R9-NQ 5 ft 46% | 0 | NR | | | | R9: 7 minutes |
| 85 | 85.0 | | | | | | |
| -43.1 | | | 1 | | | 80.0-80.9' - light olive brown, (5Y 5/6), very fine to fine grained, mild HCl reaction, extremely weak (R0), voids over 30-40% of surface grading into cavities up to 3/8", gravel-sized material | |
| | | | 1 | 85.95' - Fracture, <5 deg, rough, undulating, open<br>86.6' - Fracture, <5 deg, rough, undulating, tight | | **Limey Clay (CL)**<br>80.9-81.1' - moderate olive brown, (5Y 4/4), moist, soft, low plasticity, black carbonaceous staining, silty | |
| | R10-NQ 5 ft 98% | 59 | 2 | 87.2' - Fracture, 30-40 deg, rough, undulating, open | | **Limestone**<br>81.1-82.3' - Same as 80.0-80.9' except weak (R2), not broken into gravel-sized rock fragments | Driller's Remark: Lost circulation at 87.0' |
| | | | 2 | 87.4-87.7' - Fracture zone, 60 deg, rough, undulating, tight<br>88.45-88.7' - Fracture zone, <5-60 deg, rough, undulating, open | | **No Recovery 82.3-85.0'** | |
| | | | 2 | 89.55' - Fracture, horizontal, rough, stepped, open | | **Limestone**<br>85.0-89.9' - moderate yellowish brown to yellowish gray with depth, (10Y 5/4 to 5Y 7/2), mild to strong HCl reaction, weak to medium strong (R2 to R3), voids covering 15-40% of surface grading into cavities (up to 1-3/16") with depth, mottled with zones of light limestone becoming more fossiliferous with depth | R10: 9 minutes |
| 90 | 90.0 | | NR | | | | |
| -48.1 | | | >10 | 89.7' - Fracture, 80-90 deg, rough, undulating, open<br>90.0-90.8' - Fracture zone, various orientations | | | |
| | R11-NQ 5 ft 16% | 0 | NR | | | **No Recovery 89.9-90.0'** | |
| | | | | | | **Limestone**<br>90.0-90.8' - light olive brown to dusky yellow, (5Y 5/6 to 5Y 6/4), strong HCl reaction, weak (R2), voids over 20-30% of surface, gravel-sized rock fragments (1/4"-2"), highly fossiliferous, black carbonaceous material up to 15-20% of surface | R11: 5 minutes |
| 95 | 95.0 | | | | | | |
| -53.1 | | | | | | **No Recovery 90.8-98.5'** | Driller's Remark: Possible void 95.0 - 96.0'; very soft drilling 96.0 - 98.5', firmer drilling at 98.5' |
| | R12-NQ 5 ft 30% | 6 | NR | | | **Limestone**<br>98.5-100.0' - dusky yellow, (5Y 6/4), strong HCl reaction, weak (R2), gravel-sized rock fragments, voids covering 25-40% of surface, highly fossiliferous | |
| | | | >10 | | | | |
| | | | >10 | 99.0-100.0' - Fracture zone, 0-90 deg, rough, undulating, open | | | R12: 3 minutes |
| 100 | 100.0 | | | | | | |
| | | | | | | Bottom of Boring at 100.0 ft bgs on 4/4/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | D-05 SHEET 1 OF 5 |

# SOIL BORING LOG

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

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 : 2.0 ft bgs on 04/04/07 START : 4/4/2007 END : 4/4/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 41.8 | 0.0 | 0.8 | SS-1 | 0-0-2 (2) | **Topsoil (OL)** 0.0-0.3' - black, (N1), organics | | Water level: 2.0' below ground surface |
| | 1.5 | | | | **Poorly Graded Sand With Organics (SP)** 0.3-0.8' - brownish gray, (5YR 4/1), moist, very loose, very fine to fine grained, no HCl reaction, silica sand, trace nonplastic fines, 20% organics as fines and roots | | |
| 5 | 5.0 | | | | | | |
| 36.8 | | 1.3 | SS-2 | 1-0-0 (0) | **Sandy Lean Clay (CL)** 5.0-6.25' - greenish gray, (5G 6/1), moist to wet, very soft, low to medium plasticity, slow to rapid dilatancy, 35-40% very fine silica sand | | Weight of hammer for last 12" |
| | 6.5 | | | | | | |
| 10 | 10.0 | | | | | | |
| 31.8 | | 1.4 | SS-3 | 13-14-22 (36) | **Silty Sand (SM)** 10.0-11.4' - yellowish gray, (5Y 8/1), moist to wet, dense, very fine to coarse grained, low plasticity, very rapid dilatancy, strong HCl reaction, 20-25% low plastic trace fines gravel-sized | | Appears to have fossil fragments<br>Driller's Remark: Lost circulation at 12' |
| | 11.5 | | | | | | |
| 15 | 15.0 | | | | | | |
| 26.8 | | 1.0 | SS-4 | 1-4-26 (30) | **Silt (ML)** 15.0-15.8' - moderate yellow, (5Y 7/6), wet, very stiff, nonplastic, rapid dilatancy, moderate to strong HCl reaction, 10-15% very fine sand-sized, carbonate materials | | |
| | 16.5 | | | | **Limestone Fragments** 15.8-16.0' - moderate olive brown, (5Y 4/4), strong HCl reaction, fine to coarse gravel-sized | | Set 20' HW casing |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | D-05 SHEET 2 OF 5 |

# SOIL BORING LOG

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

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 : 2.0 ft bgs on 04/04/07 START : 4/4/2007 END : 4/4/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 21.8 | 20.0 | 0.1 | SS-5 | 50/3 (50/3") | **Limestone Fragments** 20.0-20.3' - grayish yellow, (5Y 8/4), fine to coarse grained, mild HCl reaction, fine gravel-sized fragments | | |
| 25 | 25.0 | | | | | | |
| 16.8 | 26.5 | 1.1 | SS-6 | 17-26-31 (57) | **Sandy Silt With Limestone (ML)** 25.0-26.1' - grayish yellow, (5Y 8/4), wet, hard, nonplastic, rapid dilatancy, mild HCl reaction, 10% fine to coarse limestone fragments, 35-40% fine to coarse sand-sized, carbonate materials | | |
| 30 | 30.0 | | | | | | |
| 11.8 | 31.5 | 1.5 | SS-7 | 15-17-47 (64) | **Sandy Silt (ML)** 30.0-31.5' - Same as 25.0-26.1' except mild to moderate HCl reaction, 30% fine to coarse sand-sized, trace gravel-sized | | |
| 35 | 35.0 | | | | | | |
| 6.8 | 36.2 | 1.1 | SS-8 | 34-24-50/2.5 (74/8.5") | **Sandy Silt With Limestone (ML)** 35.0-36.1' - light olive gray, (5Y 5/2), wet, hard, nonplastic, rapid dilatancy, mild HCl reaction, 40% fine to coarse sand-sized, 10% fine to coarse gravel-sized limestone fragments, carbonate materials | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | D-05 SHEET 3 OF 5 |

# SOIL BORING LOG

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

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 : 2.0 ft bgs on 04/04/07 START : 4/4/2007 END : 4/4/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 1.8 | 40.0 | 0.3 | SS-9 | 50/4 (50/4") | **Limestone Fragments** 40.0-40.3' - light olive gray, (5Y 5/2), fine to coarse grained, mild HCl reaction<br>Begin Rock Coring at 40.7 ft bgs<br>See the next sheet for the rock core log | | |
| 45 -3.2 | | | | | | | |
| 50 -8.2 | | | | | | | |
| 55 -13.2 | | | | | | | |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | D-05 SHEET 4 OF 5 |

# ROCK CORE LOG

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

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

WATER LEVELS : 2.0 ft bgs on 04/04/07 START : 4/4/2007 END : 4/4/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 40.7 R1-NQ 1 ft 85% 41.7 | 50 | 3 | 40.9' - Fracture, 10 deg, smooth, undulating, tight<br>41.0' - Fracture, 50 deg, smooth, planar, tight | | **Limestone**<br>40.7-41.7' - pale yellowish brown, (10YR 6/2), fine grained, moderate HCl reaction, weak (R2), 10-20% void space up to 1/8", trace cavities up to 1/4", moderately fossiliferous (casts/molds) | R1: 1 minute |
| | R2-NQ 5 ft 88% | 35 | 0 | 41.05' - Fracture, 10 deg, smooth, undulating, loose | | 41.7-43.5' - pale yellowish brown, (10YR 6/2), fine grained, delayed moderate HCl reaction, weak to medium strong (R2 to R3), 15-20% voids up to 1/8", trace cavities up to 3/16", moderately fossiliferous (molds/casts) | |
| | | | 5 | 43.2' - Mechanical break | | | |
| | | | >10 | 43.5-44.5' - Fracture zone (at least 7), tight but weathered fractures with fragmentation | | | |
| 45 -3.2 | | | >10 | 44.5-45.7' - Fracture zone, fragments from 1/8" to 1", subrounded | | | |
| | | | >10 | 45.7-46.1' - Fractures (at least 4), 10 deg, open, weathered, with vertical fractures and fragmentation | | 43.5-46.1' - pale yellowish brown, (10YR 6/2), fine grained, strong HCl reaction, extremely weak to very weak (R0 to R1), 10% void space up to 1/8", poorly fossiliferous | R2: 2 minutes |
| | 46.7 | | NR | | | **No Recovery 46.1-46.7'** | |
| | R3-NQ 5 ft 70% | 45 | >10 | 46.7-50.3' - Fracture zone, very soft material | | **Limestone**<br>46.7-50.3' - pale yellowish brown, (10YR 6/2), fine grained, moderate HCl reaction, extremely weak to very weak (R0 to R1), 20-30% voids, trace up to 1/3" long fossil cavities and casts | |
| | | | >10 | | | | |
| | | | >10 | | | | |
| 50 -8.2 | | | >10 | | | | |
| | | | NR | | | **No Recovery 50.5-51.7'** | R3: 1 minute |
| | 51.7 | | | | | | |
| | R4-NQ 5 ft 86% | 75 | >10 | 52.0' - Fracture, 10 deg, rough, undulating, tight | | **Limestone**<br>51.7-53.8' - pale yellowish brown, (10YR 6/2), fine grained, moderate HCl reaction, very weak to weak (R1 to R2), 10-20% voids up to 1/16" | |
| | | | >10 | 52.3-53.0' - Fracture zone, limestone fragments from silt to cobble-sized fragments | | | |
| | | | >10 | 53.8' - Fracture, 20 deg, rough, undulating, loose | | 53.8-56.0' - Same as 51.7-53.8' except moderate yellowish brown, (10YR 5/4) | |
| 55 -13.2 | | | 0 | 54.1' - Fracture, 25 deg, rough, undulating, tight<br>54.2-54.7' - Fracture zone, 20 deg, same as 52.3-53.0' | | | |
| | | | 0 | 55.5' - Mechanical break | | | R4: 2 minutes |
| | 56.7 | | NR | | | **No Recovery 56.0-56.7'** | |
| | R5-NQ 5 ft 92% | 68 | 0 | | | **Limestone**<br>56.7-61.3' - pale yellowish brown, (10YR 6/2), fine grained, moderate HCl reaction, very weak to weak (R1 to R2), 20-25% voids up to 1/8", some laminations | |
| | | | 1 | 57.9' - Fracture, 30 deg, rough, undulating, tight | | | |
| | | | >10 | 59.2' - Fracture, 70 deg, rough, undulating, tight | | | |
| 60 -18.2 | | | >10 | 59.5-60.3' - Fracture zone, gravel-sized fragments | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | D-05 SHEET 5 OF 5 |

# ROCK CORE LOG

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

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

WATER LEVELS : 2.0 ft bgs on 04/04/07 START : 4/4/2007 END : 4/4/2007 LOGGER : A. Teal

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | 1 | 60.5' - Fracture, 45 deg, rough, undulating, tight | | **Limestone**<br>60.0-60.3' - dark yellowish brown, (10YR 4/2), fine grained, mild HCl reaction, extremely weak (R0)<br>60.9-61.0' - Same as 60.0-60.3'<br>61.0-61.3' - Same as 56.7-61.3'<br>**No Recovery 61.3-61.7'**<br>Bottom of Boring at 61.7 ft bgs on 4/4/2007 | R5: 3 minutes |
| 61.7 | | | NR | 60.9' - Fracture, horizontal, smooth, planar, tight | | | End of boring |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | D-06 SHEET 1 OF 4 |

# SOIL BORING LOG

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

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 : 2.1 ft bgs on 4/23/07 START : 4/23/2007 END : 4/24/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 41.6 | 0.0 – 1.5 | 0.5 | SS-1 | 1-1-1 (2) | **Silty Sand (SM)** 0.0-0.5' - moderate yellowish brown to olive gray, (10YR 5/4 to 5Y 3/2), moist to wet, very loose, fine grained, no HCl reaction, silica sand, 15% nonplastic fines, mostly organic fines | | |
| 5 | 5.0 | | | | | | |
| 36.6 | 5.0 – 6.5 | 1.1 | SS-2 | 2-2-1 (3) | **Sandy Fat Clay (CH)** 5.0-6.1' - pale blue, (5PB 7/2), moist, soft, medium to high plasticity, no dilatancy, no HCl reaction, 35-40% very fine to fine silica sand | | |
| 10 | 10.0 | | | | | | |
| 31.6 | 10.0 – 11.5 | 1.1 | SS-3 | 11-24-40 (64) | **Limestone Fragments** 10.0-10.2' - dusky yellow, (5Y 6/4), fine to coarse grained, strong HCl reaction, gravel-sized fragments<br>**Silt (ML)** 10.2-11.1' - dusky yellow, (5Y 6/4), moist, hard, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 5-10% very fine carbonate sand | | Driller's Remark: Stiff at 9.0' |
| 15 | 15.0 | | | | | | |
| 26.6 | 15.0 – 16.5 | 1.5 | SS-4 | 22-50/5.75 (72/11.75") | **Sandy Silt (ML)** 15.0-16.0' - pale yellowish brown, (10YR 6/2), moist, very stiff, low plasticity, rapid dilatancy, moderate HCl reaction, 25% fine grained sand, some appears as silica, (possibly slough), trace fine gravel-sized limestone at 16.0', trace organics, primarily carbonate<br>**Silt (ML)** 16.0-16.5' - yellowish gray, (5Y 5/2), moist, hard, nonplastic, very rapid dilatancy, moderate HCl reaction, 5-10% very fine grained sand | | 07:38 water level at 2.1' below ground surface<br><br>Driller's Remark: 08:00 borehole caved in over night; 15.0-16.0' may include slough accounting for the discrepancy between depth of penetration and recovery length |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | D-06 SHEET 2 OF 4 |

# SOIL BORING LOG

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

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 : 2.1 ft bgs on 4/23/07 START : 4/23/2007 END : 4/24/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 21.6 | 20.0 – 21.5 | 0.8 | SS-5 | 21-29-3 (32) | **Silty Sand And Limestone (SM)** 20.0-20.8' - very pale orange, (10YR 8/2), moist, dense, fine to coarse grained, moderate HCl reaction, 60% silty sand and 40% limestone, 30% nonplastic fines, carbonate | | |
| 25 | 25.0 | | | | | | |
| 16.6 | 26.5 | 0.6 | SS-6 | 20-8-1 (9) | **Silty Sand With Limestone (SM)** 25.0-25.6' - grayish orange, (10YR 6/4), moist, loose, fine to coarse grained, moderate HCl reaction, similar to 20.0-20.8', 25% fine to coarse gravel-sized limestone fragments, 35% nonplastic fines, carbonate materials | | |
| 30 | 30.0 | | | | | | |
| 11.6 | 31.5 | 1.4 | SS-7 | 6-9-15 (24) | **Sandy Silt (ML)** 30.0-31.4' - dusky yellow, (5Y 6/4), wet, very stiff, low plasticity, rapid dilatancy, mild to moderate HCl reaction, 35-40% fine to coarse sand, carbonate materials | | 08:15 Begin drilling to 35.0'<br>During drilling to 35.0' lost circulation at 8:21 - lots of chatter during drilling |
| 35 | 35.0 | | | | | | |
| 6.6 | 35.2 | 0.0 | SS-8 | 50/2 (50/2") | **No Recovery 35.0-35.2'** | | Casing advanced to 35.0' below ground surface |
| | | | | | Begin Rock Coring at 36.0 ft bgs<br>See the next sheet for the rock core log | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
| 338884.FL | D-06 | SHEET 3 OF 5 |

# ROCK CORE LOG

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 ORIENTATION : Vertical

WATER LEVELS : 2.1 ft bgs on 4/23/07 START : 4/23/2007 END : 4/24/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 36.0 | | | | | | 10:04 Begin coring R1-NQ |
| | R1-NQ 5 ft 84% | 47 | 1 | 36.7, 37.7' - Mechanical break (2) | | **Limestone** 36.0-39.15' - pale olive to light olive gray, (10Y 6/2 to 5Y 5/2), very fine to fine grained, strong HCl reaction, fossiliferous, fossil casts, voids over 20% of surface, up to 1/16" trace dissolution, trace organic features, at 36.7' weak (R2), at 37.7' very weak to weak (R1-R2) | |
| | | | 2 | 36.9' - Bedding plane, <10 deg, rough, undulating, tight | | | |
| | | | 5 | 37.0' - Fracture, 50 deg, rough, undulating, tight<br>37.05' - Fracture, 10-25 deg, rough, undulating, tight | | | |
| | | | 0 | 38.0-38.3' - Fracture zone, rough, undulating, intersecting bedding plane and high angle fractures, tight | | 39.15-40.2' - moderate olive brown, (5Y 4/4), moderate HCl reaction, extremely weak (R0), laminar features of olive gray (5Y3/2) | |
| 40<br>1.6 | | | NR | 38.5' - Bedding plane, same as 36.9' except open up to 1/2" | | **No Recovery 40.2-41.0'** | R1: 9 minutes |
| | 41.0 | | | | | | |
| | R2-NQ 5 ft 73% | 47 | 0 | | | **Limestone** 41.0-41.85' - Same as 39.15-40.2' except strong HCl reaction | |
| | | | 1 | 42.3' - Fracture, 80 deg, rough, undulating, tight | | 41.85-44.6' - light olive gray to dusky yellow with pale olive infill, (5Y 5/2 to 5Y 6/4 with 10Y 6/2), strong HCl reaction, very weak to weak (R1 to R2), voids (up to 1/16") over 30% of surface, moderately fossiliferous, fossil casts up to 1/8" to 1/2", trace organics, very similar to 36.0-39.15' | |
| | | | 1 | 43.5-43.8' - Mechanical break | | | |
| | | | 1 | 43.8, 44.1' - Bedding plane (2), 30 deg, rough, undulating, tight | | | |
| 45<br>-3.4 | | | NR | | | 44.6-44.65' - Same as 39.15-40.2' except strong HCl reaction<br>**No Recovery 44.65-46.0'** | R2: 6 minutes |
| | 46.0 | | | | | | |
| | R3-NQ 5 ft 90% | 43 | 0 | | | **Limestone** 46.0-46.3' - dusky yellow to moderate olive brown, (5Y 6/4 to 5Y 4/4), fine grained, mild HCl reaction, extremely weak (R0), voids (<1/16") over <5% of surface, trace very fine organics, few organic inclusions up to 1/2", very similar to overlying extremely weak rock (39.15'-40.2') | |
| | | | 2 | 47.15' - Fracture, 50 deg, rough, undulating, tight | | | |
| | | | 1 | 47.55' - Bedding plane, <10 deg, rough, undulating, open 1/4"<br>48.15' - Bedding plane, <5 deg, rough, undulating, tight | | | |
| | | | 2 | 49.0' - Fracture, 75 deg, rough, undulating, tight | | 46.3-48.15' - dusky yellow to moderate olive brown, (5Y 6/4 to 5Y 4/4), moderate to strong HCl reaction, medium strong (R3), 25% fine voids predominantly <1/16", moderately fossiliferous, no longer cavities, trace organics | |
| 50<br>-8.4 | | | | 49.7' - Fracture, 50 deg, rough, undulating, tight | | | R3: 3 minutes |
| | 51.0 | | NR | 50.25' - Fracture, same as 49.0' | | | |
| | R4-NQ 5 ft 100% | 17 | 0 | | | 48.15-49.0' - Same as 46.0-46.3'<br>49.0-50.35' - Same as 46.3-48.15'<br>50.35-50.5' - Same as 46.0-46.3'<br>**No Recovery 50.5-51.0'** | |
| | | | 2 | 52.5' - Bedding plane, <5 deg, smooth, undulating, tight | | **Limestone** 51.0-52.1' - Same as 46.0-46.3' | |
| | | | 1 | 52.6' - Fracture, 70 deg, rough, undulating, open 1/8"<br>53.4' - Fracture, 50 deg, same as 52.6' | | | |
| | | | 1 | 53.5' - same as 47.55'<br>54.35' - Mechanical break, same as 48.15' | | | |
| 55<br>-13.4 | | | 0 | | | | R4: 26 minutes |
| | 56.0 | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: D-06 | SHEET 4 OF 5 |
|---|---|---|

# ROCK CORE LOG

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 ORIENTATION : Vertical

WATER LEVELS : 2.1 ft bgs on 4/23/07 START : 4/23/2007 END : 4/24/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R5-NQ 5 ft 92% | 48 | 2 | 56.4' - Fracture, 50 deg, undulating, tight<br>56.8' - Bedding plane, <5 deg, 4" infilling of silt, tight | | 52.1-54.3' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine grained, strong HCl reaction, medium strong (R3), but weaker near transitions to over and underlying rock, voids (1/16") over 15-25% of surface, moderately fossiliferous with casts and molds up to 1/4", trace organics | |
| | | | 1 | 57.5' - Fracture, same as 56.4' | | | |
| | | | 1 | | | | |
| | | | 0 | 58.8' - Bedding plane, same as 56.8, except 6" thick silt infill | | 54.3-56.0' - Same as 46.0-46.3' | |
| 60<br>-18.4 | | | 1 | 60.3' - Bedding plane, smooth, planar, open up to 1/8" | | 56.0-56.2' - dusky yellow to moderate olive brown, (5Y 6/4 to 5Y 4/4), fine grained, mild HCl reaction, extremely weak (R0), voids over <5% of surface, non-fossiliferous, gradual transitions to over and underlaying layers | R5: 18 minutes |
| | 61.0 | | NR | | | | |
| | R6-NQ 5 ft 99% | 50 | 0 | 61.2' - Mechanical break | | 56.2-56.6' - Same as 52.1-54.3' except a couple of 1/2" cavities | |
| | | | 3 | 62.0, 62.25' - Bedding plane (2), <5 deg, smooth, undulating<br>62.6' - same as 62.0', except 10 deg | | 56.6-57.0' - Same as 56.0-56.2'<br>57.0-58.5' - Same as 52.1-54.3' | |
| | | | 1 | 62.9' - same as 62.0'<br>63.5' - Bedding plane, 5 deg, smooth, undulating, open up to 1/4" | | 58.5-59.1' - Same as 56.0-56.2'<br>59.1-60.6' - light olive gray to dusky yellow, (5Y 5/2 to 5Y 6/4), very fine grained, strong HCl reaction, strong (R4), voids over <5% of surface, few infilled cavities (1/16") that are only visible because of increased voids (10%) in infill | |
| | | | >10 | 64.1-64.4' - Fracture zone | | | |
| 65<br>-23.4 | | | 2 | 65.0, 65.55' - Fractures (2), 80 deg, rough to smooth, undulating | | | R6: 14 minutes |
| | 66.0 | | NR | 65.8, 66.9' - Mechanical break (2) | | **No Recovery 60.6-61.0'** | |
| | R7-NQ 5 ft 96% | 92 | 0 | | | **Limestone**<br>61.0-61.2' - Same as 56.0-56.2' | |
| | | | 1 | 67.45' - Bedding plane, 30 deg, open up to 1" | | 61.2-62.0' - yellowish gray to dusky 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 cavities, 1/2" thick laminations / infill of light olive gray (5Y 5/2) with no voids | |
| | | | 1 | 68.4' - Bedding plane, smooth, undulating, open <1/8", associated with organic lamination | | | |
| | | | 0 | 68.5, 69.4, 70.6' - Mechanical break (3) | | 62.0-62.9' - Same as 56.0-56.2' | |
| 70<br>-28.4 | | | 1 | 70.3' - Bedding plane, 10 deg | | 62.9-64.1' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine grained, moderate to strong HCl reaction, weak to strong (R2 to R4), gradual transition from bounding weak (R2) rock, voids (1/16") over 10-30% of surface | R7: 9 minutes |
| | 71.0 | | NR | | | 64.1-64.8' - Same as 56.0-56.2'<br>64.8-65.95' - Same as 62.9-64.1' | 13:15 Total depth of hole at 71.0'<br>Note: Used 9 bags of cement (47-lb bags) and 40 gallons of water |
| | | | | | | **No Recovery 65.95-66.0'** | |
| | | | | | | **Limestone**<br>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 | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: D-06 SHEET 5 OF 5 |
|---|---|

# ROCK CORE LOG

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 ORIENTATION : Vertical

WATER LEVELS : 2.1 ft bgs on 4/23/07 START : 4/23/2007 END : 4/24/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES | | | SYMBOLIC LOG | LITHOLOGY | COMMENTS |
|---|---|---|---|---|---|---|---|
| | | R Q D (%) | FRACTURES PER FOOT | DESCRIPTION<br>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. |
| | | | | | | 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'<br>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) rock<br>**No Recovery 70.8-71.0'** | |
| | | | | | | Bottom of Boring at 71.0 ft bgs on 4/24/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | E-01 SHEET 1 OF 13 |

# 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

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 : 3.2 ft bgs on 5/30/07 START : 5/30/2007 END : 6/3/2007 LOGGER : B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 40.9 | 0.0 – 1.5 | 0.8 | SS-1 | 1-2-3 (5) | **Topsoil** 0.0-0.3' - black, (N8), organics<br>**Silty Sand (SM)** 0.3-0.75' - light brown to moderate brown, (5YR 5/6 to 5YR 4/4), moist, loose, very fine to fine grained, 15% nonplastic fines, 5-10% organics | | Start drilling at 16:00 on 5/30/07<br>Water table encountered at 3.2' below ground surface<br>Silica sand |
| 5 | 5.0 | | | | | | |
| 35.9 | 5.0 – 6.5 | 0.6 | SS-2 | 2-2-3 (5) | **Silty Sand (SM)** 5.0-5.6' - mottled moderate yellowish brown and pale green, (mottled 10YR 5/4 and 10G 6/2), moist, loose, slow dilatancy, fine silica sand, 17% moderate plasticity fines | | |
| 10 | 10.0 | | | | | | |
| 30.9 | 10.0 – 11.5 | 0.9 | SS-3 | 9-14-24 (38) | **Silt With Sand And Limestone (ML)** 10.0-10.9' - grayish orange, (10YR 7/4), wet, hard, nonplastic, very rapid dilatancy, moderate to strong HCl reaction in all materials, 15-20% very fine to medium sand-sized, 40% fine to coarse gravel-sized limestone, all material carbonate | | Driller's Remark: Lost circulation at 13.0' |
| 15 | 15.0 | | | | | | |
| 25.9 | 15.0 – 16.5 | 0.6 | SS-4 | 1-1-8 (9) | **Sandy Silt And Limestone (ML)** 15.0-15.6' - grayish orange, (10YR 7/2), wet, medium stiff, nonplastic, 29% fine to coarse sand, 16% fine to coarse sized limestone | | Set HW casing 5/31/07 at 16.0' |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | E-01 SHEET 2 OF 13 |

# 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

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 : 3.2 ft bgs on 5/30/07 START : 5/30/2007 END : 6/3/2007 LOGGER : B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 20.9 | 20.0 – 21.5 | 1.4 | SS-5 | 6-9-13 (22) | **Silt With Sand (ML)** 20.0-21.4' - grayish orange, (10YR 7/4), wet, very stiff, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 20-25% fine to coarse sand-sized, 5-10% fine gravel-sized limestone | | Carbonate material |
| 25 | 25.0 | | | | | | |
| 15.9 | 26.5 | 1.4 | SS-6 | 6-11-15 (26) | **Silty Sand (SM)** 25.0-26.4' - grayish orange, (10YR 7/4), wet, medium dense, fine to coarse grained, mild to moderate HCl reaction, 42% nonplastic fines, 12% fine to coarse gravel-sized limestone | | Carbonate material |
| 30 | 30.0 | | | | | | |
| 10.9 | 31.5 | 1.1 | SS-7 | 1-0-9 (9) | **Silty Sand With Limestone (SM)** 30.0-31.2' - Same as 25.0-26.4' | | |
| 35 | 35.0 | | | | | | |
| 5.9 | 36.5 | 0.5 | SS-8 | 2-10-8 (18) | **Silty Sand With Limestone (SM)** 35.0-35.5' - moderate yellowish brown, (10YR 5/4), wet, medium dense, fine to coarse grained, mild to moderate HCl reaction in all materials, 27% nonplastic fines, 36% fine to coarse gravel-sized limestone fragments | | Carbonate material<br>Driller's Remark: Lost circulation at 37.0' |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | E-01 SHEET 3 OF 13 |

# 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

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 : 3.2 ft bgs on 5/30/07 START : 5/30/2007 END : 6/3/2007 LOGGER : B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 0.9 | 40.0<br>40.8 | 0.6 | SS-9 | 13-50/4<br>(63/10") | **Interbedded Limestone And Sandy Silt**<br>40.0-40.6' - dark yellowish brown and moderate yellowish brown, (10YR 4/2 and 10YR 5/4), 70% of sample is limestone in fine sand-sized to coarse gravel-sized fragments, with mild HCl reaction and 30% of sample is sandy silt, moist, hard, low plasticity, rapid dilatancy, mild HCl reaction, with varved appearance<br>Begin Rock Coring at 41.0 ft bgs<br>See the next sheet for the rock core log | | Driller's Remark: Chatter at 40.0'<br>Carbonate material<br>Begin core at 41.0' 5/31/07, 10:45 |
| 45<br>-4.1 | | | | | | | |
| 50<br>-9.1 | | | | | | | |
| 55<br>-14.1 | | | | | | | |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | E-01 SHEET 4 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

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

WATER LEVELS : 3.2 ft bgs on 5/30/07 START : 5/30/2007 END : 6/3/2007 LOGGER : B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | 41.0 | | | | | **Limestone** | Casing depth 41.0' |
| | R1-HQ 5 ft 70% | 63 | >10 | 41.0-41.2' - Fracture zone, rounded to angular limestone rock fragments (gravel size) | | 41.0-41.4' - coarse gravel (limestone and chert) | |
| | | | 1 | 41.3' - Fracture, 40 deg, rough, undulating, open | | 41.4-43.0' - pale yellowish brown, (10YR 6/2), dense, very fine grained, moderate HCl reaction, medium strong to strong (R3 to R4), cavities up to 2-3/8"-2-3/4"x3/4"-1-3/16", infilled with medium grained vesicular-textured limestone, voids up to 1/16" or less over 1-2% of surface, fossils rare to absent, possibly bioturbated | NR = No Recovery |
| | | | 1 | 42.35' - Fracture, horizontal, rough, planar, 3/4" boring in fracture, tight | | | |
| | | | 2 | 43.9' - Fracture, 80 deg, rough, planar, 80% of surface covered by black organic coating <1/16" thick, fracture plane extends from 43.6-44.5' | | | |
| 45 -4.1 | | | NR | 44.3' - Fracture, 20-30 deg, rough, stepped, open | | | R1: 14 minutes |
| | 46.0 | | | | | 43.0-44.5' - pale yellowish brown, (10YR 6/2), dense, fine to medium grained, mild to moderate HCl reaction, medium strong to weak (R3 to R2), voids (generally <1/16") over 3-5% of surface grading to 10% with depth, fossils (molds/casts) rare to absent | |
| | R2-HQ 5 ft 100% | 57 | 4 | 44.3-44.5' - Fracture, 80 deg, rough, stepped, open | | | |
| | | | 0 | 46.2' - Fracture, 80 deg, rough, planar, thin (<1/16") layer of black (N1) carbonaceous material, open | | | |
| | | | 2 | 46.6' - Fracture zone, 40 deg, very rough, planar, open | | **No Recovery 44.5-46.0'** | |
| | | | 2 | 46.7' - Fracture, horizontal, rough, planar, open | | **Limestone** | |
| | | | 1 | 46.9' - Fracture, horizontal, smooth, planar, open | | 46.0-48.5' - Same as 43.0-44.5' except voids increase to 5-8%, cavities common (typically 1/16"x3/16"), fossiliferous (molds/casts) | |
| 50 -9.1 | | | | 48.7' - Fracture, 10 deg, smooth, undulating, open | | | R2: 3 minutes |
| | 51.0 | | | 48.9' - Fracture, 20 deg, smooth, undulating | | **Silty Sand (SM)** | |
| | R3-HQ 5 ft 56% | 42 | 1 | 49.3, 49.7' - Fractures (2), horizontal, smooth, undulating, tight | | 48.5-51.0' - grayish orange to dark yellowish brown, (10YR 7/4 to 10YR 6/6), mild HCl reaction, interbedded with clay, carbonate-derived silts/clays/sand-size fragments (cohesive), with some black (N1) carbonaceous/organic laminae/deposits, fossils absent | |
| | | | 10 | 50.7' - Fracture, horizontal, smooth, undulating, open | | | |
| | | | 10 | 51.0-51.3' - Fracture zone, rough, stepped, various orientation of fractures, open, gravel to cobble sized limestone rock fragments | | | |
| | | | NR | 52.2-52.9' - Fracture, 80 deg, rough, undulating, tight | | **Limestone** | |
| | | | | 52.4-53.8' - Fracture zone, intersecting fractures from 50 deg to 90 deg, rough, stepped to undulating, tight to open | | 51.0-53.8' - moderate yellowish brown, (10YR 5/4), mottled yellowish 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 laminated with black (N1) organic/carbonaceous material | |
| 55 -14.1 | | | | | | | R3: 5 minutes |
| | 56.0 | | | | | **No Recovery 53.8-56.0'** | |
| | | | | | | **Silty Sand (SM)** | |
| | | | | | | 56.0-56.6' - Same as 48.5-51.0' | |
| | R4-HQ 5 ft 80% | 42 | 2 | 56.3' - Fracture, 10 deg, very smooth, undulating | | | |
| | | | 2 | 56.6-57.0' - Fracture zone, rough, planar to undulating, large coarse gravel to cobble size, low to high angle fracture planes, open | | | |
| | | | 1 | 57.2' - Fracture, 10 deg, rough, stepped, open | | | |
| | | | 1 | 57.5-58.0' - Fracture zone, rough, planar to undulating, large coarse gravel to cobble size, low to high angle fracture planes, open | | | |
| 60 -19.1 | | | NR | 58.0' - Fracture, horizontal, smooth, planar, tight, black (N1) carbonaceous film/coating over 90-95% of surface | | | R4: 5 minutes |
| | 61.0 | | | | | | |

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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

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

WATER LEVELS : 3.2 ft bgs on 5/30/07 START : 5/30/2007 END : 6/3/2007 LOGGER : B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R5-HQ 5 ft 70% | 45 | >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 HCl 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, numerous thin, wispy, discontinuous black carbonaceous laminae, rare zone of very weak to extremely weak (R1-R0) rock (typically as cavity infilling) | |
| | | | 1 | 59.6' - Fracture, 10 deg, rough, undulating to stepped, tight | | | |
| | | | 2 | 61.0-61.6' - Fracture zone, rough, undulating, gravel-sized, angular to subangular limestone fragments, various fracture orientations, open | | | |
| | | | 1 | 61.6' - Fracture, horizontal, rough, undulating, open | | | |
| | | | NR | 61.8' - Fracture, 0-90 deg, rough to smooth, stepped, black carbonaceous film over 10% | | | |
| 65 -24.1 | 66.0 | | | 62.4' - Fracture, horizontal, smooth, undulating, tight, dark gray carbonaceous film over 50% | | **No Recovery 60.0-61.0'** | R5: 5 minutes |
| | R6-HQ 5 ft 73% | 52 | >10 | 63.15' - Fracture, horizontal, rough, undulating, open | | **Limestone** 61.0-61.6' - moderate yellowish brown, (10YR 5/4), medium grained, mild HCl reaction, extremely weak (R0), friable, cavities and voids absent, fossils absent | Mast down at 15:15 |
| | | | | 63.7' - Fracture, 60 deg, rough, undulating | | | |
| | | | 2 | 64.1' - Fracture, horizontal, smooth, undulating | | | |
| | | | | 66.5' - Fracture, 30 deg, rough, stepped, open, silt lining <1/16" thick | | | |
| | | | 3 | 66.5-67.0' - Fracture zone, irregular angles, rock fragments | | 61.6-64.5' - moderate yellowish brown becoming grayish orange with depth, (10YR 5/4 to 10YR 7/4), fine grained, mild HCl reaction, weak to medium strong (R2 to R3), voids 1/16" over 5-7% of core surface, unevenly distributed, few cavities generally 3/8" or less in diameter, thin black discontinuous carbonaceous laminae common, fossil molds/casts rare to absent | |
| | | | 1 | 67.0' - Fracture, 0-90 deg, rough, stepped, open | | | |
| 70 -29.1 | 71.0 | | NR | 67.8' - Fracture, 10 deg, rough, highly undulating to stepped, tight<br>68.1' - Fracture, horizontal, rough, undulating, open | | | R6: 4 minutes |
| | R7-HQ 5 ft 34% | 18 | 3 | 68.5, 68.75, 69.35' - Fractures (3), 10 deg, very rough, undulating, open | | **No Recovery 64.5-66.0'** | Core was stuck in core barrel, required all rods to be removed |
| | | | | 71.5' - Fracture, 0-45 deg, rough, planar, open | | **Limestone** 66.0-67.7' - pale yellowish brown grading to dark yellowish brown, (10YR 6/2 to 10YR 4/2), fine to medium grained, mild HCl reaction, weak to medium strong (R2 to R3), voids up to 1/16" over 15-20% of surface, some cavities (generally 3/16" or less in diameter), fossil molds/casts rare | |
| | | | 1 | 71.8' - Fractures (2), 45 deg, smooth, undulating, open | | | |
| | | | NR | 71.9-72.2' - Fracture zone, irregular angles<br>72.2' - Fracture, horizontal, smooth, planar, open | | | |
| 75 -34.1 | 76.0 | | | | | 67.7-67.8' - Same as 66.0-67.7' except dark yellowish brown, (10YR 4/2), medium grained, extremely weak (R0) | R7: 8 minutes |
| | R8-HQ 5 ft 98% | 83 | 3 | 76.4' - Fracture, horizontal, smooth, planar, open | | 67.8-68.1' - grayish orange mottled with pale yellowish brown, (10YR 7/4 and 10YR 6/2), fine to medium grained, mild HCl reaction, extremely weak (R0), voids/cavities/fossils absent, possible intraclasts of very weak (R1) rock | |
| | | | 0 | 76.5' - Fracture, horizontal, rough, undulating, open | | | |
| | | | 2 | 76.7' - Fracture, 0-20 deg, rough, stepped, open<br>78.0' - Fracture or mechanical break, horizontal, rough, undulating, tight | | | |
| | | | 0 | 78.9' - Fracture, 30 deg, rough, planar | | 68.1-69.45' - pale yellowish brown, (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, few cavities (<3/8" in diameter), trace fossil casts/molds | |
| 80 -39.1 | 81.0 | | 1 | | | | SC-1 collected at 79.7-80.8'<br>R8: 10 minutes |

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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

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

WATER LEVELS : 3.2 ft bgs on 5/30/07 START : 5/30/2007 END : 6/3/2007 LOGGER : B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | | | NR | 80.85' - Fracture, 40 deg, rough, planar, tight, <1/16"-sized black "peppering" of amorphous mineral over 8-10% of fracture plane surface | | **Limestone** 69.45-69.65' - grayish orange, (10YR 7/4), fine grained, mild HCl reaction, very weak to weak (R1 to R2), fossils absent, voids <1/16" over <1%, cavities absent, some very thin dark gray laminations | |
| | | | 1 | 81.5' - Fracture, horizontal, rough, undulating, open | | | |
| | | | 1 | 82.5' - Fracture, 75 deg, rough, undulating, fracture plane extends from 82.2-82.8' | | | |
| | R9-HQ 5 ft 68% | 46 | 2 | 83.1' - Fractures, 0-40 deg, rough, stepped, open | | **No Recovery 69.65-71.0'** | |
| | | | 0 | 83.3' - Fracture, 0-90 deg, rough, stepped, open | | **Limestone** 71.0-72.7' - light olive gray to moderate yellowish brown, (5Y 5/2 to 10YR 5/4), fine grained, mild to moderate HCl reaction, strong (R4), voids 1/16" over 10-15% of surface, some cavities generally 3/8" in diameter or less, sparsely fossiliferous casts/molds | |
| 85 -44.1 | | | NR | | | | R9: 6 minutes |
| | 86.0 | | | | | | |
| | | | 1 | | | | Start drill at 07:30 on 6/3/07 |
| | | | 3 | 86.85' - Fracture, 45-60 deg, rough, undulating, several intersecting fracture planes, open | | **No Recovery 72.7-76.0'** **Limestone** 76.0-78.5' - mottled yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), fine to medium grained, mild to moderate HCl reaction, medium strong to strong (R3 to R4), voids typically 1/16" or less over 5-10% of rock surface, some cavities generally 3/8" in diameter or less but up to 1-3/16" in diameter (filled with silty to sandy carbonate grains), fossils rare as molds/casts, <1% of surface having a patina of white very fine grained carbonate staining/film | Driller's Remark: Lost circulation at 87.0' |
| | R10-HQ 5 ft 86% | 80 | 1 | 87.1' - Fracture, 50 deg, rough, planar, conical | | | |
| | | | 0 | 87.45' - Fracture, horizontal, rough, undulating, tight | | | |
| | | | 0 | 87.85, 88.6' - Fractures (2), horizontal, smooth, planar | | | |
| 90 -49.1 | | | NR | | | | R10: 7 minutes |
| | 91.0 | | | | | | |
| | | | 1 | 91.3' - Mechanical break | | 78.5-79.5' - grayish orange, (10YR 7/4), fine grained, none to mild HCl reaction, extremely weak (R0), very friable, voids <1/16" over <1%, cavities absent, non-fossiliferous, rare intraclasts (<1/4") of grayish very weak to weak(R1 to R2) limestone | |
| | | | 0 | 91.7' - Fracture, horizontal, smooth, planar, tight | | | Cavity filled with organic material at 92.1' |
| | R11-HQ 5 ft 96% | 83 | 2 | 93.6' - Fracture, 20 deg, rough, planar, coarse gravel sized fragments at interface, open | | | |
| | | | 2 | 93.95, 94.25' - Fractures (2), horizontal, rough, undulating, open | | **Silt (ML)** 79.5-79.7' - grayish orange, (10YR 7/4), mild HCl reaction, carbonate derived | Cavities at 94.4-94.6' and 94.6-94.8' |
| 95 -54.1 | | | 1 | 94.95' - Fracture, horizontal, rough, planar, open | | | R11: 6 minutes |
| | 96.0 | | NR | | | **Limestone** 79.7-80.9' - grayish orange to very pale orange, (10YR 7/4 to 10YR 8/2), very fine grained, moderate HCl reaction, medium strong to weak (R3 to R2), voids 1/16" or less over 1-3% of rock surface, cavities rare, trace fossil casts/molds | |
| | | | 7 | 95.25' - Fracture, horizontal, rough, undulating to stepped, open | | | |
| | | | >10 | 96.4' - Fracture, horizontal, rough, undulating, open | | | |
| | | | >10 | 96.45' - Fracture, vertical, smooth, planar, open | | | |
| | R12-HQ 5 ft 88% | 18 | >10 | 96.5' - Fracture, <5 deg, smooth, undulating, open | | **No Recovery 80.9-81.0'** **Limestone** 81.0-81.5' - Same as 79.7-80.9' | |
| | | | >10 | 96.6' - Fracture, 60 deg, smooth, slightly undulating, tight | | | |
| | | | 2 | 96.7' - Fracture, horizontal, rough, planar to stepped, open | | | SC-2 collected at 99.0-99.9' |
| 100 -59.1 | | | NR | 96.8' - Fracture, horizontal, rough, planar, open | | | R12: 6 minutes |
| | 101.0 | | | | | | |

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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

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

WATER LEVELS : 3.2 ft bgs on 5/30/07 START : 5/30/2007 END : 6/3/2007 LOGGER : B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R13-HQ 5 ft 100% | 53 | 10 | 96.9' - Fracture, vertical, smooth, planar, open<br>97.0' - Fracture, horizontal, rough, stepped, open | | 81.5-83.5' - moderate yellowish brown with yellowish gray limestone interbeds, (10YR 5/4 with 5Y 7/2), fine to medium grained, mild to moderate HCl reaction, weak to medium strong (R2 to R3), HCl reaction strong where patina of very fine grained limestone coats core surface, abundant fractures, breccia-like features (with possible intraclasts) common from 82.7-83.5', voids up to 1/16" over 15-20% of surface, cavities common (up to 2-3/8"-2-3/4" in length, 1-9/16"-2" wide and extending 3/4"-1-3/16" into core), fossiliferous (casts/molds)<br>83.5-84.4' - yellowish gray, (5Y 7/2), fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), voids (1/16" or less) unevenly distributed over 15% of rock surface, cavities (<3/16"), fossil molds/casts rare to absent<br>**No Recovery 84.4-86.0'**<br>**Limestone**<br>86.0-87.4' - dusky yellow with yellowish gray interbeds, (5Y 6/4 with 5Y 7/2), fine to very fine grained, weak to medium strong (R2 to R3), voids 1/16" or less over 25-30% of rock surface, some cavities up to 1-3/16"-1-9/16" x 3/4"-1-3/16", very fine grained limestone from 86.7-86.8', very fine grained intraclast from 87.0-87.4' (subangular, up to 1/2"-3/4"), some fossil molds/casts<br>87.4-88.6' - very light gray, (N8), fine grained, strong HCl reaction, very weak (R1), voids (1/16" or less) over 3-5% of rock surface, cavities rare (typically 3/8"x3/16"), trace fossil molds and trace echinoderms<br>88.6-90.3' - variegated pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), fine to medium grained, moderate HCl reaction, very weak to weak (R1 to R2), voids up to 1/16" over 5-8%, cavities (typically 3/8"x3/16"), fossiliferous (molds/casts), echinoderms, becomes coarse grained with depth from 90.2-90.3' and extremely weak rock (R0) with some black carbonaceous material<br>**No Recovery 90.3-91.0'** | 08:30 rig stops for water refill<br>SC-3 collected at 101.75-102.8' |
| | | | >10 | 97.0-98.0' - Fracture zone, rough, undulating to stepped, vertical to subvertical, open | | | |
| | | | >10 | 98.23' - Fracture, horizontal, smooth, undulating to planar, open<br>98.5' - Mechanical break | | | |
| | | | 10 | 98.6-99.0' - Fracture zone, 0-90 deg, rough, stepped to undulating, open | | | |
| 105<br>-64.1 | 106.0 | | 5 | 99.9-100.05' - Fracture zone, rough, planar, various fracture orientations, gravel sized rock fragments, open | | | R13: No time recorded |
| | R14-HQ 5 ft 92% | 53 | 4 | 100.2' - Fracture, horizontal, smooth, planar, open<br>100.5' - Fracture, horizontal, rough, planar to stepped, open | | | 09:30 begin drill, add 1 bag mud |
| | | | 4 | 101.4' - Fracture, 0-45 deg, smooth, planar, open | | | Driller's Remark: Drill chatter throughout run |
| | | | >10 | 101.6-101.75' - Fracture zone, 0-50 deg, rough, undulating, open<br>102.8' - Fracture or mechanical break, horizontal, smooth, planar | | | |
| | | | 4 | 102.8-103.1' - Fracture zone, gravel-sized rock fragments, multiple fracture orientations | | | |
| 110<br>-69.1 | 111.0 | | 0 | 103.13, 103.2, 103.3, 103.45' - Bedding plane (4), horizontal, rough, planar to stepped, discontinuous, open | | | R14: 4 minutes<br>SC-4 collected at 110.15-111.0' |
| | | | NR | 103.5' - Fracture, 45 deg, smooth, planar, tight | | | |
| | R15-HQ 5 ft 76% | 15 | >10 | 103.8, 103.9' - Fractures (2), horizontal, rough, planar | | | |
| | | | >10 | 104.1, 104.2' - Fractures (2), horizontal, rough, stepped, open<br>104.7' - Fracture, rough, cone-shaped | | | |
| | | | >10 | 104.7-104.75' - Fracture zone, gravels sized fragments of irregular shape and fracture orientation | | | |
| | | | >10 | 104.83' - Fracture, horizontal, smooth, planar<br>105.2, 105.45, 105.57, 105.7, 105.9' - Bedding plane (5), horizontal, rough, planar to stepped, open | | | |
| 115<br>-74.1 | 116.0 | | NR | 106.3' - Fracture, horizontal, smooth, planar<br>106.4-106.5' - Fracture zone, horizontal, planar, multiple fragments | | | R15: 5 minutes |
| | R16-HQ 5 ft 96% | 55 | 4 | 106.55' - Fracture, horizontal, smooth, planar<br>106.6' - Fracture, horizontal, smooth, planar | | | |
| | | | 4 | 106.9' - Mechanical break, horizontal, smooth, planar<br>107.4' - Fracture, horizontal, rough, planar | | | |
| | | | 0 | 107.5' - Fracture, horizontal, rough, undulating<br>107.8' - Fracture or mechanical break, horizontal, smooth, undulating | | | |
| | | | 4 | 107.9' - Fracture or mechanical break, horizontal, smooth, undulating | | | |
| 120<br>-79.1 | 121.0 | | 6 | 108.0-108.3' - Fracture zone, horizontal, smooth, planar, bedding plane separations at 108.0, 108.1, 108.2, 108.25, 108.3' | | | R16: 4 minutes |

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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

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

WATER LEVELS : 3.2 ft bgs on 5/30/07 START : 5/30/2007 END : 6/3/2007 LOGGER : B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 125<br>-84.1 | R17-HQ<br>5 ft<br>40%<br>126.0 | 0 | >10<br>>10<br>NR | 108.5-109.0' - Fracture zone, horizontal, smooth, planar, open<br>109.05' - Bedding plane, horizontal, rough, planar to stepped, open<br>109.5, 109.85, 109.98' - Bedding plane (3), horizontal, rough, undulating, open<br>111.0-112.55' - Bedding plane, horizontal, rough, planar to undulating, open, 0.1' thick or less throughout interval, multiple breaks<br>112.3-113.7' - Fracture zone, smooth to rough, planar to undulating, coarse gravel to cobble size fragments, various fracture plane orientations, open<br>114.4-114.8' - Fracture zone, smooth to rough, planar to undulating, coarse gravel to cobble size fragments, various fracture plane orientations, open | | **Limestone**<br>91.0-92.0' - very light gray, (N8), fine grained, strong HCl reaction, weak to medium strong (R2 to R3), voids 1/16" or less over 10-15% of rock surface, several cavities typically 3/8"x3/16", trace fossil molds/casts with occasional echinoderm fossils<br>92.0-93.5' - Same as 88.6-90.3' except trace black carbonaceous/organic discontinuous laminae/cavity infilling, intraclasts (up to 1-9/16"-2", subrounded) common<br>93.2-93.5'<br>93.5-95.45' - yellowish gray to very light gray, (5Y 8/1 to N8), fine to medium grained, strong HCl reaction, very weak (R1) rock from 93.5-94.3', becoming weak rock (R2) from 94.3-95.2' and returning to very weak rock (R1) from 95.2-95.45', voids (1/16" or less) over 3-5% of rock surface and unevenly distributed, some cavities up to 1-3/16"-1-9/16"x3/8" over 2-3% of rock surface, chalk-like texture when scraped with pocket knife, fossil molds/casts rare to absent | R17: 4 minutes |
| 130<br>-89.1 | R18-HQ<br>5 ft<br>4%<br>131.0 | 0 | 0<br>NR | 116.15' - Fracture, horizontal, rough, stepped, open<br>116.27' - Fracture, 10 deg, rough, undulating, open<br>116.57' - Fracture, horizontal, rough, planar, open<br>116.68' - Fracture, horizontal, rough, planar to undulating, open<br>117.02' - Fracture, horizontal, rough, stepped, open<br>117.07' - Fracture, vertical, rough, stepped, open<br>117.1' - Fracture, 20 deg, rough, stepped, conical, open | | **Peat**<br>95.45-95.7' - black to grayish black, (N1 to N2), no HCl reaction, firm to stiff, interlaminated with some very weak limestone | Driller's Remark: Large rock fragment jammed in tip of core barrel. 10:30 drilling suspended to fix wireline spool<br>One rock fragment 2.4" long was all that was recovered during coring. No void reported.<br>Driller's Remark: Strong chatter<br>R18: 3 minutes |
| 135<br>-94.1 | R19-HQ<br>5 ft<br>92%<br>136.0 | 22 | 8<br>5<br>>10<br>6<br>>10<br>NR | 117.32' - Fracture, horizontal, rough, undulating, open<br>117.9' - Mechanical break<br>118.5' - Mechanical break<br>119.3' - Fracture, horizontal, rough, undulating, open<br>119.4' - Fracture, horizontal, rough, stepped, open<br>119.72' - Fracture, horizontal, rough, stepped, open<br>119.8' - Fracture, horizontal, rough, planar, open<br>120.05, 120.12, 125.25, 120.45, 120.65' - Fractures (5), horizontal, rough, planar to undulating, open | | **Limestone**<br>95.7-95.8' - Same as 93.5-95.45' except very weak (R1), friable<br>**No Recovery 95.8-96.0'**<br>**Limestone**<br>96.0-100.4' - yellowish gray, (5Y 8/1), strong HCl reaction, weak to medium strong (R2 to R3), voids 1/16" or less over 5-10% of rock surface, cavities typically 3/8" in diameter over 3-4%, trace fossil molds/casts<br>**No Recovery 100.4-101.0'** | Driller's Remark: Strong chatter from 133.0-136.0'<br>Many fractures resulted from breakage along weak bedding planes when removing sample from core barrel<br>R19: 5 minutes |
| 140<br>-99.1 | R20-HQ<br>5 ft<br>66%<br>141.0 | 0 | 10<br>10<br>7<br>0<br>NR | 120.75' - Fracture, 0-60 deg, rough, stepped, open<br>121.0' - Fracture zone, unconsolidated, 1/2"-4" fragments<br>131.1, 131.3, 131.35, 131.4, 131.45, 131.55, 131.7, 131.8' - Fractures (8), horizontal, rough, planar to undulating, open<br>132.25, 132.3, 132.38, 132.8, 132.9' - Fractures (5), horizontal, rough, planar to undulating, open<br>133.1, 133.25, 133.4, 133.5, 133.6, 133.7, 133.8, 133.85' - Fractures (8), horizontal, rough, planar to undulating, open<br>133.85-134.15' - Fracture zone, 0-90 deg, rough, undulating to stepped, open | | **Limestone**<br>101.0-106.0' - very pale orange to yellowish gray, (10YR 8/2 to 5Y 7/2), fine to medium grained, strong HCl reaction, weak (R2), chalky texture when scraped with pocket knife, voids up to 1/16" over 10% or less of rock surface, some cavities up to 3/8" in diameter, some echinoid fossils in addition to sparse occurrences of molds/casts<br>106.0-110.6' - Same as 101.0-106.0' except echinoderm fossils common from 106.0-107.4'<br>**No Recovery 110.6-111.0'** | R20: 4 minutes |

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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

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

WATER LEVELS : 3.2 ft bgs on 5/30/07 START : 5/30/2007 END : 6/3/2007 LOGGER : B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R21-HQ 5 ft 88% | 62 | 1 | 134.15, 134.25, 134.4, 134.5, 134.6, 134.8, 135.85' - Fractures (7), horizontal, rough, planar to stepped, open | | **Limestone** 111.0-113.7' - Same as 101.0-106.0' except echinoid fossils rare to absent 113.7-114.45' - yellowish gray, (5Y 8/1), very fine grained, strong HCl reaction, extremely weak (R0), voids/cavities absent, fossils absent 114.45-114.8' - Same as 111.0-113.7' | |
| | | | 4 | 135.07' - Fracture, horizontal, rough, planar, open | | | |
| | | | 4 | 135.07-135.7' - Fracture zone, multiple coarse gravel to cobble-sized fragments, various fracture plane orientations | | | |
| | | | 2 | 135.7' - Fracture, horizontal, rough, stepped, open 135.85' - Fracture, horizontal, rough, planar, open | | **No Recovery 114.8-116.0'** **Limestone** 116.0-119.7' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, very weak to weak (R1 to R2), chalky texture when scraped with knife, voids (<1/16" over 1-2% of surface, few cavities (generally 3/8" in diameter or less), fossils rare to absent (trace echinoderms) 119.7-120.8' - yellowish gray, (5Y 7/2), medium to coarse grained, strong HCl reaction, very weak (R1), voids <10%, some cavities (typically <3/8" in diameter), fossiliferous (molds/casts), pelecypods, gastropods, some echinoderms (fossil hash) | |
| 145 -104.1 | | | 0 | 136.1, 136.2, 136.3' - Fractures (3), horizontal, rough, planar, open | | | SC-5 collected at 144.5-145.4' R21: 5 minutes |
| 146.0 | | | NR | 136.4-136.6' - Fracture zone, bounded by planar to undulating, rough, open bedding planes | | | |
| | R22-HQ 5 ft 88% | 68 | >10 | 136.8, 136.9' - Fractures (2), horizontal, rough, undulating, open | | | |
| | | | 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, 138.5, 138.55' - Fractures (14), horizontal, rough to smooth, planar to undulating, open | | | |
| | | | 2 | 138.5' - Mechanical break 138.85' - Fracture, horizontal, rough, planar | | | |
| | | | 2 | 141.4' - Fracture or mechanical break, horizontal, rough, planar | | | |
| 150 -109.1 | | | 0 | 142.0' - Fracture, horizontal, rough, planar | | **No Recovery 120.8-121.0'** 121.0-123.0' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, extremely weak (R0), very friable, 40-50% fine to medium sand-sized grains grading to gravel-sized carbonate | R22: 7 minutes |
| 151.0 | | | NR | 142.12' - Fracture, horizontal, rough, planar, open 142.0-142.12' - Fracture zone | | | |
| | R23-HQ 5 ft 96% | 80 | 2 | 142.33, 142.40' - Fracture or mechanical break (2), horizontal, rough, planar | | | Start drill at 12:15 Add 1/2 bag mud SC-6 collected at 151.3-152.35' |
| | | | 3 | 142.9' - Fracture or mechanical break, horizontal, rough, planar | | | |
| | | | 0 | 143.0' - Fracture, horizontal, rough, undulating, coarse gravel-sized rock fragments on bottom face | | **No Recovery 123.0-126.0'** **Limestone** 126.0-126.2' - yellowish gray, (5Y 7/2), medium to coarse grained, strong HCl reaction, very weak to weak (R1 to R2), fossiliferous (echinoderms, fossil hash) | Driller's Remark: Drilling in fourth gear, consistent chatter throughout run |
| | | | 0 | 143.3' - Fracture, vertical, rough, stepped, tight 143.4' - Fracture, horizontal, rough, stepped, open | | | |
| 155 -114.1 | | | 0 | 143.7' - Fracture, 80 deg, rough, planar, tight 144.1' - Fracture, 80 deg, rough, stepped, (intersects fracture at 143.7') | | **No Recovery 126.2-131.0'** **Limestone** 131.0-135.6' - Same as 111.0-113.7' **No Recovery 135.6-136.0'** | Large cast/void at 154.85', 155.2', 155.8' R23: No time recorded |
| 156.0 | | | NR | 144.50' - Fracture or mechanical break, horizontal, rough, undulating | | **Limestone** 136.0-137.9' - Same as 131.0-136.0' 137.9-138.2' - olive gray, (5Y 3/2), fine to medium grained, strong HCl reaction, very weak (R1), thinly laminated | Lost 2.0' due to having to break 2.9' long piece to box |
| | R24-HQ 5 ft 80% | 55 | 1 | 146.4' - Fracture, horizontal, rough, undulating, organic staining on bottom face | | | |
| | | | 1 | 146.4-146.6' - Fracture zone, smooth, planar, coarse gravel to cobble-sized fragments | | | |
| | | | 1 | 146.6' - Fracture, horizontal, rough, undulating, tight 146.8' - Fracture, vertical, rough, planar, tight, fracture plane extends from 146.6-147.0' | | 138.2-138.5' - Same as 136.0-137.9' 138.5-138.7' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, weak (R2), laminated, voids (<1/16") 5-8% irregularly distributed over core surface, few cavities <1/16" in diameter, fossils (casts/molds) rare to absent | SC-7 collected at 158.3-159.1' |
| | | | 2 | 147.0' - Fracture or mechanical break, horizontal, smooth, planar, open | | | |
| 160 -119.1 | | | NR | 147.0-147.2' - Fracture zone, rough, planar to stepped, multiple fractures, open, angular gravel size fragments | | 138.7-139.3' - Same as 121.0-123.0' **No Recovery 139.3-141.0'** | R24: 4 minutes |
| 161.0 | | | | | | | |

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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

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

WATER LEVELS : 3.2 ft bgs on 5/30/07 START : 5/30/2007 END : 6/3/2007 LOGGER : B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R25-HQ 5 ft 96% | 75 | 3 | 147.7' - Fracture or mechanical break, horizontal, smooth, planar, tight | | **Limestone** 141.0-141.35' - yellowish gray to pale yellowish brown, (5Y 7/2 to 10YR 6/2), medium to coarse grained, strong HCl reaction, very weak (R1), voids (1/16") over 5-7% of surface, some cavities up to 3/8" in diameter, fossiliferous (echinoderm parts), molds/casts sparse | |
| | | | 3 | 148.4' - Fracture or mechanical break, 0-50 deg, smooth, planar, tight | | | |
| | | | 1 | 148.9' - Fracture, 70 deg, smooth, undulating, tight, fracture plane extends from 148.5-149.5' | | | |
| | | | 2 | 149.3' - Fracture, horizontal, very rough, undulating, tight | | | |
| 165 -124.1 | | | 3 | 149.55' - Fracture, vertical, rough, undulating to stepped, tight | | 141.35-142.0' - pale yellowish brown, (10YR 6/2), fine to medium grained, strong HCl reaction, weak to medium strong (R2 to R3), voids up to 1/16" over 10% of surface, few cavities generally 3/8" or less in diameter, fossiliferous (echinoids), thinly laminated with wispy, discontinuous, black (N1) carbonaceous/organic material | R25: 4 minutes |
| | | | NR | 149.8' - Fracture, 0-90 deg, rough, stepped, tight | | | |
| | 166.0 | | | 151.2' - Fracture, 10 deg, rough, stepped, tight | | | |
| | R26-HQ 5 ft 68% | 18 | 8 | 151.3' - Fracture, 10 deg, smooth, undulating, tight | | 142.0-143.05' - yellowish gray, (5Y 7/2), medium grained, strong HCl reaction, weak (R2), chalk-like texture when scraped with knife, irregular to undulating core surface, voids (<1/16" or less) over 1-2%, cavities rare, fossils (molds/casts) difficult to discern | |
| | | | 6 | 152.6' - Fracture, horizontal, smooth, undulating, tight | | | Loud drill chatter throughout, especially at 167.0' |
| | | | 9 | 152.9' - Fracture, horizontal, smooth, undulating, open | | | Large cavity >3/4" at 168.0', 169.2' |
| | | | 2 | 152.97' - Fracture, horizontal, rough, undulating | | | |
| 170 -129.1 | | | NR | 156.35' - Fracture, 10 deg, rough, undulating, open | | 143.05-145.4' - yellowish gray, (5Y 7/2), very fine grained, moderate to strong HCl reaction, medium strong to strong (R3 to R4), voids (1/16" or less) over 3% or less of rock surface, cavities common up to a few inches in length (possibly bioturbated), fossiliferous (mostly casts), some pelecypod molds/casts | R26: 4 minutes |
| | | | | 157.9' - Fracture, horizontal, smooth, undulating, open | | | |
| | | | | 158.0' - Fracture, 10 deg, smooth, planar | | | |
| | | | | 158.3' - Mechanical break | | | |
| | 171.0 | | | 159.4, 159.7' - Fractures (2), horizontal, rough, planar, open | | | |
| | R27-HQ 5 ft 96% | 57 | 2 | 161.35' - Fracture, horizontal, rough, undulating, tight | | **No Recovery 145.4-146.0'** | |
| | | | 5 | 161.6' - Fracture or mechanical break, horizontal, smooth, planar, open | | **Limestone** 146.0-146.4' - Same as 143.05-145.4' | |
| | | | 10 | 161.95' - Fracture or mechanical break, horizontal, rough, planar, open | | | |
| | | | >10 | 162.2' - Fracture, horizontal, rough, undulating, open | | 146.4-148.1' - yellowish gray to pale yellowish brown, (5Y 7/2 to 10YR 6/2), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), thin black wispy organic/carbonaceous laminations, voids (<1/16") over 1-3% of surface non-uniformly distributed, few cavities, fossil molds/casts rare to absent | |
| | | | | 162.45, 162.55' - Fracture or mechanical break (2), horizontal, rough, planar, open | | | |
| 175 -134.1 | | | 10 | 163.5' - Mechanical break | | | R27: 4 minutes |
| | | | | 163.65' - Fracture or mechanical break, horizontal, smooth, planar, open | | | |
| | 176.0 | | NR | 164.0' - Fracture or mechanical break, horizontal, smooth, planar, open | | | |
| | R28-HQ 5 ft 16% | 0 | 3 | 164.0-164.1' - Fracture zone | | 148.1-149.0' - yellowish gray, (5Y 7/2), very fine grained, moderate to strong HCl reaction, medium strong to strong (R3 to R4), voids (<1/16") over <1% of surface, cavities (<3/16") rare to absent, fossils absent | |
| | | | | 164.1' - Fracture, 10 deg, rough, planar | | | |
| | | | NR | 165.15, 165.2, 165.25' - Fractures (3), horizontal, smooth, planar, open | | | |
| | | | | 166.10, 166.4, 166.42, 166.45, 166.55, 166.6, 166.7, 166.8' - Bedding plane (8), horizontal, rough, planar, open | | | Drill chatter at 178.0' |
| | | | | 167.15, 167.2, 167.25, 167.3, 167.35, 167.95' - Bedding plane (6), horizontal, smooth, planar to stepped | | | |
| 180 -139.1 | | | | 168.0' - Fracture, 10 deg, rough, undulating, open | | | R28: 4 minutes |
| | | | | 168.2, 168.25, 168.3, 168.35, 168.4, 168.5, 168.6, 168.9' - Mechanical break (8), horizontal, smooth, planar | | | |
| | 181.0 | | | | | | |

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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

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

WATER LEVELS : 3.2 ft bgs on 5/30/07 START : 5/30/2007 END : 6/3/2007 LOGGER : B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 185<br>-144.1 | R29-HQ<br>5 ft<br>26%<br>186.0 | 15 | 2<br>2<br>NR | 168.5-168.6' - Fracture zone<br>169.0, 169.1' - Fracture or mechanical break (2), horizontal, smooth, planar, along bedding planes<br>171.35' - Fracture, 80 deg, smooth, planar, tight<br>171.8' - Fracture, 80 deg, rough, planar, tight<br>172.0' - Fracture or mechanical break, horizontal, rough, undulating to stepped, tight<br>172.2' - Fracture, 80 deg, rough, planar, (possible continuation of 171.8' fracture)<br>172.62' - Fracture or mechanical break, horizontal, smooth, planar<br>172.80' - Fractures (2), 70 deg, rough, planar, tight, parallel | | 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 HCl 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<br>150.0-150.4' - yellowish gray, (5Y 7/2), medium grained, strong HCl reaction, weak (R2), although rock has "grainy" appearance, the interval is generally absent of voids, cavities absent, fossil (casts/molds) rare to absent | Extensive drill chatter throughout run<br>R29: 7 minutes |
| | | | | 172.92' - Fracture, 30-60 deg, rough, stepped, tight<br>173.45' - Fracture, horizontal, rough, planar, open<br>173.9-174.3' - Fracture zone, 0-60 deg, rough, undulating, open<br>174.3' - Fracture, horizontal, rough, planar, open<br>174.5-174.8' - Fracture zone, various fracture plane orientations producing angular gravel-sized limestone rock fragments<br>174.85' - Fracture, horizontal, rough, planar, open<br>175.2' - Fracture, horizontal, rough, planar, open<br>175.75-175.8' - Fracture zone, 0-90 deg, rough, undulating, open<br>176.0-176.1' - Fracture zone, multiple irregular sized, very angular cobble-sized fragments<br>176.35, 176.5' - Fractures or mechanical break (2), horizontal, rough, planar, open<br>181.25, 181.7' - Fractures or mechanical break (2), horizontal, smooth, planar<br>182.05' - Fracture or mechanical break, horizontal, smooth, planar | | **No Recovery 150.4-151.0'**<br>**Limestone**<br>151.0-153.0' - Same as 150.0-150.4' except with some intraclasts between 151.5' and 151.9'<br>153.0-155.8' - yellowish gray, (5Y 7/2), fine grained, moderate HCl 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<br>**No Recovery 155.8-156.0'**<br>**Limestone**<br>156.0-156.3' - variegated yellowish gray to pale brown, (5Y 7/2 to 5YR 5/2), fine grained, moderate HCl 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<br>156.3-159.1' - Same as 153.0-155.8' except lacking dark yellowish orange banding<br>159.1-159.25' - dark yellowish orange, (10YR 6/6), medium to coarse grained, strong HCl reaction, weak (R2), hummocky/irregular surface with 4% voids, cavities absent, fossil hash, contact sharp with undulating limestone<br>159.25-160.0' - very pale orange, (10YR 8/2), medium grained, strong HCl reaction, weak (R2), voids over <1%, cavities (<3/16") rare, some rip up/intraclast-like grain, fossil casts and molds rare<br>**No Recovery 160.0-161.0'** | Driller's Remark: Total of 37 flights used for total depth |

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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

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

WATER LEVELS : 3.2 ft bgs on 5/30/07 START : 5/30/2007 END : 6/3/2007 LOGGER : B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES | | | SYMBOLIC LOG | LITHOLOGY | COMMENTS |
|---|---|---|---|---|---|---|---|
| | | R Q D (%) | FRACTURES PER FOOT | DESCRIPTION<br>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. |
| | | | | | | **Limestone**<br>161.0-161.6' - Same as 159.25-160.0'<br>161.6-162.5' - very pale orange, (10YR 8/2), coarse grained, strong HCl reaction, weak to medium strong (R2 to R3), fossil hash, voids (<1/16" or less) over 3-5% of rock surface, cavities rare, fossils common (echinoids, pelecypods, casts/molds), rip up/intraclasts common in base of interval<br>162.5-164.1' - yellowish gray mottled with moderate yellowish brown, (5Y 7/2 mottled with 10YR 5/4), medium grained, strong HCl reaction, weak to medium strong (R2 to R3), becoming finer grained with depth, voids (1/16" or less) over 3-5% of rock surface (irregularly distributed), brown mottling is wavy and discontinuous, some echinoids and fossil molds/casts<br>164.1-165.8' - yellowish gray, (5Y 7/2), fine to medium grained, strong HCl reaction, weak (R2), voids (1/16") over 1% or less of rock, cavities rare (1/8"-3/16" over <1%), echinoids rare, fossil molds/casts rare to absent<br>**No Recovery 165.8-166.0'**<br>**Limestone**<br>166.0-166.6' - Same as 159.25-160.0'<br>166.6-169.4' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, medium strong (R3), voids (1/16" or less) over 3-5% of rock surface, few cavities (typically 3/16" or less in diameter), voids and cavities becoming more common below 168.5' up to 20-25% voids, fossils (casts/molds) and echinoids rare to absent to 168.5', some fossil molds/casts and few echinoids below 168.5-169.4'<br>**No Recovery 169.4-171.0'**<br>**Limestone**<br>171.0-175.8' - yellowish gray, (5Y 7/2), fine to medium grained, mild to moderate HCl reaction, weak to medium strong (R2 to R3), voids (1/16" or less) over 5-10% of rock surface, cavities (generally 3/16" or less in diameter) over 2-3% of surface, fossil (casts/molds) rare, medium to coarse grained from 174.5-175.3'<br>**No Recovery 175.8-176.0'** | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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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

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

WATER LEVELS : 3.2 ft bgs on 5/30/07 START : 5/30/2007 END : 6/3/2007 LOGGER : B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES | | | SYMBOLIC LOG | LITHOLOGY | COMMENTS |
|---|---|---|---|---|---|---|---|
| | | R Q D (%) | FRACTURES PER FOOT | DESCRIPTION<br>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. |
| | | | | | | **Limestone**<br>176.0-176.35' - yellowish gray, (5Y 7/2), fine to very fine grained, mild to moderate HCl reaction, medium strong (R3), voids (1/16" or less) over 3-5% of rock surface (irregularly distributed), cavities along bedding planes (elongate 3/8"-3/4"), fossils (casts/molds) rare to absent<br>176.35-176.8' - dark yellowish orange, (10YR 6/6), fine grained, mild to moderate HCl reaction, weak to medium strong (R2 to R3), voids (typically <1/16") over 10% of surface, cavities common (up to 3/8"x3/16") irregularly distributed, fossil molds/casts rare<br>**No Recovery 176.8-181.0'**<br>**Limestone**<br>181.0-182.3' - dark yellowish orange, (10YR 6/6), very fine grained, mild HCl reaction, weak to medium strong (R2 to R3), voids (typically 1/16" or less) over 3-5% of rock surface, some cavities, arcuate to ovate (up to 3/4"x3/16"), fossil (casts/molds) rare<br>**No Recovery 182.3-186.0'**<br>Bottom of Boring at 186.0 ft bgs on 6/3/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | E-02 SHEET 1 OF 11 |

# SOIL BORING 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

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 bgs on 5/18/07 START : 5/18/2007 END : 5/21/2007 LOGGER : P. De Sa'rego, R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 39.8 | 0.0 | 1.0 | SS-1 | 1-3-6 (9) | **Topsoil (OL)** 0.0-0.3' - grayish brown to brownish black, (5YR 3/2 to 5YR 2/1), wood debris and organics | | Water level: 1.5-5.0' |
| | 1.5 | | | | **Poorly Graded Sand (SP)** 0.3-1.0' - grayish orange, (10YR 7/4), moist, loose, nonplastic, very fine to fine grained silica sand, trace nonplastic fines, trace fine organics and roots | | |
| 5 | 5.0 | | | | | | |
| 34.8 | | 0.9 | SS-2 | 5-6-5 (11) | **Wood Debris And Silty Sand (SM)** 5.0-5.95' - light olive gray to yellowish gray, (5Y 5/2 to 5Y 7/2), wet, medium dense, 30% nonplastic fines, very fine to fine grained silica sand | | |
| | 6.5 | | | | | | |
| 10 | 10.0 | | | | | | |
| 29.8 | 10.3 | 0.3 | SS-3 | 50/3.5 (50/3.5") | **Silty Sand (SM)** 10.0-10.3' - dark yellowish brown, (10YR 6/6), moist, very dense, fine to coarse grained, mild to moderate HCl reaction, carbonate, 48% nonplastic fines, rapid dilatancy, bottom 1" contains fine gravel-sized limestone fragments | | |
| 15 | 15.0 | | | | | | |
| 24.8 | | 0.8 | SS-4 | 4-4-5 (9) | **Limestone** 15.0-15.2' - dark yellowish orange, (10YR 6/6), mild HCl reaction, carbonate materials | | Driller's Remark: 100% fluid loss, no circulation |
| | 16.5 | | | | **Silt With Sand (ML)** 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 | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

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 bgs on 5/18/07 START : 5/18/2007 END : 5/21/2007 LOGGER : P. De Sa'rego, R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 19.8 | 21.0 | | | | | | Install 15' HW casing to seal off flow zone after collecting SS-5: 20.0-21.5' SPT |
| | 21.9 | 0.9 | SS-5 | 20-50/5 (70/11") | **Sandy Silt (ML)** 21.0-21.9' - grayish yellow to grayish orange, (5Y 8/4 to 10YR 7/4), moist, hard, nonplastic, moderate HCl reaction, 38% fine to coarse grained gravel-sized, rapid dilatancy, carbonate materials | | Water level surface<br><br>05/19/07 07:30 Drilling from 20.0', advance HW casing to 20.0', using 3-7/8" tricone roller and AWJ rod beyond 30.0' inside HW casing<br><br>Driller's Remark: Smooth, moderate to rapid drilling rate, intermittent light chatter |
| 25 | 25.0 | | | | | | |
| 14.8 | 25.4 | 0.3 | SS-6 | 50/5 (50/5") | **Silty Sand (SM)** 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 | | |
| 30 | 30.0 | | | | | | |
| 9.8 | 30.3 | 0.1 | SS-7 | 50/4 (50/4") | **Silty Sand (SM)** 30.0-30.1' - Same as 25.0-25.3' except grayish orange, (10YR 7/4), no iron cemented sands, coarse grained silica sand, limestone fragments | | |
| 35 | 35.0 | | | | | | |
| 4.8 | 36.5 | 1.3 | SS-8 | 29-26-50/6 (76/12) | **Sandy Silt (ML)** 35.0-36.3' - moderate yellowish brown, (10YR 5/4), moist to wet, mild to moderate HCl reaction, low plastic, 33% very fine to medium grained sand-sized, trace fine gravel-sized limestone, carbonate materials | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

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 bgs on 5/18/07 START : 5/18/2007 END : 5/21/2007 LOGGER : P. De Sa'rego, R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -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 -5.2 | 45.0 45.4 | 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 to medium sand-sized, carbonate materials | | |
| 50 -10.2 | 50.0 50.3 | 0.3 | SS-11 | 50/4 (50/4") | **Limestone** 50.0-50.3' - pale yellowish brown, (10YR 6/2), mild HCl reaction, fine gravel-sized<br>Begin Rock Coring at 51.0 ft bgs<br>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<br>Begin rock coring with NQ wireline tooling from 51' below ground surface |
| 55 -15.2 | | | | | | | |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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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

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

WATER LEVELS : 1.5 ft bgs on 5/18/07 START : 5/18/2007 END : 5/21/2007 LOGGER : P. De Sa'rego, R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | RQD (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | 51.0 | | 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" | | **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 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 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 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'** | Begin rock coring at 16:00 with NQ wireline tooling from 51.0' using water only SC-1 collected at 51.85-52.85' |
| | | | 1 | | | | |
| | R1-NQ 5 ft 96% | 69 | 10 | 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" | | | |
| | | | 3 | | | | |
| 55 -15.2 | | | 1 | | | | R1: 4 minutes |
| | 56.0 | | NR | | | | |
| | | | 10 | 56.15, 56.3, 56.43, 56.55, 56.7, 56.9' - Fractures (6), <10 deg, rough, undulating, open <1/2" | | | |
| | | | >5 | 57.40-57.55' - Fracture zone, rough, undulating | | | |
| | R2-NQ 5 ft 90% | 50 | 2 | 58.2, 58.45, 59.65' - Mechanical break (3), <10 deg, rough, undulating, tight to open <1/2" | | | |
| | | | 1 | | | | |
| 60 -20.2 | | | >10 | 60.3-60.45' - Fracture zone, rough, undulating, gravel sized fragments <3/4" diameter | | | R2: 3 minutes |
| | 61.0 | | NR | | | | |
| | | | >10 | 61.0-61.1' - Fracture zone, rough, undulating, gravel sized fragments <1" diameter | | | |
| | | | 0 | | | | |
| | R3-NQ 5 ft 78% | 58 | 0 | | | | SC-2 collected at 62.65-63.65' |
| | | | 4 | 64.05, 64.3, 64.5, 64.7' - Fractures (4), 40 deg, rough, undulating, tight, open <1/2" | | | |
| 65 -25.2 | | | NR | | | | R3: 5 minutes |
| | 66.0 | | | | | | |
| | | | 1 | 66.2, 63.25, 65.1, 65.15, 65.55' - Fractures (5), <10 deg, undulating, smooth to rough, open <1/4" | | | |
| | | | 0 | | | | |
| | R4-NQ 5 ft 95% | 85 | 1 | | | | |
| | | | 0 | | | | |
| 70 -30.2 | | | 2 | | | | R4: 3 minutes |
| | 71.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
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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

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

WATER LEVELS : 1.5 ft bgs on 5/18/07 START : 5/18/2007 END : 5/21/2007 LOGGER : P. De Sa'rego, R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R5-NQ 5 ft 90% | 48 | NR | 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' | | **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 | |
| | | | 10 | | | | NQ wireline lowered in boring at 76.0', backhammer |
| | | | 1 | 72.4, 73.05, 73.25, 73.65' - Fractures (4), <10 deg, rough, undulating, open <1/4" | | | |
| | | | >10 | | | | 5/19/07 17:15 76.0' Water level at surface |
| | | | 5 | 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" | | **No Recovery 70.75-71.0'** **Limestone** 71.0-75.5' - moderate yellowish brown, (10YR 5/4), very fine to 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 | |
| 75 -35.2 | | | 1 | | | | R5: 3 minutes |
| 76.0 | | | NR | 75.3' - Clay seam | | | |
| | R6-NQ 5 ft 78% | 63 | >10 | 76.4, 76.9' - Fracture (2), <10 deg, undulating, smooth to rough, tight, open <1/2" | | | 05/20/07 08:00 Continue advancing HW casing from 50.0 to 65.0' |
| | | | 10 | 76.9-77.15' - Fracture zone, rough, undulating, gravel-sized fragments, <1-1/2" diameter | | | 10:30 NQ tooling freed at 76.0' with HW casing at 65.0', continue rock coring from 76.0' |
| | | | 4 | 78.45-78.5' - Fractures (3+), rough, undulating, intersecting | | **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" 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 HCl reaction, 78.45-79.9' weak to medium strong rock (R2-R3), fine to medium grained, voids <1/16" over <10-40% of surface, poorly fossiliferous, secondary recrystallized infill of cavities over 40% of surface, strong HCl reaction | SC-3 collected at 77.15-78.3' |
| | | | 3 | 78.9, 79.35, 79.45' - Fractures (3), <10 deg, rough, undulating, tight, open <1/4" | | | |
| 80 -40.2 | | | NR | | | | R6: 4 minutes |
| 81.0 | | | | | | | |
| | R7-NQ 5 ft 96% | 65 | 10 | 81.3-81.45' - Fracture zone (5+ intersecting), rough, undulating | | | |
| | | | 3 | 82.0-82.1' - Fracture zone (3+ intersecting), rough, undulating | | | |
| | | | 4 | 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" | | **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 (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 HCl reaction | |
| | | | >10 | | | | |
| 85 -45.2 | | | 3 | 84.4-84.7' - Fracture zone, rough, undulating, gravel-sized fragments <1" diameter | | | R7: 5 minutes |
| 86.0 | | | NR | 85.7-85.8' - Fractures (3+), rough, undulating, open <1/2" | | | |
| | R8-NQ 5 ft 72% | 6 | 6 | 86.3, 86.45, 86.55, 86.6' - Fractures, 40 deg and 60 deg, rough, undulating, open <1/2" | | | |
| | | | 6 | 86.8, 86.85, 87.0, 87.2, 87.4, 87.65' - Fractures, <10 deg, rough, undulating, open <1/2" | | | |
| | | | >10 | 87.8, 87.95' - Fractures (2), 40 deg and 60 deg, rough, undulating, open <1/4" | | | |
| | | | 2 | 88.25-88.65' - Fracture zone, rough, undulating, gravel-sized fragments, <1" diameter | | | |
| 90 -50.2 | | | NR | 88.85, 89.1, 89.4' - Fractures, 10 deg and 40 deg, rough, undulating, open <1/4" | | **No Recovery 85.8-86.0'** | R8: 4 minutes |
| 91.0 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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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

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

WATER LEVELS : 1.5 ft bgs on 5/18/07 START : 5/18/2007 END : 5/21/2007 LOGGER : P. De Sa'rego, R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R9-NQ 5 ft 90% | 59 | >10 | 91.0-91.4' - Fracture zone, <10 deg, rough, undulating, gravel-sized fragments, no stain or infill, <1" diameter | | **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, poorly fossiliferous | |
| | | | 5 | 91.65' - Fracture, <10 deg, rough, undulating, tight | | | |
| | | | 0 | 92.2' - Fracture, 40 deg, rough, undulating, tight, open <1/4" | | 87.8-89.6' - medium gray (N5) to olive gray (5Y 4/1), medium strong to strong rock (R3 to R4), very fine-grained, voids 1/16" over 30-40% of surface, moderately to highly fossiliferous with many fossil molds <1/2" diameter, few cavities <1" diameter, moderate to strong HCl reaction | |
| | | | 2 | 92.6, 92.85, 92.95' - Fractures (3), <10 deg, rough, undulating, silt and/or clay sized infilling, trace of silt infill at 92.6', open <1" | | | |
| | | | 4 | 93.4-93.65' - elastic silt (MH) seam | | | |
| 95 -55.2 | | | NR | 94.55, 95.1' - Fractures (2), horizontal, rough, undulating, 80 deg intervals, open <1/2" | | | R9: 7 minutes |
| | 96.0 | | | | | **No Recovery 89.6-91.0'** | |
| | R10-NQ 5 ft 100% | 52 | 3 | 96.4, 96.5, 96.95, 97.35, 97.6, 97.7, 98.05, 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, tight, open <1/4" | | **Limestone** 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' 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 <1/2" diameter, poorly fossiliferous | |
| | | | 3 | | | | |
| | | | 8 | | | | SC-4 collected at 98.85-100.0' |
| | | | 0 | | | **Elastic Silt (MH)** 93.4-93.65' - olive gray, (5Y 4/1), medium plasticity, strong HCl reaction | |
| 100 -60.2 | | | 6 | | | | R10: 4 minutes |
| | 101.0 | | | | | **Limestone** 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 fossiliferous with molds/casts <1/2" diameter | |
| | R11-NQ 5 ft 99% | 16 | >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, 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, smooth to rough, tight, open <1/2" | | | |
| | | | 10 | | | | |
| | | | 10 | | | **No Recovery 95.5-96.0'** | |
| | | | >10 | | | **Limestone** 96.0-101.0' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl 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, with fossil molds/casts <1" diameter, no cavities | |
| 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, undulating | | | R11: 4 minutes |
| | 106.0 | | | | | | |
| | R12-NQ 5 ft 100% | 62 | NR | 106.1, 106.8, 109.1, 109.25, 109.3, 109.55, 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" | | **Limestone** 101.0-105.95' - yellowish gray, (5Y 7/2), very fine to fine grained, extremely weak to weak rock (R0 to R2), voids <1/16" over <20% of surface, poorly fossiliferous, laminated, strong HCl reaction | |
| | | | 2 | | | | |
| | | | 0 | | | | SC-5 collected at 106.85-107.9' |
| | | | >10 | 108.1-108.45' - Fracture zone, rough, undulating, gravel-sized fragments, <2" diameter | | | |
| | | | 10 | | | **No Recovery 105.95-106.0'** | |
| 110 -70.2 | | | 10 | | | | R12: 5 minutes |
| | 111.0 | | | | | | |

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

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| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R13-NQ 5 ft 79% | 22 | >10 | 111.1-111.2' - Fracture zone, undulating, gravel-sized fragments <1" diameter, smooth to rough | | **Limestone** 106.0-111.0' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl reaction, very weak to weak (R1 to R2), voids <1/16" over <20% of surface, moderately fossiliferous with molds <1" diameter, laminated | |
| | | | >10 | 111.65-112.15' - Bedding plane, <10 deg, rough, undulating, tight | | | |
| | | | >10 | 112.25, 112.5, 112.65, 112.7, 112.8' - Bedding plane (5), <10 deg, undulating, smooth to rough, tight | | **Limestone** 111.0-114.95' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl reaction, extremely weak to weak (R0 to R2), laminated, voids 1/16" over <10% of surface, no fossils | |
| | | | >10 | 112.85-114.2' - Fracture zone, and bedding plane, gravel-sized fragments <1-1/2" diameter | | | |
| 115 -75.2 | | | NR | 114.8' - Bedding plane, <10 deg, smooth, undulating, open <1/2" | | **No Recovery 114.95-116.0'** | R13: 4 minutes |
| | 116.0 | | | | | | |
| | R14-NQ 5 ft 100% | 97 | 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, very weak to weak rock (R1 to R2), voids <1/16" over <10-15% increasing at 118.5', highly fossiliferous, few cavities <1-1/2" diameter, strong HCl reaction | |
| | | | 0 | | | | |
| | | | 2 | | | | |
| | | | 0 | | | | |
| 120 -80.2 | | | 1 | | | | R14: 3 minutes |
| | 121.0 | | | | | | |
| | R15-NQ 5 ft 81% | 70 | 2 | 121.35, 121.5, 122.5, 122.8, 130.0' - Bedding plane (5), <10 deg, rough, undulating, tight | | **Limestone** 121.0-125.05' - pale yellowish brown to yellowish gray, (10YR 6/2 to 5Y 7/2), very fine to medium grained, very weak to weak rock (R1 to R2), voids <1/16" over <20% of surface, highly fossiliferous at 122.5-124.1', strong HCl reaction | |
| | | | 2 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| 125 -85.2 | | | 1 NR | | | **No Recovery 125.05-126.0'** | R15: 4 minutes |
| | 126.0 | | | | | | |
| | R16-NQ 5 ft 97% | 93 | 2 | 126.0-126.1' - Fracture zone, rough, undulating, gravel-sized fragments, tight | | **Limestone** 126.0-131.0' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), very fine to medium grained, strong HCl reaction, very weak to weak (R1 to R2), moderately to highly fossiliferous molds <1" diameter, voids <1/16" over 30% of surface, trace laminated bedding | |
| | | | 1 | 126.8' - Fracture, <10 deg, rough, undulating, open <1/2" | | | SC-6 collected at 126.85-127.95' |
| | | | 0 | 127.9, 130.3' - Fractures (2), <10 deg, rough, undulating, tight, open <1/4" | | | |
| | | | 0 | | | | |
| 130 -90.2 | | | 1 | | | | R16: 3 minutes |
| | 131.0 | | | | | | |

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

WATER LEVELS : 1.5 ft bgs on 5/18/07 START : 5/18/2007 END : 5/21/2007 LOGGER : P. De Sa'rego, R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | NR | | | **Limestone** | |
| | | | 6 | 131.1, 131.4, 131.5, 131.85, 132.3, 132.4, 132.55, 132.6, 132.75, 132.85, 133.25, 133.55, 133.75, 133.9, 134.0, 134.3, 134.35, 134.45, 134.5, 134.7, 134.85, 134.9, 140.15, 140.45' - Bedding plane (24), 40 deg, undulating, smooth to rough, tight, open <1/2" | | 131.0-135.6' - yellowish gray, (5Y 7/2), very fine to medium grained, strong HCl reaction, extremely weak to weak (R0 to R2), voids <1/16" over <20% of surface, poorly to moderately fossiliferous with fossil molds, <1" diameter, few cavities with secondary infill <2" diameter, trace laminated bedding | |
| | | | 6 | | | | |
| | R17-NQ 5 ft 92% | 22 | 5 | | | | |
| | | | 7 | | | | |
| 135 -95.2 | | | 2 | | | | R17: 4 minutes |
| | 136.0 | | NR | | | **No Recovery 135.6-136.0'** | |
| | | | 4 | 136.1, 136.4, 136.6, 137.0, 137.05, 138.5, 139.65, 139.75, 139.8, 139.85, 139.95, 140.2' - Bedding plane (12), <10 deg, rough, undulating, tight, open <1/4" | | **Limestone** 136.0-140.75' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), very fine to medium grained, strong HCl reaction, very weak to weak (R1 to R2), 140.0-140.75' medium strong to strong rock (R3 to R4), voids <1/16" over <10% of surface, poorly to moderately fossiliferous, laminated bedding 136.1-136.6', trace secondary infill, 140.2-140.75' cavities over 30% of surface (50% of which have secondary recrystallized infill) <1-1/2" diameter | |
| | | | 2 | 137.7, 138.25' - Fracture (2), 30 deg, rough, undulating, tight, open <1/4" | | | |
| | R18-NQ 5 ft 95% | 60 | 2 | | | | |
| | | | 5 | | | | |
| 140 -100.2 | | | 1 | | | | R18: 5 minutes |
| | 141.0 | | NR | | | **No Recovery 140.75-141.0'** | |
| | | | 0 | | | **Limestone** 141.0-145.75' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), very fine to medium grained, strong HCl reaction, medium strong to strong (R3 to R4), very weak rock (R1) 145.55-145.75', voids <1/16" over <20-40% of surface, many cavities <1" diameter, highly fossiliferous, trace laminated bedding, <30% cavities with secondary recrystallized infill | |
| | | | 2 | | | | |
| | R19-NQ 5 ft 95% | 70 | 3 | 142.65, 142.95, 143.3, 143.5, 143.9, 145.45' - Fractures (6), <10 deg, rough, undulating, open <1/4" to 1/2" | | | |
| | | | 10 | 144.15-144.25' - Fracture zone, rough, undulating, gravel-sized fragments <1/2" diameter | | | |
| 145 -105.2 | | | 2 | | | | R19: 6 minutes |
| | 146.0 | | NR | 145.55' - Fracture, <10 deg, rough, undulating, open <1" | | **No Recovery 145.75-146.0'** | |
| | | | 2 | 146.1, 146.2, 147.35, 149.25' - Bedding plane (4), <10 deg, rough, undulating, tight, open <1" | | **Limestone** 146.0-150.4' - yellowish gray, (5Y 7/2), fine to medium grained, strong HCl reaction, weak (R2), moderately fossiliferous with molds <1/2" diameter, sandy silt (ML) lenses 146.0-146.1' and 1/2" at 150.25' | |
| | | | 1 | | | | SC-7 collected at 147.35-148.55' |
| | R20-NQ 5 ft 88% | 80 | 0 | | | | |
| | | | 1 | | | | |
| 150 -110.2 | | | >10 | | | | R20: 5 minutes |
| | 151.0 | | NR | | | **No Recovery 150.4-151.0'** | |

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| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R21-NQ 5 ft 86% | 48 | 1 | 150.25-150.35' - Fracture zone, rough, undulating, gravel-sized fragments <1" diameter | | **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 grained, <10% voids, no cavities, very weak rock (R1), 151.0-153.0' mild HCl reaction, 153.5-155.3' strong HCl reaction | |
| | | | 1 | 151.3, 152.4, 153.2, 153.3, 153.35, 153.5, 153.85' - Bedding plane (7), <10 deg, undulating, rough to smooth, tight, open to <1/4" | | | |
| | | | 5 | | | | |
| | | | >10 | 154.0-155.3' - Bedding plane, rough, undulating, intersecting vertical fractures, tight, open <1/2" | | | |
| 155 -115.2 | | | >10 | | | | R21: 7 minutes |
| | 156.0 | | NR | | | | |
| | R22-NQ 5 ft 100% | 70 | 1 | 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" | | **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 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 | |
| | | | 2 | | | | |
| | | | 9 | | | | |
| | | | 5 | | | | |
| 160 -120.2 | | | 2 | | | | R22: 5 minutes |
| | 161.0 | | | 160.6' - Fractures (2), 20 deg and 50 deg, rough, undulating, intersecting, open <1/4" | | | |
| | R23-NQ 5 ft 98% | 0 | >10 | 161.0-164.7' - Bedding plane, <10 to 90 deg, undulating, intersecting vertical fractures, rough to smooth | | | |
| | | | >10 | | | | |
| | | | >10 | | | **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 lenses <1/2" thick | SC-8 collected at 163.15-164.05' |
| | | | >10 | | | | |
| 165 -125.2 | | | 10 | 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" | | | R23: 5 minutes |
| | 166.0 | | NR | | | **No Recovery 165.9-166.0'** | |
| | R24-NQ 5 ft 89% | 53 | >10 | 166.0-166.2' - Fracture zone, undulating, vertical, smooth to rough, tight | | | |
| | | | >10 | 166.6, 166.65, 167.3, 167.35, 167.5, 168.15, 169.05, 169.2, 170.05, 170.15, 170.5, 170.35, 170.4' - Bedding plane (13), undulating, <1/4" silt and/or clay sized infilling, rough to smooth, tight, open <1/2" | | | |
| | | | 1 | 167.05-167.15, 167.5-167.6' - Fracture zone (2), rough, undulating, gravel-sized fragments <1", no stain or infill | | | |
| | | | >10 | 169.4-169.7' - silt lens to extremely friable | | | |
| 170 -130.2 | | | 5 | | | | R24: 10 minutes |
| | 171.0 | | NR | | | | |

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|---|---|---|---|---|---|---|---|
| | R25-NQ 5 ft 86% | 47 | 0 | 171.2-171.3' - silt lens | | **Limestone** 166.0-170.45' - dark yellowish brown to pale yellowish brown, (10YR 4/2 to 10YR 6/2), very fine to fine grained, grains becoming more coarse with depth 166.0-169.4' very fine to fine-grained, becoming more coarse with depth, weak to strong rock (R2 to R4) interbedded, <1/2" thick silt/sand (carbonate) at 166.65', <10% voids, few cavities/recrystallized cavities <1" diameter, gradational contact to extremely weak rock (R0) at 169.3-169.4' laminated, 169.3-169.7' extremely weak rock (R0) to poorly competent silts/sand (carbonate), laminated, friable, 169.7-170.45' very fine to fine-grained, medium strong to stong rock (R3 to R4), trace voids, no cavities, trace fossils, moderate HCl reaction | |
| | | | 4 | 172.1, 172.35, 172.6, 173.15, 173.35, 173.4, 173.6, 174.1' - Bedding plane (8), <10 deg, rough, undulating, tight, open <1/2" | | | |
| | | | 10 | 172.75, 174.5' - Fractures (2), 50 deg and 40 deg, rough, undulating, tight, open <1/4" 173.6-173.65, 173.8-173.85, 174.0-174.1' - silt/sand silt (ML) lenses | | | |
| | | | 10 | | | | |
| 175 -135.2 | | | 0 | | | | R25: 11 minutes |
| | 176.0 | | NR | | | | |
| | R26-NQ 5 ft 84% | 16 | 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, 179.6, 179.8' - Bedding plane, <10 deg, rough, undulating, tight, open <1/2" | | **No Recovery 170.45-171.0'** **Limestone** 171.0-175.3' - pale yellowish brown, (10YR 6/2), very fine to fine grained, 171.0-173.6' weak to strong rock (R2 to R4), 1" silt (ML) lens at 171.2-171.3' - voids <1/16' over <20% of surface, variable, poorly fossiliferous, moderate odor, laminated organics in silt lens, moderate HCl reaction, 173.6-174.1' - interbedded silt (ML) lenses, extremely weak rock (R0), strong odor, strong HCl reaction, 174.1-175.35' - medium strong to strong rock (R3 to R4), <10% voids <1/16", few cavities with secondary recrystallized infill <1" diameter, moderate odor, moderate to strong HCl reaction | |
| | | | 10 | 176.7-176.8', 177.6-177.9' - silt seams | | | |
| | | | 10 | 178.25-178.35, 179.6-179.7' - Fracture zone (2), rough, undulating, gravel-sized fragments <1" diameter | | | |
| | | | >10 | 179.35' - Fractures (2+), vertical, smooth, undulating, vertical, tight | | | |
| 180 -140.2 | | | 0 | 179.95' - Fractures (2+), <10 deg and 40 deg, rough, undulating, intersecting, open <1/2" | | | R26:9 minutes |
| | 181.0 | | NR | | | | |
| | R27-NQ 5 ft 84% | 16 | 2 | | | | 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), <10 deg, rough, undulating, tight, <1/2" | | | |
| | | | >10 | 182.05, 182.2, 182.4, 182.7, 182.85' - Fractures (5), rough, undulating, open <1/2" | | | |
| | | | >10 | 184.1-185.0' - Fracture zone, rough, undulating, gravel-sized fragments <1" diameter | | | |
| 185 -145.2 | | | 1 | 185.05' - Fractures, 40 deg, rough, undulating, open <1/4" | | | R27: 8 minutes |
| | 186.0 | | NR | | | | |
| | | | | | | 176.0-180.2' - light olive gray, (5Y 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 HCl 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 |

# 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 bgs on 5/18/07 START : 5/18/2007 END : 5/21/2007 LOGGER : P. De Sa'rego, R. Bitely

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES | | | SYMBOLIC LOG | LITHOLOGY | COMMENTS |
|---|---|---|---|---|---|---|---|
| | | R Q D (%) | FRACTURES PER FOOT | DESCRIPTION<br>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. |
| | | | | | | **Limestone**<br>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 HCl reaction increasing with depth<br>**No Recovery 185.2-186.0'**<br>Bottom of Boring at 186.0 ft bgs on 5/21/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | E-03 SHEET 1 OF 10 |

# SOIL BORING 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

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 bgs on 5/07/07 START : 5/7/2007 END : 5/8/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.0 | 0.0 – 1.5 | 1.0 | SS-1 | 1-2-3 (5) | **Topsoil** 0.0-0.1' **Silty Sand (SM)** 0.1-1.0' - dusky yellowish brown to dark yellowish brown, (10YR 2/2, 10YR 4/2), moist, loose, fine grained, 15-20% non plastic fines, silica sand | | Begin E-03 at 11:27 05/07/2007; HW surface casing used in boring |
| 5 | 5.0 – 6.5 | 0.5 | SS-2 | 1-2-2 (4) | **Clayey Sand (SC)** 5.0-5.5' - greenish gray, (5G 6/1), moist, very loose, 21% fines, 1/2" limestone fragments between 5.3' and 5.6' with mild HCl reaction, no HCl reaction in clay | | |
| 37.0 | | | | | | | |
| 10 | 10.0 – 11.5 | 1.0 | SS-3 | 5-18-30 (48) | **Silt With Sand (ML)** 10.0-10.95' - pale yellowish orange, (10YR 8/6), moist, hard, nonplastic, rapid dilatancy, mild HCl reaction, 20% very fine to medium sand, carbonate materials | | |
| 32.0 | | | | | | | |
| 15 | 15.0 – 15.3 | 0.1 | SS-4 | 50/3 (50/3") | **Limestone Fragments** 15.0-15.1' - grayish orange, (10YR 7/4), mild to moderate HCl reaction, fragments to 1/2" | | |
| 27.0 | | | | | | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | E-03 SHEET 2 OF 10 |

# SOIL BORING 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

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 bgs on 5/07/07 START : 5/7/2007 END : 5/8/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.0 | 20.0 | 0.0 | SS-5 | 50/3 (50/3") | **No Recovery 20.0-20.3'** | | |
| 25 | 25.0 | | | | | | |
| 17.0 | 25.5 | 0.4 | SS-6 | 50/5.5 (50/5.5") | **Sandy Silt (ML)** 25.0-25.4' - pale yellowish orange, (10YR 8/6), wet, hard, low plasticity, rapid dilatancy, mild HCl reaction, 49% fine to medium grained sand | | |
| 30 | 30.0 | | | | | | |
| 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' | | |
| 35 | 35.0 | | | | | | |
| 7.0 | 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 | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | E-03 SHEET 3 OF 10 |

# SOIL BORING 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

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 bgs on 5/07/07 START : 5/7/2007 END : 5/8/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.0 | 40.0 | 0.4 | SS-9 | 50/5 (50/5") | **Sandy Silt (ML)** 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 | | |
| 45 -3.0 | 45.0 | | | | | | |
| | 45.8 | 0.6 | SS-10 | 42-50/3 (92/9") | **Sandy Silt (ML)** 45.0-45.6' - Same as 40.0-40.4' except 5-10% fine gravel-sized limestone fragments | | |
| 50 -8.0 | 50.0 | | | | | | |
| | 50.3 | 0.0 | SS-11 | 50/3 (50/3") | **No Recovery 50.0-50.3'** | | Driller's Remark: Drill chatter |
| 55 -13.0 | 55.0 | | | | | | |
| | 55.3 | 0.0 | SS-13 | 50/2 (50/2") | **Limestone Fragments** 55.0-55.05' - moderate olive brown, (5Y 4/4), mild HCl reaction, fragments to 1/4" | | |
| | 60.0 | | | | | | |
| | 60.1 | 0.1 | SS-12 | 50/3 (50/3") | **No Recovery 60.0-60.1'** one 1/2" limestone fragment | | Water level at 2.9' below ground surface at 17:31 |
| 60 | | | | | | | |
| | | | | | Begin Rock Coring at 60.0 ft bgs<br>See the next sheet for the rock core log | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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

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

WATER LEVELS : 2.9 ft bgs on 5/07/07 START : 5/7/2007 END : 5/8/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -18.0 | 60.0 R1-NQ 1 ft 100% 61.0 | 100 | 1 | 60.45' - Bedding plane, 15 deg, rough, undulating | | **Limestone** 60.0-60.7' - light olive gray, mottled moderate olive brown, (5Y 5/2, mottled 5Y 4/4), very fine to fine grained, weak to medium strong (R2 to R3), poorly fossiliferous, voids <1/16", 15-25% coverage | Begin rock coring at 07:47 05/08/2007; water level at 3.9' below ground surface R1: 2 minutes |
| | R2-NQ 5 ft 86% | 25 | 1 | 61.2, 63.95' - Mechanical break 61.7, 62.2' - Fracture, 75 deg, rough, undulating | | 60.7-61.0' - Same as 60.0-60.7' except highly fossiliferous with casts and molds up to 1/2" | |
| | | | 2 | 62.8' - Bedding plane, <5 deg, rough, undulating | | 61.0-65.3' - light olive gray and moderate olive brown, (5Y 5/2, 5Y 4/4), fine to medium grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), voids <1/16" with 10% coverage on surface, extremely weak (R0) rock at 61.2' and 63.95', medium strong (R3) at 61.8' | |
| | | | 3 | 63.0' - Bedding plane, 35 deg, rough, undulating, open up to 1/4" | | | |
| | | | 3 | 63.15' - Bedding plane, <5 deg, smooth, planar | | | |
| 65 -23.0 | | | 0 | 63.25' - Bedding plane, <5 deg, rough, undulating | | | R2: 3 minutes |
| | 66.0 | | NR | 64.25' - Bedding plane, <5 deg, rough, undulating, open up to 1/4" | | **No Recovery 65.3-66.0** | SC-1 collected at 66.0-66.9' |
| | R3-NQ 5 ft 84% | 34 | 1 | 64.65' - Bedding plane, <5 deg, rough, undulating, open up to 1/4" | | **Limestone** 66.0-67.8' - light olive gray, (5Y 5/2), very fine to fine grained, moderate HCl reaction, medium strong to strong (R3 to R4), voids <1/16" with 15% coverage of surface | |
| | | | >10 | 64.8' - Fracture, 80 deg, rough, undulating, open | | | |
| | | | >10 | 66.9' - Bedding plane, <5 deg, rough, undulating, open up to 1/4" | | 67.8-69.2' - grayish yellow to dusky yellow, (5Y 8/4, 5Y 6/4), medium grained, mild HCl reaction, medium strong (R3), porous voids <1/16" with 45 to 55% coverage, trace 1/4" cavities, moderately fossiliferous (casts/molds) | |
| | | | 3 | 67.3-67.5' - Fracture zone, up to 1-1/2" fragments, intersecting fractures | | | |
| 70 -28.0 | | | 1 | 67.95' - Bedding plane, 30 deg, rough, undulating, open up to 1/2" | | | R3: 5 minutes |
| | 71.0 | | NR | 68.5' - Bedding plane, <5 deg, smooth to rough, undulating, open up to 1/4" | | | |
| | R4-NQ 5 ft 80% | 7 | 3 | 68.6' - Bedding plane, <5 deg, smooth to rough, undulating | | 69.2-70.2' - Same as 66.0-67.8' except extremely weak to medium strong (R0 to R3) | |
| | | | 5 | 68.85-69.15' - Fracture zone, fragments to 2", intersecting fractures | | **No Recovery 70.2-71.0'** | |
| | | | >10 | 69.35, 69.7, 69.95' - Fracture, vertical, rough, undulating | | **Limestone** 70.2-71.8' - Same as 66.0-67.8' except trace organics | |
| | | | >10 | 70.1' - Bedding plane, <5 deg, smooth to rough, undulating, open up to 1/4" | | 71.8-72.15' - dusky yellow, (5Y 8/4), fine to medium grained, moderate to strong HCl reaction, extremely weak to weak (R0 to R2), poorly to moderately competent, trace voids <1/16" on surface | |
| | | | NR | 71.1' - Fracture, 60 deg, rough, stepped to undulating, open up to 1/8" | | | |
| 75 -33.0 | | | | 71.3, 71.6' - Bedding plane, 25 deg, rough, undulating, open to 1/8", 1/2" at 71.6' | | | R4: 10 minutes |
| | 76.0 | | | 72.1, 72.35, 72.7' - Bedding plane, <5 deg, rough to smooth, planar, along abrupt lithology change, open up to 1/8" at 72.1', no gap at 72.7 | | 72.15-74.15' - Same as 66.0-67.8' 74.15-75.0' - Same as 67.8-69.2' | |
| | R5-NQ 5 ft 80% | 53 | 2 | 72.15-72.4' - Fracture zone, 70-80 deg, multiple hairline fractures, branch-like appearance | | **No Recovery 75.0-76.0'** | |
| | | | 1 | 72.8' - Bedding plane, 60 deg, rough to smooth, undulating | | **Limestone** 76.0-80.0' - dusky yellow and yellowish gray, (5Y 6/4 and 5Y 7/2), mild to moderate HCl reaction, medium strong (R3), voids <1/16" covering 45-55% of surface, trace cavities to 1/4", moderately fossiliferous (casts and molds), trace organics | |
| | | | 1 | 73.1-73.3' - Fracture zone, fragments to 2", intersecting fractures | | | |
| | | | 5 | 73.5' - Bedding plane, 60 deg, rough to smooth, undulating | | | |
| 80 | | | | 73.7-74.2, 74.35, 74.6' - Fracture zone, fragments to 2", intersecting fractures, open up to 1/4" at 74.35' and 74.6' | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | E-03 SHEET 5 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

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

WATER LEVELS : 2.9 ft bgs on 5/07/07 START : 5/7/2007 END : 5/8/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -38.0 | | | NR | 74.8-74.9' - Bedding plane, 60 deg, rough to smooth, undulating, intersects high angle fracture, fragments to 2", predominantly 1/4" | | **No Recovery 80.0-81.0'** | R5: 3 minutes |
| | 81.0 | | | | | | |
| | R6-NQ 5 ft 94% | 63 | 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' | | **Limestone** 81.0-85.7' - Same as 76.0-80.0' except yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), trace cavities to 1" | |
| | | | 1 | 77.1' - Bedding plane, 30 deg, open up to 1/2" | | | |
| | | | >10 | 78.6' - Bedding plane, 20 deg, tight | | | |
| | | | >10 | 79.1, 79.3' - Bedding plane, 20 deg, open up to 1/2" at 79.1' | | | |
| | | | 0 | 79.6, 79.7' - Bedding plane, 20 deg, open up to 1/2" | | | |
| | | | NR | 79.9' - Fracture, 85 deg, rough, undulating | | | |
| 85 -43.0 | | | | 81.2' - Bedding plane or mechanical break, 40 deg, rough, undulating | | | SC-2 collected at 84.7-85.7' |
| | | | | 81.9' - Bedding plane or mechanical break, <5 deg, rough to smooth, undulating to planar | | | R6: 3 minutes |
| | 86.0 | | | 82.8' - Fracture, 75 deg, rough, undulating | | **No Recovery 85.7-86.0'** | |
| | R7-NQ 5 ft 98% | 58 | >10 | 83.8-84.1' - Fracture zone, fragments to 1" | | **Limestone** 86.0-88.1' - very light gray, (N8), very fine to fine grained, mild HCl reaction, medium strong (R3), voids <1/16" with <2% coverage on surface | |
| | | | >10 | 84.75' - Fracture, 75 deg, rough, undulating, open up to 1/4" | | | |
| | | | 1 | 86.4' - Bedding plane, <5 deg, smooth to rough, planar, open to <1/8" gap, organic stain | | | |
| | | | 1 | 86.6, 87.5, 88.5, 88.6' - Mechanical break | | 88.1-90.9' - dusky yellow, (5Y 6/4, N8), fine grained, mild to moderate HCl reaction, medium strong (R3), mottled very light gray (N8) from 88.1-88.6', voids up to 1/16" covering 30-40% of surface, cavities up to 1/4" covering up to 3% of surface, trace organics | |
| | | | | 86.9-87.2' - Fracture zone, fragments to 3 1/2" | | | |
| | | | 1 | 88.4' - Fracture, 80 deg, rough, undulating, open 1/8" | | | |
| 90 -48.0 | | | | 89.1' - Bedding plane, 30 deg, rough, undulating | | | R7: 6 minutes |
| | | | 1 | 90.2' - Bedding plane, 40 deg, rough, undulating | | | |
| | 91.0 | | NR | | | **No Recovery 90.9-91.0'** | |
| | R8-NQ 5 ft 100% | 80 | 1 | 91.7' - Fracture, 75 deg, associated with dissolution features or very extensive breaks in softer area, open up to 2" | | **Limestone** 91.0-96.0' - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, weak to medium strong (R2 to R3), laminated bedding 91.0-92.5', trace voids <1/6" and cavities to 1/4", trace fossil casts | |
| | | | 0 | | | | |
| | | | >10 | 93.1-93.35' - Fracture zone, intersecting fractures, fragments to 2" | | | |
| | | | 3 | 94.0' - Fractures (2), 65 deg, rough, undulating, open up to 1/2", organic features on fracture surface | | | |
| 95 -53.0 | | | | | | | R8: 10 minutes |
| | | | 1 | 94.6, 95.7' - Bedding plane, <5 deg, smooth to rough, undulating, open up to 1/2", organic features on fracture surface; no organics at 95.7' | | | |
| | 96.0 | | | | | | |
| | R9-NQ 5 ft 92% | 57 | 3 | 96.2' - Fracture, 80 deg, rough, undulating, open | | 96.0-100.6' - light olive gray to yellowish gray, (5Y 5/2 to 5Y 7/2), fine grained, strong HCl reaction, weak to medium strong (R2 to R3), mottled from 96.6-97.5', trace voids from <1/16" to 1/8", organic layers from 97.6-97.7' (black), trace fossil casts | |
| | | | 1 | 96.7' - Bedding plane (2), 10 deg and 60 deg, rough to smooth, undulating | | | |
| | | | 1 | 97.5' - Bedding plane, <5 deg, rough to smooth, undulating | | | |
| | | | 1 | 97.6-97.7' - Fracture (3), 0-10 deg, open to 1/4", 1/4" organic infill | | | |
| | | | 0 | 98.5' - Bedding plane (2), 10 deg and 60 deg, rough to smooth, undulating | | | SC-3 collected at 99.1-99.85' |
| 100 | | | | 99.3, 97.6, 99.85' - Mechanical break | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: E-03 | SHEET 6 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

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

WATER LEVELS : 2.9 ft bgs on 5/07/07 START : 5/7/2007 END : 5/8/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -58.0 | | | 0 | | | | R9: 7 minutes |
| | 101.0 | | NR | | | **No Recovery 100.6-101.0'** | |
| | R10-NQ 5 ft 68% | 19 | 8 | 101.1' - Bedding plane, 10 deg, rough, undulating, open up to 1/8" | | **Limestone** 101.0-104.4' - yellowish gray to dusky yellow, (5Y 7/2, 5Y 6/4), fine to medium grained, strong HCl reaction, very weak (R1), 1/16" voids with 10% coverage, trace cavities to 1/4", trace planar bedding of variable thickness, poorly to moderately fossiliferous, zone of circular discoloration from 103.8-104.2' (possible leaching) | |
| | | | 4 | 101.3, 101.35, 101.4, 101.5' - Bedding plane, 5-10 deg, rough, undulating, open up to 1/8"<br>101.6' - Bedding plane, 35 deg, rough, undulating | | | |
| | | | 4 | 101.8' - Fracture, 65 deg, rough, undulating<br>101.9' - Bedding plane, 10 deg, rough, undulating, open up to 1/4" | | | |
| | | | 0 | 102.2' - Fracture (2), 60 deg and <5 deg, rough, undulating, open up to 1/8" | | | |
| 105<br>-63.0 | | | NR | 102.9' - Fracture (2), 60 deg and 80 deg, rough, undulating, open up to 1/8"<br>103.1' - Bedding plane, 10 deg, rough, undulating, open up to 1/8" | | **No Recovery 104.4-106.0'** | R10: 4 minutes |
| | 106.0 | | | | | | |
| | R11-NQ 5 ft 78% | 43 | 1 | 103.25, 103.5' - Bedding plane, 35 deg, rough, undulating | | **Limestone** 106.0-109.9' - yellowish gray, (5Y 8/1), fine grained, strong HCl reaction, very weak (R1), trace voids <1/16" on surface, laminated bedding | |
| | | | 1 | 103.7' - Fracture, 80 deg and vertical, rough, undulating, open up to 1/8"<br>103.9' - Bedding plane, <5 deg, rough, stepped | | | |
| | | | >10 | 106.6' - Bedding plane, 30 deg, rough, undulating<br>107.8' - Bedding plane, 25 deg, rough, undulating | | | |
| | | | >10 | 108.2-109.8' - Fracture zone, intersecting fractures, fragments to 2" | | | |
| 110<br>-68.0 | | | NR | | | **No Recovery 109.9-111.0** | R11: 3 minutes |
| | 111.0 | | | | | | |
| | R12-NQ 5 ft 100% | 88 | 1 | 111.3' - Bedding plane, 30 deg, rough, undulating, open to 1/2" | | **Limestone** 111.0-116.0' - mottled yellowish gray and yellowish gray, (5Y 7/2 and 5Y 8/1), fine to coarse grained, strong HCl reaction, very weak to weak (R1 to R2), voids <1/16" with 10-20% coverage, cavities to 1/4" with 5-10% coverage decreasing with depth, 1" laminated bedding at 114.0', moderately fossiliferous | |
| | | | 0 | 112.7, 113.5' - Mechanical break | | | |
| | | | 1 | | | | |
| | | | 1 | 113.9, 114' - Bedding plane, <5 deg, rough to smooth, undulating, open up to 1/4" | | | |
| 115<br>-73.0 | | | 0 | | | | R12: 2 minutes |
| | 116.0 | | | | | | |
| | R13-NQ 5 ft 100% | 60 | 4 | 116.1, 116.25' - Bedding plane, <5 deg, rough to smooth, undulating to planar, open to <1/8" | | **Limestone** 116.0-121.0' - yellowish gray, (5Y 8/1), fine to coarse grained, strong HCl reaction, weak to medium strong (R2 to R3), laminated bedding at 116.0-116.35', voids <1/16" with 40% coverage, trace cavities to 1/2"-1-1/2" cavity at 117.6', moderately fossiliferous (casts and molds) | |
| | | | 0 | 116.45' - Bedding plane, 35 deg, rough, undulating | | | |
| | | | 1 | 116.7' - Bedding plane, <5 deg, rough, undulating to planar, open up to 1/4"<br>117.1, 118.4, 118.8, 119.7, 120.9' - Mechanical break | | | |
| 120 | | | 3 | 118.2' - Bedding plane, 10-15 deg, rough, undulating to planar, open up to <1/4" | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: E-03 | SHEET 7 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

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

WATER LEVELS : 2.9 ft bgs on 5/07/07 START : 5/7/2007 END : 5/8/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -78.0 | | | 1 | 119.0-119.1' - Bedding plane, <5 deg, rough to smooth, undulating to planar, open to <1/8" | | | SC-4 collected at 119.7-120.55' |
| | 121.0 | | | 119.05' - Fracture, 85 deg, fracture between two bedding fractures, open up to 1/8" | | | R13: 2 minutes |
| | | | 3 | 120.55' - Bedding plane, <5 deg, rough to smooth, undulating to planar, open to <1/8" | | **Limestone** 121.0-125.95' - Same as 116.0-121.0' except transitions from coarse to fine grained with depth, percentage of voids and fossils decrease with depth, laminated bedding from 122.6-125.1' | |
| | | | 2 | 121.3' - Fracture, 85 deg, rough, undulating, open to <1/8" | | | |
| | R14-NQ 5 ft 99% | 40 | 1 | 121.85, 121.9, 122.0' - Bedding plane, <5 deg, smooth to rough, undulating, open up to 1/4" | | | |
| | | | | 122.2' - Bedding plane, <5 deg, smooth to rough, undulating, open to <1/8" | | | |
| | | | >10 | 122.4' - Fractures or mechanical break (2), 75 deg and <5 deg, rough, undulating, high angle fracture intersected by bedding (partial fracture), open up to 1/8" | | | |
| 125 -83.0 | | | >10 | | | | R14: 2 minutes |
| | 126.0 | | | 123.9, 124.5' - Bedding plane, <5 deg, smooth to rough, undulating, open up to 1/4" | | | |
| | | | NR | | | **No Recovery 125.95-126.0'** | |
| | | | 0 | 124.6' - Fracture, 50 deg, rough, undulating, open to <1/4" | | **Limestone** 126.0-130.85' - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, very weak to weak (R1 to R2), voids <1/16" with 10% coverage, trace voids to 1/4" and voids <1/16" with 30% coverage from 127.2-128.6' and 130.0-130.85', zone of slightly undular laminated bedding from 128.7-129.2' | |
| | | | 1 | 124.65' - Bedding plane, <5 deg, smooth to rough, undulating, open up to 1/4" | | | |
| | R15-NQ 5 ft 97% | 63 | 2 | 124.9-125.8' - Fracture zone, intersecting fractures, fragments to 1-1/2" 127.3' - Bedding plane, 30 deg, rough, undulating, open up to 1/2" | | | |
| | | | 4 | 128.4, 128.65' - Mechanical break 128.85, 128.9, 129.1, 129.3' - Bedding plane, <5 deg, rough to smooth, undulating, open up to 1/4"; may have associated dissolution cavities at 128.9', 129.1', and 129.3' | | | |
| 130 -88.0 | | | 1 | | | | R15: 3 minutes |
| | 131.0 | | | 129.5, 129.55' - Bedding plane, <5 deg, smooth, planar to undulating, open to <1/8" | | | |
| | | | NR | | | **No Recovery 130.85-131.0'** | |
| | | | >10 | 130.25' - Bedding plane, 20 deg, rough to smooth, undulating, open to <1/8" | | **Limestone** 131.0-132.8' - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, very weak (R1), undular bedding planes (variable thickness 1/2" to 1-1/2"), trace voids to 1/16" 132.8-134.9' - yellowish gray and light olive gray, (5Y 8/1 and 5Y 5/2), fine to medium grained, very weak to weak (R1 to R2), up to 1/16" voids cover 5-10%, wavy laminated bedding transitioning to planar with depth, trace fossils (casts) | |
| | | | >10 | 131.1' - Bedding plane, <5 deg, rough to smooth, organic stain, open up to 1/4" | | | |
| | | | | 131.2-131.4' - Fracture zone, intersecting fractures, fragments to 1-1/2" | | | |
| | R16-NQ 5 ft 78% | 0 | 3 | 131.7' - Fracture, 70 deg, rough, undulating, open, piece of fracture missing, organic staining | | | |
| | | | >10 | 132.0-132.7' - Fracture zone or bedding plane, <5 deg, rough, undulating, open up to 1/8" | | | |
| 135 -93.0 | | | NR | 132.7-132.85' - Fracture zone, fragments to 1/2" | | | R16: 2 minutes |
| | 136.0 | | | 133.4, 133.9, 133.95, 134.0, 134.2, 134.6, | | **No Recovery 134.9-136.0'** | |
| | | | >10 | 134.65' - Fracture zone or bedding plane, <5 deg, rough, undulating, open up to 1/8" | | **Limestone** 136.0-139.6' - yellowish gray, (5Y 7/2, 5Y 8/1), very fine to fine grained, strong HCl reaction, trace fossil casts/molds, elongated voids to 1/2" with 5-10% coverage from 136.0-137.5', voids <1/16" with 10% coverage | |
| | | | 3 | 134.5-134.6' - Fracture zone, fragments to 1/2" 136.0-136.4' - Fracture zone, intersecting fractures, fragments to 1-1/2" | | | |
| | R17-NQ 5 ft 72% | 13 | >10 | 136.5, 136.8, 136.9, 137.1' - Bedding plane, <5 deg, rough, undulating, open up to 1/2", associated with dissolution | | | |
| | | | 2 | 137.4' - Fracture, 65 deg, rough, undulating, open up to 1"; fossils and voids | | | |
| 140 | | | | | | **No Recovery 139.6-141.0'** | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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

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

WATER LEVELS : 2.9 ft bgs on 5/07/07 START : 5/7/2007 END : 5/8/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: 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, undulating, open up to 3/4"<br>138.1-138.5' - Fracture zone, fragments to 1-1/2" | | | R17: 5 minutes |
| 141.0 | | | | | | **Limestone**<br>141.0-143.5' - yellowish gray, (5Y 8/1), fine to medium grained, strong HCl reaction, very weak (R1), voids <1/16" with 30% coverage, wavy bedding planes to 1/2" | |
| | R18-NQ<br>5 ft<br>74% | 15 | >10 | 138.8, 139.1' - Bedding plane, <5 deg, rough, undulating, open up to 1/2", associated with dissolution | | | |
| | | | >10 | 139.5' - Fracture, 60 deg, rough to smooth, undulating, open to <1/8" | | | |
| | | | 2 | 141.2-141.7' - Fracture zone or bedding plane, <10 deg, rough, undulating, open to <1/2" (most <1/8") | | 143.5-144.7' - yellowish gray, (5Y 8/1), very fine grained, moderate HCl reaction, medium strong to strong (R3 to R4), voids <1/16" with 10-20% coverage, 1/4" zone at 143.75' of weak to medium strong rock (R2 to R3) with voids <1/16" covering 30-40% of the surface and slightly darker color | |
| | | | 1 | 141.75-142.2' - Fracture zone, intersecting fractures, fragments to 1/2" | | | |
| 145<br>-103.0 | | | NR | 142.25, 142.3' - Bedding plane, <5 deg, rough, planar<br>142.4-143.0' - Fracture zone, fragments to 1-1/2" | | | R18: 3 minutes |
| 146.0 | | | | | | **No Recovery 144.7-146.0'** | |
| | R19-NQ<br>5 ft<br>98% | 58 | 1 | 143.1, 143.3' - Bedding plane, open to 1/4"<br>143.5' - Mechanical break | | **Limestone**<br>146.0-147.0' - grayish yellow to yellowish gray, (5Y 8/4 to 5Y 7/2), very fine to fine grained, strong HCl reaction, strong to weak (R4 to R2), trace organics and voids <1/16" | |
| | | | 1 | 144.1' - Fracture, 75-80 deg, rough, undulating, organic stain or mineralization, open<br>144.3' - Mechanical break | | | |
| | | | 3 | 146.85' - Fracture, 70 deg, rough, undulating<br>147.75' - Bedding plane, <5 deg, rough, undulating | | | |
| | | | 0 | 148.0, 148.6, 148.65, 150.8, 150.9' - Bedding plane, <5 deg, rough, undulating, 1/4" open<br>148.1, 148.5, 149.95' - Mechanical break | | 147.0-147.9' - yellowish gray, light olive gray, and grayish yellow, (5Y 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 10% coverage, trace organics, wavy laminated bedding, possible cross bedding | |
| 150<br>-108.0 | | | 2 | | | | SC-5 collected at 148.95-150.80'<br>R19: 4 minutes |
| 151.0 | | | NR | | | | |
| | R20-NQ<br>5 ft<br>97% | 37 | >10 | 151.0-151.35' - Fracture zone, intersecting fractures, fragments to 1-1/4", some organic staining | | 147.9-150.9' - grayish yellow, (5Y 8/1), fine to medium grained, strong HCl reaction, weak to medium strong (R2 to R3), voids <1/16" with 10% coverage, trace cavities to 1/4" | |
| | | | 2 | 151.6' - Bedding plane, 15-40 deg, open up to 1" | | | |
| | | | 3 | 152.15, 152.45' - Bedding plane, <5 deg, rough, undulating, open to <1/8"<br>153.15' - Fracture, 40-45 deg, rough, undulating, open <1/8" to 1/2" | | **No Recovery 150.9-151.0'** | |
| | | | 3 | 153.3, 153.9, 154.9' - Bedding plane, <5 deg, rough, planar, open to 1/4" at 154.9' | | **Limestone**<br>151.0-152.15' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, weak to medium strong (R2 to R3), trace voids <1/16", poorly fossiliferous | |
| 155<br>-113.0 | | | 1 | 154.6' - Fracture (2), 65 deg and <5 deg, intersected with bedding fracture, open up to 1/8" | | | R20: 2 minutes |
| 156.0 | | | NR | | | 152.15-155.85' - Same as 151.0-152.15' except yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), weak (R2) | |
| | R21-NQ<br>5 ft<br>88% | 23 | 2 | 155.8' - Bedding plane, <5 deg, rough, undulating, open to <1/8"<br>156.15' - Bedding plane, <5 deg, smooth to rough, planar to undulating, trace organics, open to <1/4" | | **No Recovery 155.85-156.0** | |
| | | | >10 | 156.7' - Bedding plane, 10 deg, rough, undulating, open up to 1" | | **Limestone**<br>156.0-160.4' - yellowish gray to mottled yellowish gray, and dusky yellow, (5Y 7/2 to mottled 5Y 6/4 and 5Y 6/2), fine to medium grained, strong HCl reaction, medium strong (R3), trace voids, trace fossils (casts) | |
| | | | >10 | 157.1' - Bedding plane, <5-35 deg, rough, undulating, open up to 1" | | | |
| | | | 4 | 157.2' - Bedding plane, 35 deg, rough, undulating, open up to 1/8" | | | |
| 160 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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

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

WATER LEVELS : 2.9 ft bgs on 5/07/07 START : 5/7/2007 END : 5/8/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -118.0 | | | >10 | 157.35' - Bedding plane, <5 deg, rough, undulating, open up to 1/8" | | | Driller's Remark: 100% loss of circulation at 159.5' |
| | 161.0 | | NR | 157.45-157.7' - Fracture zone, intersecting fractures, fragments to 1" | | **No Recovery 160.4-161.0'** | R21: 3 minutes |
| | | | 4 | 157.8, 157.9, 158.5' - Bedding plane, <5 deg, rough, undulating, open up to 1/8" | | **Limestone** 161.0-162.6' - yellowish gray, (5Y 7/2), fine grained, moderate to strong HCl reaction, medium strong (R3), <1/16" voids with 5-10% coverage, trace cavities to 1/4", poorly fossiliferous | |
| | | | 3 | 158.6-158.8' - Fracture zone, intersecting fractures, fragments to 1-1/2" | | | |
| | R22-NQ 5 ft 85% | 28 | 8 | 158.9, 159.05, 159.15, 159.3' - Bedding plane, <5 deg, rough, undulating, open 1/8-1/4" | | 162.6-165.25' - alternating dusky yellow to light olive gray, (5Y 6/4 to 5Y 5/2), medium to very fine grained, strong to moderate HCl reaction, 15-20% coverage of voids <1/16" and fossiliferous in dusky yellow zones; trace voids <1/16" and no visible fossils in light olive gray zones | |
| | | | 5 | 159.6' - Bedding plane, 10-30 deg, rough, undulating, open up to 1/8" | | | |
| 165 | | | | 160.05' - Bedding plane, 35 deg, rough, undulating, open up to 1/8" | | | |
| -123.0 | | | >10 | 160.1-160.2' - Fracture zone | | | R22: 3 minutes |
| | 166.0 | | NR | 161.05, 161.5, 161.6' - Bedding plane, <5 deg, rough, undulating, open up to 1/4" | | **No Recovery 165.25-166.0'** | |
| | | | 1 | 161.75' - Bedding plane, <5 deg, rough, undulating, open up to 1" | | **Limestone** 166.0-170.6' - light olive gray and dusky yellow, (5Y 5/2 and 5Y 6/4), fine to medium grained, moderate HCl reaction, medium strong to strong (R3 to R4), voids to 1/16" with 30-40% coverage and cavities up to 1/4"x1/2", color transitions to moderate yellowish brown (10YR 5/4) at 169.7' with interbeds of light olive gray material up to 2" | |
| | | | | 162.6' - Bedding plane, <5 deg, rough, undulating, open to <1/8" | | | SC-6 collected at 166.0-166.85' |
| | | | 2 | 162.8, 162.9' - Bedding plane, <5 deg, rough, planar, open up to 1/4" | | | |
| | R23-NQ 5 ft 92% | 29 | >10 | 163.1' - Fracture, 60 deg, rough, undulating, open to 1/8" | | | |
| | | | | 163.3, 163.4' - Bedding plane, <5 deg, rough, undulating, open up to 1/4" | | | |
| | | | 4 | 163.45' - Fracture, 85 deg, rough to smooth, planar to undulating, intersects bedding plane fracture | | | |
| 170 | | | | | | | |
| -128.0 | | | 1 | 163.55, 163.6, 163.65' - Bedding plane, <5 deg, rough, undulating, open up to 1/4" | | | R23: 3 minutes |
| | 171.0 | | NR | 163.9' - Bedding plane, horizontal and 35 deg, open | | **No Recovery 170.6-171.0'** | |
| | | | 4 | 164.3, 164.4, 164.6, 164.75, 164.8' - Bedding plane, <5 deg, rough, undulating, open up to 1/4" | | **Limestone** 171.0-174.3' - Same as 166.0-170.6' except light olive gray to dusky yellow, (5Y 5/2 to 5Y 6/4) | |
| | | | >10 | 165.0-165.2' - Fracture zone, fragments to 1", most to 1/4", intersecting fractures | | | |
| | R24-NQ 5 ft 66% | 33 | >10 | 166.85, 167.4, 167.5' - Bedding plane, <15 deg, rough, undulating, open to 1/8" | | | |
| | | | 1 | 168.0' - Fracture, 75 deg, rough, undulating, open up to 1/8" | | | |
| 175 | | | | 168.25, 168.35, 168.5' - Bedding plane, <15 deg, rough, undulating, open up to 1/8" | | **No Recovery 174.3-176.0'** | |
| -133.0 | | | NR | 168.7, 168.85' - Bedding plane, <5 deg, rough, undulating, open to 1/8" | | | R24: 4 minutes |
| | 176.0 | | | 169.1, 169.7, 169.75' - Bedding plane, <5 deg, smooth to rough, planar, open to 1/8" | | | |
| | | | 3 | 169.85, 170.35' - Fracture, 55-60 deg, rough, undulating, open to 1/2" | | **Limestone** 176.0-177.3' - yellowish gray, (5Y 8/1), very fine to medium grained, moderate to strong HCl reaction, medium strong to strong (R3 to R4), moderately fossiliferous (casts, trace molds), voids <1/16" with 10% coverage, cavities to 1/4" with 5% coverage | |
| | | | 3 | 171.2, 171.45, 171.55, 171.95' - Bedding plane, <5 deg, rough to smooth, planar, open up to 1/4", open to 1/2" at 171.95 | | | |
| | R25-NQ 5 ft 95% | 18 | 3 | 172.8-178.4' - Fracture zone, intersecting fractures, fragments to 1-1/2" | | | |
| | | | 6 | 173.5, 174.05' - Bedding plane, <5 deg, rough to smooth, planar, open up to 1/4", gray staining at 173.5' | | | |
| 180 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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

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

WATER LEVELS : 2.9 ft bgs on 5/07/07 START : 5/7/2007 END : 5/8/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD 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", organic stains or thin laminae at 177.3' | | 177.3-178.3' - yellowish gray to dusky yellow, (5Y 8/4 to 5Y 6/4), fine to medium grained, moderate HCl reaction, medium strong to weak (R3 to R2), voids to 1/8" with 10-20% coverage increasing with depth | R25: 4 minutes |
| | 181.0 | | NR | 177.5' - Bedding plane, <5 deg, rough, planar to undulating, open to <1/8" | | 178.3-180.75' - Same as 176.0-177.3' except poorly fossiliferous and trace voids <1/16", laminated bedding | |
| | | | 4 | 177.7' - Bedding plane, 35 deg, rough, undulating, open to <1/2" | | **No Recovery 180.75-181.0'** | |
| | | | >10 | 178.15, 178.5' - Mechanical break | | **Limestone** | |
| | R26-NQ 5 ft 85% | 20 | >10 | 178.65, 178.75, 178.9,179.0, 179.15, 179.3, 179.5' - Bedding plane, <5 deg, rough, planar to undulating, open to <1/8" | | 181.0-182.5' - Same as 177.3-178.3' except mild to moderate HCl reaction | |
| | | | 4 | 179.75' - Bedding plane, <5 deg, rough, planar to undulating, open to 1/8" | | 182.5-185.25' - alternating yellowish gray, (alternating 5Y 8/1 and 5Y 7/2), very fine to medium grained, strong to moderate HCl reaction, strong to medium strong (R4 to R3), alternating beds, trace voids <1/16" and cavities to 1", voids <1/16" with 20-30% coverage, cavities to 1/4" with 10% coverage, 1/16" laminated bedding only visible in finer grained beds | |
| 185 | | | 1 | 179.8, 180.2, 180.3' - Bedding plane, <5 deg, rough, planar to undulating, open to <1/8" | | | |
| -143.0 | | | NR | 180.1' - Fracture, 60 deg, rough, undulating | | | R26: 3 minutes |
| | 186.0 | | | 180.4' - Fracture, 85-90 deg, rough, undulating | | | |
| | | | | 180.65' - Bedding plane, <5 deg, rough, stepped, open up to 1/4" | | **No Recovery 185.25-186.0'** | |
| | | | | 181.2, 181.5, 181.7, 181.9' - Bedding plane, <10 deg, stain on some fracture planes, open up to 1/8" | | Bottom of Boring at 186.0 ft bgs on 5/8/2007 | |
| | | | | 182.3' - Bedding plane, 15 deg, organic stain, open to <1/8" | | | |
| | | | | 182.5' - Bedding plane, <10 deg, open to 1/8" | | | |
| | | | | 182.85-183.0' - Fracture zone, fragments to 1", intersecting fractures | | | |
| | | | | 183.1' - Bedding plane, 15 deg, organic stain, open to <1/8" | | | |
| | | | | 183.4-183.5' - Fracture zone, fragments to 1", intersecting fractures | | | |
| | | | | 183.6, 183.9, 184.2, 184.8, 184.4, 185.0, 185.2' - Bedding plane, <10 deg, open to 1/8" | | | |
| | | | | 183.65, 184.25' - Fracture, 55-60 deg, rough, undulating, open to <1/8" | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 43.1 | 0.0 – 1.5 | 1.4 | SS-1 | 1-2-2 (4) | **Topsoil** 0.0-0.3' **Poorly Graded Sand With Organics (SP)** 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 | | No water level - start hole Cathead operator: Paul Buchler |
| 5 | 5.0 | | | | | | |
| 38.1 | 5.0 – 6.5 | 1.0 | SS-2 | 1-2-2 (4) | **Clayey Sand (SC)** 5.0-5.35' - light greenish gray, (5GY 8/1), wet, very loose, very fine to fine grained, 35% low to medium plasticity fines, sand is silica **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 | | |
| 10 | 10.0 | | | | | | |
| 33.1 | 10.0 – 11.4 | 1.2 | SS-3 | 22-40-50/5 (90/11") | **Silt With Sand (ML)** 10.0-11.2' - dark yellowish orange, (10YR 6/6), moist, hard, nonplastic, rapid dilatancy, mild HCl reaction, 16% of sand-sized, carbonate material | | |
| 15 | 15.0 | | | | | | |
| 28.1 | 15.0 – 15.8 | 0.7 | SS-4 | 40-50/4 (90/10") | **Silt With Sand (ML)** 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 material | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 23.1 | 20.0 | 0.1 | SS-5 | 50/2 (50/2") | **Limestone Fragments** 20.0-20.1' - grayish orange, (10YR 7/4), mild HCl reaction, coarse sand-sized fragments, very poor recovery | | |
| 25 | 25.0 | | | | | | |
| 18.1 | 26.5 | 1.0 | SS-6 | 13-20-25 (45) | **Silty Sand (SM)** 25.0-26.0' - grayish orange, (10YR 7/4), wet, dense, fine to coarse grained, mild HCl reaction, 30% nonplastic fines, 13% gravel-sized limestone fragments with many fossil molds/casts, all carbonate material | | |
| 30 | 30.0 | | | | | | |
| 13.1 | 31.5 | 1.1 | SS-7 | 5-17-14 (31) | **Sandy Silt (ML)** 30.0-31.1' - dusky yellow, (5Y 6/4), wet, hard, fine to coarse grained, fine% gravel, nonplastic, rapid dilatancy, mild HCl reaction, 30% fine to coarse sand-sized, 10% fine gravel-sized limestone fragments, carbonate material | | |
| 35 | 35.0 | | | | | | |
| 8.1 | 35.3 | 0.3 | SS-8 | 50/4 (50/4") | **Limestone Fragments** 35.0-35.3' - moderate yellowish brown, (10YR 5/4), mild to moderate HCl reaction, coarse sand to fine gravel sized fragments, poor recovery | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
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# SOIL BORING 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 3.1 | 40.0 | 0.1 | SS-9 | 50/4 (50/4") | **Limestone Fragments** 40.0-41.0' - pale olive, (10Y 6/2), mild HCl reaction, poor recovery | | Very hard rock, a lot of bit chatter - if continues will start coring at 45.0' |
| 45 -1.9 | 45.0 45.8 | 0.6 | SS-10 | 30-50/4 (80/10") | **Silty Sand With Limestone (SM)** 45.0-45.6' - light olive, (10Y 5/4), wet, very dense, fine to coarse grained, mild HCl reaction, 40% low plastic fines, 15% fine gravel-sized, carbonate material | | Continue drilling soils based on drillers log of nearby boring GSC-6 where they went through a tough rock layer, then about 5.0' of sand from about 48.0-53.0', the driller wants to make sure they case deep enough at the start of the hole |
| 50 -6.9 | 50.0 50.4 | 0.3 | SS-11 | 50/5 (50/5") | **Silty Gravel With Sand (GM)** 50.0-50.3' - moderate olive brown, (5Y 4/4), wet, very dense, fine to coarse grained, mild HCl reaction, 22% low plastic fines, 38% fine to coarse sand, carbonate material | | |
| 55 -11.9 | 55.0 56.5 | 1.4 | SS-12 | 22-35-35 (70) | **Silty Sand With Limestone (SM)** 55.0-56.4' - moderate olive brown, (5Y 4/4), wet, very dense, fine to coarse grained, mild HCl reaction, 20-25% low plastic fines, 20% fine to coarse gravel-sized, carbonate materials | | |
| 60 | | | | | | | |

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|---|---|
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# SOIL BORING 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -16.9 | 60.0 – 61.4 | 1.3 | SS-13 | 33-42-50/5 (92/11") | **Silty Sand With Gravel (SM)** 60.0-61.3' - moderate olive brown, (5Y 4/4), moist, very dense, fine to coarse grained, rapid dilatancy, mild to moderate HCl reaction, 40% nonplastic fines, 17% gravel-sized limestone fragments | | |
| | | | | | Begin Rock Coring at 61.5 ft bgs<br>See the next sheet for the rock core log | | |
| 65 -21.9 | | | | | | | |
| 70 -26.9 | | | | | | | |
| 75 -31.9 | | | | | | | |
| 80 | | | | | | | |

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|---|---|
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# 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 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | RQD (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | 61.5 | | | | | | |
| | R1-NQ 4.5 ft 89% | 63 | 3 | 61.6' - Fracture, rough, undulating<br>61.95' - Mechanical break<br>62.3' - Mechanical break | | **Limestone**<br>61.5-65.5' - moderate yellowish brown, (10YR 5/4), fine to medium grained, mild HCl reaction, weak (R2), 30% void space typically related to fossil casts, trace stringers and lenses of black organic material from 61.5', moderate HCl reaction where pulverized, solution cavities to 1-1/2"x3/8", organic lenses, partings and blebs disseminated through the run | 16:05 Began inserting new bit and reamer to 61.5'<br>Driller's Remark: Reamed the borehole to 61.5' below ground surface<br>5/2/07 at 16:23, Commence coring<br>First core run is 4.5' long to get even run at 66.0' |
| | | | 2 | 62.5' - Fracture, rough, undulating, along solution cavity<br>62.85' - Bedding plane, possible separation | | | |
| | | | 1 | 63.9' - Mechanical break | | | |
| 65<br>-21.9 | | | 3 | 64.85' - Mechanical break<br>65.1' - Mechanical break or fracture, along solution cavity | | | R1: 2 minutes |
| | 66.0 | | NR | | | **No Recovery 65.5-66.0'** | |
| | R2-NQ 5 ft 98% | 90 | 1 | 65.25' - Mechanical break or fracture, along solution cavity<br>66.5' - Mechanical break | | **Limestone**<br>66.0-67.8' - Same as 61.5-65.5' | |
| | | | 1 | 67.25' - Mechanical break | | | |
| | | | 0 | 67.95' - Fracture, smooth, planar, at contact with finer grained segment | | 67.8-68.0' - yellowish gray, (5Y 7/2), very fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), limestone is composed of silt sized particles with trace organic pieces | |
| | | | 1 | 69.55' - Fracture, 65 deg, rough, irregular | | | |
| 70<br>-26.9 | | | 1 | 70.0' - Mechanical break | | 68.0-69.6' - light olive gray, (5Y 5/2), fine to medium grained, mild to moderate HCl reaction, weak to medium strong (R2 to R3), 40% open voids that are fossil casts of forams and some possible pelecypods, thin stringers of carbon or organic black material between 68.0' and 68.3' | R2: 4 minutes |
| | 71.0 | | NR | 70.6' - Mechanical break or fracture, very rough, irregular | | | |
| | R3-NQ 5 ft 98% | 78 | 2 | 71.5' - Fracture, smooth, undulating, some fines buildup from drilling | | 69.6-70.45' - Same as 67.8-68.0' except laminar bedding<br>70.45-70.9' - Same as 68.0-69.6' | |
| | | | 1 | 71.95' - Mechanical break | | | |
| | | | 1 | 73.0' - Fracture, smooth, undulating, soft thin gouge zone and gently undulant surface near contact | | **No Recovery 70.9-71.0'**<br>**Limestone**<br>71.0-72.9' - moderate olive brown, (5Y 4/4), fine grained, mild HCl reaction, very weak to weak (R1 to R2), except 72.3-72.9' zone medium strong to strong (R3 to R4), voids to 1/16" covering 20% of surface, fossiliferous (casts) | |
| | | | 2 | 73.5' - Fracture, appears shattered, angular faces | | | |
| 75<br>-31.9 | | | 4 | 74.3' - Mechanical break<br>74.95' - Fracture, appears shattered at lithology change, angular | | | R3: 4 minutes |
| | 76.0 | | NR | 75.3' - Fracture, 30 deg, smooth, planar<br>75.6' - Fracture, 3-5 deg, smooth | | | |
| | R4-NQ 5 ft 73% | 50 | 1 | 75.75' - Mechanical break<br>75.85' - Mechanical break | | 72.9-73.5' - light brown, (5Y 6/4), fine to medium grained, mild HCl reaction, very weak (R1), bedding planes irregular, with varying angles and gently crenelated, the angle increases with depth, small stress fractures between and through the planes, which are laminar to thin bedded | |
| | | | 4 | 76.65' - Mechanical break, 60 deg, probably part of cleavage | | | |
| | | | >10 | 77.6-78.0' - Fracture zone, cannot describe because the fragments were cleaved by the bit; fragments are angular with sharp edges, may have been broken during drilling | | | |
| | | | >10 | 79.0' - Fracture, 40 deg, 1" thick where there is a parallel fracture, these have been broken then another fractured piece to 79.4, the remainder of the rock is unbroken | | | |
| 80<br>-36.9 | | | NR | | | 73.5-75.0' - moderate yellowish brown, (10YR 5/4), fine to medium grained, mild to very mild HCl reaction, medium strong (R3), 12-15% voids (fossil casts), trace laminar bedding, trace organics | R4: 7 minutes<br>Driller's Remark: Lost circulation at 80.0-80.3' |
| | 81.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
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# 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 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R5-NQ 5 ft 84% | 27 | >10 | 81-81.7' - Fracture zone, rock fragments from 1/4'-1/2", no visible orientation, angular to subangular fragments | | 75.0-75.75' - Same as 72.9-73.5' except trace organics | |
| | | | 7 | 81.9' - Fracture, undulating, generally horizontal, irregular | | 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 | |
| | | | 5 | 82.2' - Bedding plane, <5 deg, open<br>82.6-83.0' - Fractures, 0-90 deg, open, fragments vary in shape and size | | 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) | |
| | | | >5 | 83.0-83.5' - Fractures, 0-90 deg, open, fragments vary in shape and size | | | |
| 85<br>-41.9 | | | 1 | 85.7' - Fracture, fracture from 85.7-85.9' does not extend across the core | | | R5: 4 minutes |
| | | | NR | | | **No Recovery 79.65-81.0'** | |
| | 86.0 | | | | | **Limestone** | |
| | R6-NQ 5 ft 86% | 63 | 0 | 86.5-86.9' - Fracture zone, fragments <1" x 1" average at 1/2" x 1/2" | | 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 HCl reaction, strong to very strong (R4 to R5), delayed reaction to HCl, voids <1/16" over 20% of surface, trace cavities to 1/8", trace organics, poorly fossiliferous | End of drilling for the day, 5/2/07 at 86'<br>Resume drilling on 5/3/07<br>Water level 5.5' below ground surface on 5/3/07 |
| | | | 1 | 87.75' - Fracture or bedding plane, 0-20 deg, rough, undulating, 1" open, | | | |
| | | | 0 | 88.3' - Mechanical break<br>88.5' - Mechanical break | | 82.2-83.1' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine to medium grained, mild to moderate HCl reaction, medium strong to strong (R3 to R4), voids to 1/16" 5% coverage, trace organics | |
| | | | >10 | 89.35' - Fracture, 80 deg, rough, undulating, 1/8" open | | | |
| 90<br>-46.9 | | | >10 | 89.7-90.15' - Fracture zone, intersecting fractures, up to 1" x 1/2" fragments, some silt with organics from 89.7-89.8' | | | R6: 6 minutes<br>Possible start of breccia zone at 89.7-90.5' |
| | 91.0 | | NR | | | | |
| | R7-NQ 5 ft 96% | 67 | 0 | | | 83.1-85.2' - dusky yellow transitioning to yellowish gray, (5Y 6/4 to 5Y 8/1), fine grained, mild HCl reaction, medium strong to strong (R3 to R4), voids <1/16" 30-40% coverage | |
| | | | | 91.85' - Mechanical break | | | |
| | | | >10 | 92.6-93.05' - Fracture zone, with some clay infill | | **No Recovery 85.2-86.0'** | |
| | | | | | | **Limestone** | |
| | | | 3 | 93.4, 93.75' - Fracture or bedding plane (2), horizontal, rough, undulating, 5% organics on bottom surface of fracture, up to 1/4" open | | 86.0-90.3' - Same as 83.1-85.2' except moderately fossiliferous, with 5-10% coverage of cavities to 1/2" | |
| | | | 2 | 93.6' - Fracture, 80 deg, rough, undulating, organics on 5% of fracture | | **No Recovery 90.3-91.0'** | |
| | | | | | | **Limestone** | |
| 95<br>-51.9 | | | 0 | 94.2' - Mechanical break<br>94.45' - Fracture, 5 deg, smooth, planar, tight, slight organics on fracture surface (5-10%) | | 91.0-93.5' - yellowish gray and light olive gray, (5Y 7/2 and 5Y 8/1), fine to medium grained, mild to moderate HCl reaction, medium strong (R3), voids <1/16" 25-35% of surface, trace cavities to 1/2", trace organics | R7: 5 minutes |
| | 96.0 | | NR | | | | |
| | R8-NQ 5 ft 98% | 83 | 1 | 94.9' - Bedding plane, 5 deg, rough, undulating, organic staining, open 2", clay infill with limestone fragments | | 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 | |
| | | | 3 | 95.25' - Mechanical break<br>96.3' - Mechanical break | | | |
| | | | 2 | 96.8' - Fracture, 5 deg, organic staining, bedding plane fracture, open 3", infill fines | | **No Recovery 95.8-96.0'** | |
| | | | 0 | 97.0, 97.05' - Bedding plane (2), smooth, undulating, organics (5-10%) of surface of fracture, up to 1/8" open | | **Limestone** | |
| 100<br>-56.9 | | | 0 | 97.8' - Fracture, 80 deg, rough, undulating, organic staining<br>98.5' - Mechanical break<br>99.1' - Mechanical break | | 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", moderately fossiliferous (casts/molds) | R8: 9 minutes |
| | 101.0 | | NR | 100.2' - Mechanical break | | | |

| PROJECT NUMBER: | BORING NUMBER: |
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# 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 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | 3 | 101.2' - Fracture, 5 deg, rough, undulating, bedding plane fracture, up to 1/8" open | | **No Recovery 100.9-101.0'** | |
| | | | 0 | 101.7, 101.9' - Mechanical break (2), high angle, tight | | **Limestone** 101.0-106.0' - yellowish gray, (5Y 8/1), very fine to fine grained, strong to very strong HCl reaction, very weak to weak (R1 to R2), voids <1/16" 5-10%, trace cavities to 1/4", moderately fossiliferous (casts/molds), <1% oval to circular, calcite filled voids | |
| | R9-NQ 5 ft 100% | 85 | 1 | 103.25, 103.5, 104.45' - Mechanical break (3) | | | SC-1 collected at 103.5-104.45' |
| | | | 0 | | | | |
| 105 -61.9 | | | >5 | | | | R9: 4 minutes |
| | 106.0 | | | 105.5' - Fractures or mechanical break, multiple fractures intersecting | | | |
| | | | 3 | 106.1' - Fracture, 5 deg, smooth, undulating, bedding plane fracture, up to 1/4" open | | 106.0-111.0' - Same as 101.0-106.0' except yellowish gray, (5Y 8/1 to 5Y 7/2), trace planar bedding of variable widths, trace cavities to 1" | |
| | | | 1 | 106.25' - Fracture, 5 deg, smooth, undulating, bedding plane fracture, up to 1/2" open | | | |
| | R10-NQ 5 ft 100% | 68 | 1 | 106.5' - Fracture, 10 deg, smooth, undulating, bedding plane fracture, up to 1/4" open<br>107.4' - Mechanical break | | | |
| | | | 4 | 108.85' - Mechanical break or bedding plane, 5 deg, tight | | | |
| 110 -66.9 | | | 3 | 109.15' - Fracture, 5 deg, smooth, undulating, bedding plane fracture, up to 1/4" open<br>109.35' - Fracture, 5 deg, smooth, undulating, bedding plane fracture, up to 1/4" open | | | R10: 3 minutes |
| | 111.0 | | | 109.55' - Fracture, 30 deg, smooth, undulating, bedding plane fracture, except 1" open | | | |
| | | | 3 | 109.8' - Fracture, 5 deg, smooth, undulating, bedding plane fracture, up to 1/4" open | | 111.0-115.8' - white to yellowish gray, (N9 to 5Y 8/1), very strong HCl reaction, extremely weak to weak (R0 to R2), trace organics, <2% voids to 1/16", trace wavy bedding, poorly fossiliferous (casts) | |
| | | | >10 | 110.05' - Fracture, high angle<br>110.45' - Mechanical break, 5 deg, tight | | | |
| | R11-NQ 5 ft 96% | 57 | >10 | 110.5' - Mechanical break, 65 deg, rough, undulating, dark (possibly organic) | | | |
| | | | 0 | 111.2' - Fracture zone, intersecting fractures up to 1/2" fragments | | | |
| 115 -71.9 | | | 1 | 111.6, 111.95, 112.02, 112.25, 112.25, 112.4, 112.6, 112.7, 112.8' - Fracture (9), 0-5 deg, smooth, undulating, bedding plane fracture, easily separates | | | R11: 5 minutes |
| | 116.0 | | NR | 112.85-113.2' - Fracture zone, intersecting fractures up to 1/2" fragments | | **No Recovery 115.8-116.0'** | |
| | | | 1 | | | **Limestone** 116.0-120.95' - Same as 111.0-115.8' except fine to medium grained, 20-30% voids to 1/16", trace cavities to 1/2", moderately fossiliferous | |
| | | | 0 | 116.95, 119.75, 119.8, 120.1, 120.8' - Fracture (5), smooth, undulating, bedding plane fracture, easily separates | | | |
| | R12-NQ 5 ft 99% | 80 | 0 | | | | |
| | | | 2 | | | | |
| 120 -76.9 | | | 4 | | | | R12: 3 minutes |
| | 121.0 | | NR | | | **No Recovery 120.95-121.0'** | |

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# 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 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | | | 2 | 120.9' - Fracture zone, intersecting fractures, fragments up to 1/2" | | **Limestone** 121.0-125.7' - yellowish gray, (5Y 8/1), fine to coarse grained, strong HCl reaction, very weak to weak (R1 to R2), medium to coarse grained zone at 123.2-124.0', trace voids <1/16", cavities to 1/4" <2% of surface, moderately fossiliferous (casts/molds), trace ovular voids with calcite infill | |
| | | | 2 | 121.2' - Fracture, 50 deg, smooth, undulating, up to 1/8" open | | | |
| | R13-NQ 5 ft 94% | 65 | 2 | 121.6' - Fracture or mechanical break, horizontal, bedding plane<br>122.1' - Fracture, 5 deg, rough, undulating, bedding plane, up to 1/4" open | | | |
| | | | >5 | 122.4' - Fracture, 5 deg, rough, undulating, bedding plane, up to 1/4" open | | | |
| 125 -81.9 | | | 4 | 123.2' - Fracture, 5 deg, rough, undulating, bedding plane, up to 1/4" open | | | R13: 2 minutes |
| | 126.0 | | NR | 123.5' - Fracture, 60 deg, undeveloped fracture associated with 123.9' | | **No Recovery 125.7-126.0'** | |
| | | | >10 | 123.9' - Fracture, 60 deg, rough, undulating, up to 1/8" open | | **Limestone** 126.0-129.9' - Same as 121.0-125.7' except fine to medium grained, trace organics | |
| | | | 0 | 124.6-124.7' - Fracture zone, intersecting fractures, fragments up to 1"<br>125.6-125.7' - Fracture zone, intersecting fractures, fragments up to 1" | | | |
| | R14-NQ 5 ft 98% | 70 | 1 | 126.4' - Fracture, 75 deg, rough, undulating, medium light gray staining | | | |
| | | | 1 | 126.5-126.7' - Fracture zone, intersecting fractures, fragments up to 1"<br>126.95' - Fractures (3), 70 deg, rough, undulating | | | |
| 130 -86.9 | | | 3 | 128.4' - Mechanical break<br>128.6' - Fracture, 70 deg, rough, undulating, medium light gray staining | | **No Recovery 129.9-131.0'** | R14: 4 minutes |
| | 131.0 | | NR | | | | |
| | | | >10 | 129.4' - Fractures (2), rough, undulating, medium light gray staining, intersecting fractures | | **Limestone** 131.0-135.75' - yellowish gray, (5Y 7/2), fine to coarse grained, moderate HCl reaction, very weak to weak (R1 to R2), voids to 1/16" over 5-10% of surface, trace planar bedding of variable widths, rock is friable at 132.0-133.5', trace fossil casts | |
| | | | 1 | 130.45' - Fracture, horizontal, rough, undulating, bedding plane fracture | | | |
| | R15-NQ 5 ft 95% | 13 | 3 | 130.6' - Fracture, 75 deg, rough, undulating, medium light gray staining, up to 1/4" open<br>130.9' - Fracture, horizontal, rough, undulating, bedding plane fracture, up to 1/4" open | | | |
| | | | >10 | 131.2' - Fracture, horizontal, rough, undulating, bedding plane fracture, up to 1/8" open | | | |
| 135 -91.9 | | | 5 | 131.3-131.5' - Fracture zone, intersecting fractures, up to 1" fragments | | | R15: 3 minutes |
| | 136.0 | | NR | | | **No Recovery 135.75-136.0'** | |
| | | | 0 | 131.7-131.85' - Fracture zone, intersecting fractures, up to 1/2" fragments | | **Limestone** 136.0-140.7' - Same as 131.0-135.75' except mottled with light olive gray (5Y 5/2), becoming predominantly light olive gray at 138.8-139.1' and 140.1-140.35', trace cavities to 1/4", 5-10% coverage of voids to 1/2" with calcite infill from 139.1-140.1' | |
| | | | 1 | 132.6' - Fracture, 5 deg, bedding plane fracture, open less than 1/8"<br>133.1' - Fracture, 55 deg, rough, undulating | | | |
| | R16-NQ 5 ft 94% | 76 | 2 | 133.8' - Fracture, 0-5 deg, rough, undulating, bedding plane fracture, up to 1/4" open<br>133.9' - Fracture, 55 deg, rough, undulating, up to 1/2" open | | | |
| | | | 3 | 134.1-134.95' - Fracture zone, intersecting fractures | | | |
| 140 -96.9 | | | 1 | 135.2, 135.25' - Fracture (2), 5 deg, bedding plane fracture, open less than 1/8"<br>135.3' - Fracture, 25 deg, rough, undulating, bedding plane fracture | | | R16: 3 minutes |
| | 141.0 | | NR | 135.55' - Fracture, <5 deg, rough, undulating, bedding plane fracture | | **No Recovery 140.7-141.0'** | |

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# 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 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R17-NQ 5 ft 88% | 45 | >10 | 135.65' - Fracture, <5 deg, rough, undulating, bedding plane fracture | | **Limestone** 141.0-145.4' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 8/1), very 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 to moderately fossiliferous decreasing with depth, trace laminar bedding | |
| | | | >10 | 136.9' - Mechanical break | | | |
| | | | >10 | 137.75' - Fracture, 5-10 deg, rough, undulating, bedding plane fracture, up to 1/4" open | | | |
| | | | >10 | 138.2' - Mechanical break | | | |
| | | | | 138.5' - Mechanical break | | | |
| | | | 3 | 138.55' - Bedding plane, 5 deg, rough, undulating | | | |
| 145 -101.9 | | | 1 | 138.75, 139.1' - Bedding plane (2), 0-5 deg, rough, planar | | | R17: 7 minutes |
| | 146.0 | | NR | 140.15, 140.35' - Bedding plane (2), 0-5 deg, rough, planar, up to 1/2" open | | **No Recovery 145.4-146.0'** | |
| | R18-NQ 5 ft 80% | 53 | >10 | 140.2' - Bedding plane, 5 deg, rough, undulating | | **Limestone** 146.0-146.5' - Same as 141.0-145.4' except only trace voids to 1/8" size 146.5-149.4' - dusky yellow to moderate olive brown, (5Y 6/4 to 5Y 4/4), medium to coarse grained, mild 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 fossiliferous (casts/molds) 149.4-150.0' - Same as 146.0-146.5' | |
| | | | | 141.5' - Fracture, 30 deg, up to 1/4" open | | | |
| | | | 2 | 142.2-142.3' - Fracture zone, intersecting fractures, up to 1/2" fragments | | | |
| | | | 2 | 142.4' - Fracture, 0-5 deg, bedding plane fracture, olive gray (5Y 3/2) organic staining, up to 1/4" open | | | |
| | | | | 142.6' - Fracture, 0-5 deg, organic staining, up to 1/4" open | | | |
| | | | 4 | 142.85-142.45' - Fracture zone, intersecting fractures, up to 1/2" fragments | | | |
| 150 -106.9 | | | NR | 143.95-143.6' - Fracture zone, intersecting fractures, up to 1/2" fragments | | **No Recovery 150.0-151.0'** | R18: 3 minutes |
| | 151.0 | | | 143.7' - Fracture, 0-5 deg, organic staining, tight | | | |
| | R19-NQ 5 ft 80% | 23 | 2 | 143.9' - Fracture, 0-5 deg, organic staining, up to 1/8" open | | **Limestone** 151.0-155.0' - yellowish gray, (5Y 8/1 to 5Y 7/2), fine to medium grained, mild HCl reaction, medium strong to 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 wavy laminar bedding planes at 153.0-153.5' | |
| | | | >10 | 144.0' - Fracture, 0-5 deg, organic staining, up to 1/8" open | | | |
| | | | | 144.3' - Fracture, 0-5 deg, organic staining, up to 1/4" open | | | |
| | | | 5 | 144.5' - Fracture, 15 deg, organic staining, tight | | | |
| | | | | 144.8' - Mechanical break | | | |
| | | | 4 | 145.0' - Fracture, 15 deg, possible organic stain on 50% of surface, up to 1/4" open | | | |
| 155 -111.9 | | | NR | 146.0-146.3' - Fracture zone, intersecting fractures, fragments up to 1/2" | | **No Recovery 155.0-156.0'** | R19: 4 minutes |
| | 156.0 | | | 146.9, 146.95' - Fracture (2), 0-5 deg, rough, undulating, bedding plane fractures, up to 1/8" open | | | |
| | R20-NQ 5 ft 42% | 37 | 3 | 147.1' - Fracture, 20 deg, rough, undulating, up to 1/4" open | | **Limestone** 156.0-157.2' - dusky yellow, (5Y 8/1), medium grained, mild HCl reaction, weak (R2), voids to 1/16" 20-30%, cavity to 1/2" 5-10%, moderately fossiliferous (casts/molds) 157.2-158.1' - yellowish gray, (5Y 8/1), fine to medium grained, moderate to strong HCl reaction, voids to <1/16" 5-10% of surface, trace cavities to 1/4", trace organics, trace fossils (casts) | SC-2 collected at 156.3-157.23' |
| | | | 1 | 147.95' - Fracture, 5 deg, rough, undulating, up to 1/4" open | | | |
| | | | 0 | 148.1, 149.1' - Fracture (2), 5 deg, rough, undulating, up to 1/8" open | | | |
| | | | | 148.3' - Fracture, 20 deg, rough, undulating, up to 1/2" open | | | |
| | | | NR | 148.5' - Fracture, 50-60 deg, undeveloped or healed | | | |
| 160 -116.9 | | | | 149.3, 149.4, 149.8' - Fracture (3), 5 deg, rough, undulating, 1/8"-1/4" open | | **No Recovery 158.1-161.0'** | R20: 6 minutes |
| | 161.0 | | | 151.6' - Fracture, 70-80 deg, rough, undulating, organic stain on 95% of fracture surface, up to 1/4" open | | | |

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# 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 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R21-NQ 5 ft 72% | 16 | 3 | 151.65' - Fracture, 5 deg, rough, undulating, organic staining, bedding plane fracture, intersecting, <1/8" open, olive gray (5 Y 3/2) | | **Limestone** 161.0-164.6' - yellowish gray with light olive gray mottling, (5Y 7/2 with 5Y 5/2), fine to medium grained, mild to moderate HCl reaction, medium strong to strong (R3 to R4), 5-10% voids to <1/16" decreasing with depth, <1% cavities to 1/4", mildly fossiliferous, trace planar bedding | |
| | | | 4 | 152.0-152.2' - Fracture zone, fragments up to 1", intersecting fractures | | | |
| | | | >10 | 152.25' - Fracture, <5 deg, rough, undulating, bedding plane fracture, <1/8" open | | | |
| | | | 4 | 152.4' - Fracture, <5 deg, rough, undulating, bedding plane fracture, up to <1/4" open | | | |
| 165 -121.9 | | | NR | 152.45' - Fracture or mechanical break, <5 deg, rough, undulating, bedding plane fracture, up to <1/4" open | | **No Recovery 164.6-166.0'** | R21: 7 minutes |
| | 166.0 | | | 152.55' - Fracture, <5 deg, rough, undulating, bedding plane fracture, tight | | | |
| | R22-NQ 5 ft 96% | 62 | 5 | 152.9' - Fracture zone, fragments up to 1", intersecting fractures | | **Limestone** 166.0-170.8' - yellowish gray and dusky yellow in alternating zones of variable widths (3"-8"), (5Y 7/2 and 5Y 6/4), moderate HCl reaction, medium strong to strong (R3 to R4), medium strong (R3) zone from 166.5-167.2', voids to <1/16" 10-20% decreasing with depth, trace cavities to 1/2", mild to moderately fossiliferous decreasing with depth, planar bedding of variable widths | |
| | | | 1 | 153' - Fracture zone, fragments up to 1", intersecting fractures | | | |
| | | | 2 | 153.05, 153.15, 153.3' - Fracture (3), <5 deg, rough, undulating, bedding plane fracture, <1/8" open | | | |
| | | | 3 | 153.4' - Fracture, <5 deg, rough, undulating, bedding plane fracture, up to 1/2" open | | | |
| 170 -126.9 | | | 0 | 153.5' - Mechanical break | | | R22: 7 minutes |
| | 171.0 | | NR | 153.6' - Fracture, 10 deg, rough, undulating, bedding plane fracture, up to 1/2" open | | **No Recovery 170.8-171.0'** | |
| | R23-NQ 5 ft 100% | 45 | >5 | 154.2, 154.3' - Fracture (2), 10 deg, rough, undulating, bedding plane fracture, up to 1/4" open | | **Limestone** 171.0-176.0' - yellowish gray and dusky yellow in alternating zones of variable widths (<4"-6"), (5Y 7/2 and 5Y 6/4), fine to medium grained, moderate HCl reaction, medium strong to strong (R3 to R4), voids <1/16" 10-20% of surface, trace organics, poorly to moderately fossiliferous (casts/molds) | |
| | | | >10 | 154.45' - Fracture, 85 deg, rough, undulating, remineralization, olive gray (5Y 3/2) organic staining | | | |
| | | | 3 | 154.65' - Fracture or bedding plane, 30 deg, smooth to rough, undulating, up to 1" open | | | |
| | | | 3 | 156.05' - Fracture, 5-10 deg, up to 1/4" open | | | |
| 175 -131.9 | | | 1 | 156.15, 156.3' - Fracture (2), 5-10 deg, up to 1/2" open | | | R23: 5 minutes |
| | 176.0 | | | 157.25' - Fracture, 5 deg, smooth, undulating, bedding plane fracture along abrupt bedding, up to 1/4" open | | | |
| | R24-NQ 5 ft 94% | 73 | 2 | 157.4' - Fracture, healed or undeveloped, olive gray (5Y 3/2) organic staining | | 176.0-180.7' - Same as 171.0-176.0' except trace cavities to 1/2", trace light olive gray (5Y 5/2) laminae, zone of wavy bedding with possible cross bedding from 176.5-176.95' | |
| | | | 2 | 161.3' - Fracture, 10 deg, rough, undulating, bedding plane, up to 2/3" open | | | |
| | | | 1 | 161.55' - Fracture, 40 deg, rough, undulating, up to 1/2" open | | | |
| | | | 2 | 161.8' - Fracture or bedding plane, up to 1/2" open | | | |
| | | | 2 | 162.2, 162.45' - Fracture (2), <5 deg, rough, undulating, bedding planes, up to <1/2" open | | | |
| | | | 1 | 162.3' - Fracture, 80-90 deg, partially healed | | | |
| | | | 2 | 162.75' - Fracture, 10 deg, rough, undulating, bedding plane | | | |
| 180 -136.9 | | | 2 | 163.15' - Fracture, 10 deg, rough, undulating, bedding plane | | | R24: 6 minutes |
| | 181.0 | | NR | 163.35-163.5' - Fracture zone, fractures intersecting, up to 1" fragments | | **No Recovery 180.7-181.0'** | |
| | | | | 163.8' - Fracture, 10 deg, rough, undulating, bedding plane, up to 2/3" open | | | |
| | | | | 163.9' - Fracture, 40 deg, rough, undulating, up to 1/2" open | | | |

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# 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 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 185<br>-141.9 | R25-NQ<br>5 ft<br>92%<br>186.0 | 37 | 9<br>2<br>2<br>5<br>>10<br>NR | 163.95' - Fracture, 10 deg, rough, undulating, along bedding plane, <1/8" open<br>164.05' - Fracture, 80-90 deg<br>164.2, 164.25' - Fracture (2), 10 deg, rough, undulating, bedding plane<br>164.35' - Fracture, 80-90 deg<br>166.1, 166.15, 166.25' - Mechanical break (3), <5 deg, smooth, planar, bedding plane<br>166.5' - Fracture, <5 deg, rough, undulating, bedding plane, 1/4" open<br>116.7, 167.1, 169.1' - Mechanical break (3), <5 deg, smooth, planar, bedding plane, up to 1/8" open<br>167.15-167.7' - Fracture, 80-90 deg, smooth, planar, bedding plane, up to 1/8" open<br>168.15' - Fracture, <5 deg, rough, undulating, bedding plane, 1/4" open<br>168.5' - Mechanical break<br>168.7' - Mechanical break, <5 deg, smooth, planar, bedding plane<br>169.45, 107.35' - Fracture (2), <5 deg, rough, undulating, undeveloped or healed, bedding plane fractures<br>169.5' - Mechanical break, 10 deg, bedding plane<br>169.6' - Fracture, 10 deg, rough, undulating, bedding plane<br>169.8' - Mechanical break, <5 deg, smooth, planar, bedding plane<br>171.45-171.55' - Fracture zone, intersecting fractures, up to 1/2" fragments<br>171.85' - Fracture, <5 deg, rough, undulating, olive gray (5Y 3/2) organic staining on bottom surface, up to 1/2" open<br>172.15' - Fracture, <5 deg, rough, undulating to planar, bedding plane, possible remineralization<br>172.4' - Fracture, 10 deg, rough, undulating, bedding plane, possible remineralization<br>172.5-172.6' - Fracture zone, intersecting fractures, up to 1/2" fragments<br>172.8, 174.1' - Fracture (2), <5 deg, rough, undulating, bedding plane, possible remineralization, up to 1/8" open<br>173.0' - Fracture, 50 deg, rough, undulating, less than 1/8" open<br>173.1' - Fracture, 80-90 deg, rough, undulating, tight<br>173.2' - Fracture, <5 deg, rough, undulating, bedding plane<br>173.5' - Mechanical break<br>174.75, 174.8' - Fracture (2), <5 deg, rough, undulating, bedding plane, possible remineralization, up to 1/4" open<br>175.7-175.75' - Fracture, intersecting fractures, up to 1/4" fragments<br>176.15' - Fracture, <5 deg, smooth, undulating, bedding plane, up to 1/8" open<br>176.7, 177.4, 179.15' - Fracture (3), <5 deg, smooth, undulating, bedding plane, up to 1/4" open | | **Limestone**<br>181.0-185.6' - dusky yellow transitioning with depth to yellowish gray, (5Y 6/4 to 5Y 7/2), fine to medium grained, moderate HCl reaction, weak to medium strong (R2 to R3), weak (R2) zone from 181.9-182.9', voids <1/16" 10-20% increasing with depth, highly fossiliferous from 183.2-184.8', casts/molds up to 1/2", zones of planar bedding with variable thickness from 181.0-181.25', 182.9-183.2', and 184.7-185.6'<br>**No Recovery 185.6-186.0'**<br>Bottom of Boring at 186.0 ft bgs on 5/3/2007 | R25: 5 minutes |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | E-04 SHEET 12 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 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 177.25' - Fracture, vertical, rough, undulating<br>178.05' - Mechanical break<br>178.4' - Mechanical break<br>178.5' - Mechanical break<br>178.6, 179.35, 180.55' - Fracture (3), <5 deg, smooth, undulating, bedding plane, up to 1/8" open<br>179.25' - Fracture, <5 deg, smooth, undulating, bedding plane, tight<br>180.25' - Fracture, 50 deg, rough, undulating<br>181.05, 181.15, 181.6, 181.7, 181.9, 182.95' - Fracture (6), <5 deg, rough to smooth, undulating<br>181.4' - Fracture, 65-75 deg, rough, undulating<br>181.65' - Fracture, 85 deg, rough, undulating<br>181.8' - Fracture, 85 deg, rough, undulating, open up to 1/4"<br>182.4, 183.1, 184.1, 184.5' - Fracture (4), <5 deg, rough to smooth, undulating<br>183.05' - Fracture, 75-85 deg, rough, undulating<br>183.5' - Mechanical break<br>184.6' - Fracture, 60 deg, rough, undulating<br>184.85-185.6' - Fracture zone, <10 deg, rough to smooth, undulating, bedding plane fractures | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | E-05 SHEET 1 OF 11 |

# SOIL BORING 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

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 : 4/10/2007 END : 4/18/2007 LOGGER : R. Bitely, K. Coke, A. Erickson, W. Elliott

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.6 | 0.0 – 1.5 | 1.3 | SS-1 | 0-2-3 (5) | **Poorly Graded Sand With Organics (SP)** 0-1.3' - grayish black grading to medium light gray, (N2 to N6), moist, loose, very fine to fine grained, 20-30% organics, fines decreasing with depth, silica sand, roots | | SS-1: First 6" was weight of hammer<br>Water level is based on Ground Water Monitoring at LNP site (FSAR Table 2.4.12.08) |
| 5 | 5.0 | | | | | | |
| 37.6 | 5.0 – 6.5 | 1.0 | SS-2 | 2-3-3 (6) | **Poorly Graded Sand (SP)** 5.0-5.75' - pale yellowish brown, (10YR 6/2), moist to wet, loose, very fine to fine grained, 3% medium plastic fines, silica sand<br>**Fat Clay With Sand (CH)** 5.75-6.0' - pale blue to pale olive, (5B 6/2 to 10Y 6/2), moist, medium stiff, high plasticity, no dilatancy, 20% very fine silica sand | | |
| 10 | 10.0 | | | | | | |
| 32.6 | 10.0 – 11.5 | 1.2 | SS-3 | 5-7-8 (15) | **Clayey Sand (SC)** 10-10.25' - pale blue to pale olive, (5B 6/2 to 10Y 6/2), moist, medium dense, fine to medium grained, 24% medium plasticity fines, iron cemented sand<br>**Poorly Graded Sand (SP)** 10.25-11.2' - very pale orange, (10YR 8/2), wet, medium dense, very fine to fine grained, trace nonplastic fines, trace black mineral grains | | |
| 15 | 15.0 | | | | | | |
| 27.6 | 15.0 – 16.5 | 1.0 | SS-4 | 6-9-9 (18) | **Poorly Graded Sand With Silt (SP-SM)** 15.0-15.55' - very pale orange to pale yellowish brown, (10YR 8/2 to 10YR 6/2), wet, medium dense, very fine to fine grained, 6% nonplastic fines, silica sand<br>**Sandy Lean Clay (CL)** 15.55-16.0' - pale yellowish brown, (10YR 6/2), wet, very stiff, low to medium plasticity, slow dilatancy, 40-45% very fine to fine silica sand | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | E-05 SHEET 2 OF 11 |

# SOIL BORING 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

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 : 4/10/2007 END : 4/18/2007 LOGGER : R. Bitely, K. Coke, A. Erickson, W. Elliott

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.6 | 20.0 – 21.5 | 1.0 | SS-5 | 6-9-10 (19) | **Silty Sand (SM)** 20.0-21.0' - pale yellowish brown, (10YR 6/2), wet, medium dense, very fine to fine grained, 30-40% nonplastic fines, silica sand | | |
| 25 | 25.0 | | | | | | |
| 17.6 | 25.0 – 26.5 | 1.0 | SS-6 | 6-7-6 (13) | **Silty Sand (SM)** 25.0-26.0' - Same as 20.0-21.0' | | |
| 30 | 30.0 | | | | | | |
| 12.6 | 30.0 – 31.5 | 1.3 | SS-7 | 4-6-8 (14) | **Lean Clay (CL)** 30.0-31.3' - pale yellowish brown to dark yellowish brown becoming greenish gray in last 0.1', (10YR 6/2 to 10YR 1/2 to 5G 6/1), moist, stiff, medium plasticity, no dilatancy, 5-10% very fine silica sand | | |
| 35 | 35.0 | | | | | | |
| 7.6 | 35.0 – 36.5 | 1.2 | SS-8 | 4-4-4 (8) | **Silty Sand (SM)** 35.0-36.2' - light olive gray, (3Y 5/2), moist to wet, loose, very fine to fine grained, 30% low plastic fines, silica sand, medium bluish gray (5B 5/1) clay lens from 35.4-35.6' | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | E-05 SHEET 3 OF 11 |

# SOIL BORING 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

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 : 4/10/2007 END : 4/18/2007 LOGGER : R. Bitely, K. Coke, A. Erickson, W. Elliott

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.6 | 40.0 – 41.5 | 1.5 | SS-9 | 2-4-5 (9) | **Lean Clay (CL)** 40.0-41.5' - dark gray, (N3), moist, stiff, medium plasticity, no dilatancy, 40.7-40.8' organic soil (OH) seam, light olive gray (5Y 6/1), brittle organic layer 40.45- 40.65' | | |
| 45 -2.4 | 45.0 – 46.5 | 1.5 | SS-10 | 0-1-2 (3) | **Lean Clay (CL)** 45.0-46.5' - Same as 40.0-41.5' except 45.2-45.6' seam of silty sand (SM), light olive gray (5Y 6/1), very fine to fine silica sands, 20% nonplastic fines | | |
| 50 -7.4 | 50.0 – 51.5 | 1.5 | SS-11 | 3-4-7 (11) | **Silty Sand (SM)** 50.0-50.65' - dark gray, (N3), moist to wet, medium dense, very fine to fine grained, 17% low plastic fines, possible organics, 1/4" clayey organic seam, silica sand | | |
| | | | | | **Organic Soil (OL)** 50.65-50.85' - dusky yellowish brown, (10YR 2/2), moist, stiff, low to medium plasticity, rapid dilatancy | | |
| | | | | | **Elastic Silt (MH)** 50.85-51.4' - yellowish gray, (5Y 7/2), moist, stiff, low to medium plasticity, rapid dilatancy, mild to moderate HCl reaction, carbonate | | |
| 55 -12.4 | 55.0 – 56.5 | 1.5 | SS-12 | 14-27-36 (63) | **Organic Soil (OL)** 51.4-51.5' - Same as 50.65-50.85' except olive black, (5Y 2/1) | | |
| | | | | | **Silt With Sand (ML)** 55.0-56.5' - light olive gray, (5Y 5/2), moist, hard, low plasticity, rapid dilatancy, mild HCl reaction, 20% very fine to fine sand, trace organics | | Driller's Remark: Harder drilling at 59.0' |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | E-05 SHEET 4 OF 11 |

# SOIL BORING 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

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 : 4/10/2007 END : 4/18/2007 LOGGER : R. Bitely, K. Coke, A. Erickson, W. Elliott

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -17.4 | 60.0 – 61.5 | 1.5 | SS-13 | 26-29-30 (59) | **Silty Sand And Limestone (SM)** 60.0-61.5' - moderate yellowish brown, (10YR 5/4), wet, very dense, fine to coarse grained, mild HCl reaction, 25-30% low plastic fines, 30-40% gravel-sized lime stone, 1/4" organic layer at 61.3' | | Driller's Remark: Reports clay at 63.0' |
| 65 | 65.0 – 66.5 | 1.5 | SS-14 | 2-10-10 (20) | **Elastic Silt (MH)** 65.0-65.4' - moderate yellowish brown, (10YR 5/4), wet, very stiff, low to medium plasticity, rapid dilatancy, moderate HCl reaction, carbonate material; **Organic Soil (OH)** 65.4-65.65' - brownish black, (5YR 2/1), moist, soft, high plasticity, slow dilatancy, no HCl reaction; **Limestone Fragments** 65.65-66.50' - yellowish brown, (10YR 5/4), fine grained, mild HCl reaction | | |
| -22.4 | 70.0 – 71.5 | 1.0 | SS-15 | 11-16-7 (23) | **Silt With Sand (ML)** 70.0-71.0' - moderate yellowish brown, (10YR 5/4), wet, very stiff, low plasticity, rapid dilatancy, moderate HCl reaction, 15-20% fine to coarse sand-sized, trace fine gravel-sized limestone fragments, carbonate material | | Driller's Remark: Lost circulation at 73.5' |
| 70 | 75.0 – 76.5 | 1.1 | SS-16 | 1-3-2 (5) | **Silt With Sand (ML)** 75.0-76.1' - moderate yellowish brown to dusky yellowish brown, (10YR 5/4 to 10YR 2/2), wet, medium stiff, fine to medium grained, low plasticity, rapid dilatancy, mild HCl reaction, trace fine gravel-sized limestone; organic seam at 75.85-76.0' | | Driller's Remark: Hard zone 79.0-80.0' |
| -27.4 | | | | | | | |
| 75 | | | | | | | |
| -32.4 | | | | | | | |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | E-05 SHEET 5 OF 11 |

# SOIL BORING 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

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 : 4/10/2007 END : 4/18/2007 LOGGER : R. Bitely, K. Coke, A. Erickson, W. Elliott

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -37.4 | 80.0<br>80.8 | 0.9 | SS-17 | 41-50-50<br>(100) | **Silty Sand And Limestone (SM)**<br>80.0-80.9' - moderate yellowish brown, (10YR 5/4), wet, very dense, fine to coarse grained, mild HCl reaction, 25% low plastic fines, 35% of sample is fine to coarse gravel-sized limestone fragments<br>Begin Rock Coring at 81.5 ft bgs<br>See the next sheet for the rock core log | | Break for evening 17:30 on 4/10/2007 |
| 85<br>-42.4 | | | | | | | |
| 90<br>-47.4 | | | | | | | |
| 95<br>-52.4 | | | | | | | |
| 100 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | E-05 SHEET 6 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

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

WATER 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| 81.5 | R1-NQ 4 ft 45% | 13 | >10 | 81.6' - Mechanical break, 75 deg, smooth, undulating | | **Limestone** 81.5-83.3' - moderate yellowish brown, (10YR 5/4), fine to medium grained, mild HCl 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'** | Continue drilling, switch to rock coring 04/11/07 at 08:00 |
| | | | >10 | 82.1-82.5' - Fracture zone (>5), rough, undulating, 2" gravel-sized fragments, angular | | | |
| | | | NR | 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 | | | R1: 8 minutes |
| 85 -42.4 / 85.5 | R2-NQ 5 ft 8% | 0 | >10 | 85.5-85.9' - Fracture zone, rough, undulating, 1-1/2" gravel-sized fragments, mostly <1" | | **Limestone** 85.5-85.9' - moderate yellowish brown, (10YR 5/4), fine to medium grained, mild HCl reaction, very weak to weak (R1 to R2), voids cover 5% surface area **No Recovery 85.9-90.5'** | |
| | | | NR | | | | R2: 2 minutes |
| 90 -47.4 / 90.5 | R3-NQ 5 ft 54% | 24 | >5 | 90.5-91.0' - Fracture zone (>5), smooth, undulating, 2" gravel-sized fragments, angular | | **Limestone** 90.5-92.5' - Same as 85.5-85.9' except moderately fossiliferous (molds and casts) | |
| | | | >10 | 91.5, 91.7, 92.4' - Fracture or mechanical break (3), smooth, undulating | | | |
| | | | 0 | 93.0' - Mechanical break | | 92.5-93.2' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, weak (R2), small (1/16") voids over 5% of the surface, trace silt **No Recovery 93.2-95.5'** | |
| | | | NR | | | | R3: 8 minutes |
| 95 -52.4 / 95.5 | R4-NQ 5 ft 100% | 88 | | 95.7' - Mechanical break | | | |
| | | | 1 | 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 | | **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' |
| | | | >2 | | | | |
| | | | 4 | | | | |
| | | | 2 | | | | SC-2 collected at 99.1-100.3' |
| 100 -57.4 / 100.5 | | | >10 | | | | R4: 11 minutes |
| | | | 6 | 100.3-100.5' - Fracture zone (>10), 45 deg, rough, undulating, 2" diameter gravel fragments | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | E-05 SHEET 7 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

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

WATER 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R5-NQ 5 ft 64% | 30 | 6 | 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 | | **Limestone** 100.3-100.5' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, very weak (R1), trace organics, trace silt | |
| | | | >10 | 101.5, 101.7, 101.9, 102.3, 103.0, 103.4' - Fracture or mechanical break (6), rough, undulating, open (3/4") | | 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' | |
| 105 -62.4 | 105.5 | | NR | | | | R5: 8 minutes |
| | R6-NQ 5 ft 85% | 75 | >10 | | | **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 voids (3/8"x3/4") cover 10% of the surface fossiliferous (molds and casts), trace organics | |
| | | | 1 | 106.6, 107.1' - Mechanical break, tight | | | |
| | | | 3 | 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" | | | SC-3 collected at 108.3-109.8' |
| | | | 0 | | | | R6: 10 minutes |
| 110 -67.4 | 110.5 | | NR | | | **No Recovery 109.8-110.5'** | |
| | R7-NQ 5 ft 76% | 38 | >10 | 110.7-110.9, 111.4-111.7' - Fracture zone, horizontal and vertical, rough, undulating, 3/8" and larger size rock fragments | | **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 | |
| | | | >5 | 111.1' - Fracture, 60 deg, rough, undulating, tight to open up to 1/16" | | | |
| | | | 1 | 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" | | | Driller's Remark: Water loss at 113.0' |
| | | | 2 | 112.4' - Fracture, horizontal, rough and undulating on one face, smooth and undulating on the other, open | | 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 | |
| 115 -72.4 | 115.5 | | NR | 113.4' - Fracture, 65 deg, rough, undulating, open up to 1/16" | | **No Recovery 114.3-115.5'** | R7: 6 minutes |
| | R8-NQ 5 ft 68% | 64 | 0 | 114.0, 114.1' - Fracture, horizontal, rough, undulating, open, possible bedding plane | | **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' | |
| | | | 2 | | | | |
| | | | 1 | 117.2, 117.4' - Fracture zone (>2), rough, undulating, up to 1/2" gravel-sized fragments, angular | | | |
| | | | 0 | 118.1' - Fracture, horizontal, rough, undulating, tight to open up to 3/16" | | | |
| 120 -77.4 | 120.5 | | NR | | | **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 | | | |

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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 ORIENTATION : Vertical

WATER 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R9-NQ 5 ft 42% | 24 | 4 | 120.8-120.9' - Fracture zone, rough, undulating, gravel-sized fragments <1/4" diameter, angular, no openings >1/4" | | **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") cover 15% of the surface | |
| | | | NR | 121.9, 122.0' - fit tightly with opening up to 1/16" | | 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 molds about 5% of the surface | R9: 5 minutes |
| 125 -82.4 | 125.5 | | | | | **No Recovery 122.6-125.5'** | |
| | R10-NQ 5 ft 70% | 34 | >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 fragment faces match together | | **Limestone** 125.5-126.4' - yellowish gray, (5Y 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 limestone ( slow HCl, medium strong [R3]) is present (interval unknown due to fractured nature of the interval) | |
| | | | >3 | 126.8' - Fracture, 20 deg, rough, undulating, tight and open(1/8") | | | |
| | | | 1 | 127.1-127.2' - Fracture, horizontal, rough, undulating, open, some small (1/2") fragments | | | Driller's Remark: Hard material at 128.0' |
| | | | >5 | 127.4' - Fracture, horizontal, smooth, planar and undulating, open | | | |
| | | | NR | 127.6' - 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 (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 HCl 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' | R10: 8 minutes |
| 130 -87.4 | 130.5 | | | | | **No Recovery 129.0-130.5'** | |
| | R11-NQ 5 ft 8% | 7 | 1 | 128' - Fracture, horizontal, rough, undulating, tight with some openings up to 1/16" | | **Limestone** 130.5-131.0' - pale yellowish brown and grayish orange, (10YR 6/2 and 10YR 7/4), mottled, fine grained, moderate to strong HCl reaction, very weak (R1), small voids (1/16") cover about 10%, 3/16" size cavities | |
| | | | NR | 128.7-129.0' - Fracture zone, horizontal, rough and smooth, undulating to planar, fragment faces do not fit together<br>130.55' - Fracture, horizontal, rough, undulating, open | | | Driller's Remark: Soft material throughout the run<br>R11: 1 minutes |
| 135 -92.4 | 135.5 | | | | | **No Recovery 131.0-135.5'** | |
| | R12-NQ 5 ft 22% | 0 | 7 | 135.55' - Fracture, horizontal, smooth, planar and undulating, open | | **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 | |
| | | | 1 | 135.65, 135.75, 136.3, 136.35' - Fracture, horizontal, smooth, planar, tight to open up to 1/8", appear to be bedding plane | | | |
| | | | NR | 135.7-136.1' - Bedding plane<br>136.0, 136.2' - Fracture, horizontal, smooth, planar and undulating, open<br>136.1-136.7' - rock fragments<br>136.5' - Fracture, horizontal, smooth, planar and undulating, open | | 136.0-136.2' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, extremely weak (R0), very fossiliferous | R12: 4 minutes |
| 140 -97.4 | 140.5 | | | | | | |
| | | | >10 | 140.5-140.7' - Fracture zone, smooth, undulating, 1/2" fragments | | | |

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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 ORIENTATION : Vertical

WATER 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R13-NQ 5 ft 44% | 12 | >10 | 141.3-142.0' - Fracture zone, horizontal and vertical, rough and smooth, undulating, numerous fragments from 3/16"-2" in size | | **Limestone** 136.2-136.6' - Same as 135.5-136.0' except thinly laminated bedding, bedding angle about 5 deg | |
| | | | 2 | 142.4-142.7' - Fracture, horizontal and 60 deg, rough, undulating, open, both fractures have several small (about 3/16") fragments | | **No Recovery 136.6-140.5** 140.5-141.2' - dusky yellow, (5Y 6/4), fine grained, moderate HCl reaction, weak (R2), fossiliferous, small voids (1/16") cover about 25% of the surface, large voids (up to 3/16"x3/8") cover about 5% of the surface area | Driller's Remark: Become harder at 143.0' |
| | | | NR | | | | R13: 11 minutes |
| 145 -102.4 | 145.5 | | | | | | |
| | R14-NQ 5 ft 80% | 20 | >10 | 145.7' - Fracture, 10 deg, rough, undulating, tight with some open up to 3/16" | | 141.2-142.7' - yellowish gray, (5Y 7/2), fine grained, mild to moderate HCl reaction, medium strong (R3), small voids (<1/16") cover 10% of the surface area, large voids (3/16"x3/4") cover about 5%, fossiliferous | Driller's Remark: Piece stuck in core, pullout, clean and then run last 2.0' |
| | | | 5 | 146.0-146.4' - Fracture zone, rough and smooth, undulating, Numerous small fragments 3/16"-1" | | **No Recovery 142.7-145.5'** **Limestone** 145.5-146.2' - Same as 141.2-142.7' | |
| | | | >10 | 146.4-147.0' - Fracture, 80 deg, smooth, undulating, tight | | 146.2-148.6' - yellowish gray to grayish orange, (5Y 7/2 to 10YR 7/4), fine grained, moderate HCl reaction, medium strong (R3), thinly laminated bedding from 146.4-147.0' and 148.2-148.6', trace voids (1/16") | |
| | | | 2 | 146.7' - Fracture, 5 deg, smooth, undulating, tight, appears to be along bedding plane | | | |
| | | | NR | 147' - Fracture, 10 deg, rough, undulating, open, few fragments | | | R14: 22 minutes |
| 150 -107.4 | 150.5 | | | 147.1' - Fracture or mechanical break, 45 deg, rough, undulating, open | | | |
| | R15-NQ 5 ft 66% | 16 | >10 | 147.4-148.2' - Fracture zone, horizontal and 70 deg, rough, undulating, several fragments 1"-3" in size, undulating, many fragments fit together, fragments at 148.0' shows coring marks in 2 directions | | 148.6-149.5' - light olive gray, (5Y 5/2), fine grained, mild HCl reaction, medium strong to strong (R3 to R4), very fossiliferous (mold and casts), less than 1/16" size voids cover about 25% of the surface area. voids and fossil molds (up to 3/8"x3/4") cover 15% of the surface area, trace organics | |
| | | | >10 | 148.2' - Fracture, horizontal, smooth, planar, open | | | |
| | | | 6 | 148.7' - Fracture or mechanical break, 10 deg, rough, undulating, tight to open up to 3/8" | | | |
| | | | 2 | 149.5-149.7' - Fracture, 65 deg, rough, undulating, tight to open up to 3/8" | | **No Recovery 149.5-150.5'** **Limestone** 150.5-151.7' - dusky yellow, (5Y 6/4), fine grained, moderate HCl reaction, very weak to weak (R1 to R2), small voids (up to 1/16") cover about 15% surface, few large voids | |
| | | | NR | 149.7' - Fracture, horizontal, rough, undulating, open up to 3/8" | | | |
| 155 -112.4 | 155.5 | | | 150.0-151.2' - Fracture zone, rough, undulating, some dark staining, gravel-sized fragments | | | R15: 8 minutes |
| | R16-NQ 5 ft 46% | 30 | 2 | 151.2-151.4' - Fracture (2), vertical and 70 deg, rough, undulating, dark, tight to open up to 3/16",10% stain coverage on both surface | | 151.7-153.8' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, strong (R4), fossiliferous, 2-13/32 zone of light olive gray (5Y 5/2) mottling at about 151.5', small voids (<1/16") cover 5% of surface, few larger voids (fossil molds) | |
| | | | 4 | 151.5-151.9' - Fracture zone, horizontal and 60 deg, rough, undulating, several fragments up to 1-1/2", few pieces fit together | | | |
| | | | 1 | 152.3, 152.4, 152.6, 152.9' - Fracture (4), 40 deg and 50 deg, rough, undulating, fracture in alternating direction, tight, some open up to 3/16" | | **No Recovery 153.8-155.5'** **Limestone** 155.5-155.6' - dark yellowish brown, (10YR 4/2), fine grained, strong to moderate HCl reaction, very weak (R1), laminated bedding, trace voids (<1/16") | |
| | | | NR | 152.6-152.9' - Fracture, 70 deg, rough, undulating, tight to open up to 1/16" | | | |
| 160 -117.4 | 160.5 | | | 153.2' - Fracture, 55 deg, rough, undulating, dark, tight, 10% dark staining | | | R16: 5 minutes |
| | | | | 153.3, 153.4' - Fracture (2), horizontal, smooth, undulating, open | | | |
| | | | 1 | 153.4-153.55' - Fracture zone | | | SC-4 collected at 160.5-161.4' |

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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 ORIENTATION : Vertical

WATER 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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R17-NQ 5 ft 32% | 28 | 6 | 153.7, 153.75' - Fracture (2), horizontal, smooth and undulating, rough and undulating, moderately tight | | **Limestone** 155.6-156.7' - light olive gray, (5Y 5/2), fine grained, mild HCl reaction, medium strong to strong (R3 to R4), small voids (<1/16") cover about 15% surface, moderately fossiliferous, few 3/16" fossil molds and casts 156.7-157.8' - dusky yellow, (5Y 6/4), fine grained, mild to moderate HCl reaction, very weak (R1), becoming weak to moderately strong (R2 to R3) by 157.6', laminated bedding 156.7-157.2', moderately fossiliferous, small voids (<1/16") cover about 5% surface area, few large voids **No Recovery 157.8-160.5'** **Limestone** 160.5-162.1' - dusky yellow to light olive gray, (5Y 6/4 to 5Y 5/2), fine grained, moderate HCl reaction, medium strong (R3), small voids (<12/16") cover 15% of the surface area, few large voids (3/16") **No Recovery 162.1-165.5'** **Limestone** 165.5-166.3' - Same as 160.5-162.1' 166.3-167.2' - moderate olive brown, (5Y 4/4), fine grained, mild HCl reaction, medium strong (R3), small voids (<1/16") cover 50% of the surface area, few larger voids (3/16"), moderately fossiliferous, fragments of gray limestone (up to 3/8") inclusion from 167.0-167.2' 167.2-168.7' - yellowish gray, (5Y 7/2), mild to moderate HCl reaction, medium strong (R3), laminated bedding 168.0-168.2', small voids (1/16") cover 5% of the surface area **No Recovery 168.7-170.5'** **Limestone** 170.5-174.7' - light olive gray to yellowish gray, (5Y 5/2 to 5Y 7/2), mild to moderate HCl reaction, strong (R4), voids (up to 1/16") cover 10% surface area, zone of increased small voids (20%) from 173.4-173.6', fewer larger voids (3/16") **No Recovery 174.7-175.5'** **Limestone** 175.5-177.0' - Same as 170.5-174.7' except increased amount of voids (30%) from 175.9 to 176.5' **No Recovery 177.0-180.5'** | |
| | | | NR | 155.6' - Fracture, rough, planar, open 155.7-156.2' - Fracture, 70 deg, rough, undulating, tight and open (1/16") 156.7, 156.8' - Fracture, horizontal, rough, planar, open 157.2' - Fracture, 20 deg, rough, undulating, tight 157.4' - Fracture, 50 deg, rough, undulating, tight | | | R17: 4 minutes |
| 165 -122.4 | 165.5 | | | | | | |
| | R18-NQ 5 ft 64% | 17 | 7 | 157.6' - Fracture, 30 deg, rough, undulating, tight 161.4' - Bedding plane, smooth, planar | | | |
| | | | 4 | 161.8-162.1' - Bedding plane, horizontal, smooth, planar, open 165.5-165.9, 166.6' - Bedding plane (3), smooth, planar | | | |
| | | | 4 | 166.2' - Fracture, horizontal, rough, undulating, open 166.4' - Fracture, horizontal, rough, undulating, open | | | |
| | | | NR | 166.7' - Fracture, 5 deg, smooth, undulating, open 167.1' - Fracture, 5 deg, rough, undulating, tight with open up to 3/16" | | | R18: 12 minutes |
| 170 -127.4 | 170.5 | | | | | | |
| | R19-NQ 5 ft 84% | 45 | 4 | 167.4, 167.9' - Fracture (2), horizontal, rough, undulating, open 167.7' - Fracture, 30 deg, rough, undulating, tight with open up to 1/16" | | | |
| | | | 4 | 168.1, 168.7' - Fracture (2), horizontal, rough, undulating, open 170.5-170.8' - Fracture, 80 deg, closed | | | |
| | | | >10 | 170.8, 171.2, 172.0, 172.2' - Fracture (4), horizontal, rough, undulating 170.8-171.2' - Fracture, 80 deg, open up to 3/16" | | | |
| | | | >10 | 171.7' - Fracture, horizontal and 40 deg, rough, undulating, dark | | | |
| | | | 0 NR | 172.5' - Fracture, 50 deg, dark gray, tight with open up to 3/16" | | | R19: 13 minutes |
| 175 -132.4 | 175.5 | | | | | | |
| | R20-NQ 5 ft 30% | 7 | >10 | 172.7' - Fracture, horizontal, smooth, undulating, open 173.0-173.8' - Fracture zone, horizontal and vertical, rough, undulating, dark, many 3/16"-2" size fragments, some faces are smooth and planar | | | |
| | | | 4 | | | | |
| | | | NR | 174.0, 174.1, 174.2' - Fracture (3), 5 deg, rough, undulating, open 174.4' - Fracture, 60 deg, smooth, undulating, tight 175.8, 175.9' - Fracture or mechanical break, 20 deg and 30 deg, rough, undulating, tight 175.8-176.0' - Fracture, vertical, rough, undulating, open 176.1-176.3' - Fracture zone, rough, undulating, several 1" size fragments, no identifiable fracture angle | | | R20: 6 minutes |
| 180 -137.4 | 180.5 | | | | | | |
| | | | 5 | 176.3, 176.4, 176.5, 176.55, 176.65' - Fracture, horizontal, rough, undulating, open | | | |

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

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ELEVATION : 42.6 ft (NAVD88) DRILLING CONTRACTOR : Universal Engineering Sciences, Gainesville, FL; Driller: R. Woodard

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| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R21-NQ 5 ft 72% | 45 | 0 | 176.7, 177.0' - Fracture, horizontal, smooth, planar, open | | **Limestone** 180.5-180.8' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, weak (R2), thinly laminated bedding, few small voids (<1/16") | SC-5 collected at 181.7-183.4' |
| | | | 0 | 180.6, 180.7, 180.8, 180.9, 181.5, 181.6, 181.7" - Fracture (7), horizontal, smooth, planar to undulating, openings ranging from 1/16"-3/8", no faces match to other | | 180.8-181.7' - moderate yellowish brown, (10YR 5/4), fine grained, moderate to strong HCl reaction, very weak (R1), thinly laminated bedding (10 deg angle), zone of olive gray (5Y 3/2) lamination about 1/16"-3/16" thick with 1/2" spacing from 181.3-183.6' | |
| | | | >10 | 181.4' - Fracture, horizontal, smooth, undulating, open | | | |
| 185 -142.4 | 185.5 | | NR | 183.4' - Fracture, horizontal, rough, undulating, open 183.7-184.1' - Fracture zone, horizontal and vertical, rough and undulating, smooth and planar, 1/2"-1- 1/2" size rock fragments | | 183.4-183.7' - yellowish gray, (5Y 7/2), fine grained, mild to moderate HCl reaction, medium strong (R3), fragments (3/16"x3/8") of gray limestone present in the yellowish gray matrix, up to 1/16" voids cover about 15% of the surface area, up to 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, medium strong (R3), thinly laminated, few small voids (1/16") **No Recovery 184.1-185.5'** | R21: 9 minutes |
| | | | | | | Bottom of Boring at 185.5 ft bgs on 4/18/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

DRILLING METHOD AND EQUIPMENT : CME 55 S/N 252345, mud rotary, auto hammer, AWJ rods, 2-15/16" tri-cone bit ORIENTATION : Vertical

WATER LEVELS : 5.5 ft bgs on 5/02/07 START : 5/2/2007 END : 5/4/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.8 | 0.0 – 1.5 | 1.1 | SS-1 | 1-1-2 (3) | **Poorly Graded Sand With Silt (SP-SM)** 0.0-1.1' - brownish black, (5YR 2/1), moist, very loose, very fine to fine grained, color grades to light gray (N7) below 0.6', 6% nonplastic fines, organics decreasing with depth, silica sand | | |
| 5 | 5.0 | | | | | | |
| 37.8 | 5.0 – 6.5 | 1.0 | SS-2 | 1-3-4 (7) | **Sandy Fat Clay (CH)** 5.0-6.0' - very light gray, (N8), moist, medium stiff, high plasticity, no dilatancy, with iron oxide staining (5.0-5.3'), 25-30% very fine grained, trace organic particles, silica sand | | |
| 10 | 10.0 | | | | | | |
| 32.8 | 10.0 – 11.5 | 1.5 | SS-3 | 1-2-3 (5) | **Sandy Lean Clay (CL)** 10.0-11.5' - Same as 5.0-6.0' except thin light gray, (N7), medium plasticity, 41% fine sand, sandy seams | | |
| 15 | 15.0 | | | | | | |
| 27.8 | 15.0 – 16.5 | 1.1 | SS-4 | 1-4-7 (11) | **Sandy Fat Clay (CH)** 15.0-15.2' - Same as 5.0-6.0' **Silt (ML)** 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 | | First reaction to HCl |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | E-06 SHEET 2 OF 11 |

# SOIL BORING 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

DRILLING METHOD AND EQUIPMENT : CME 55 S/N 252345, mud rotary, auto hammer, AWJ rods, 2-15/16" tri-cone bit ORIENTATION : Vertical

WATER LEVELS : 5.5 ft bgs on 5/02/07 START : 5/2/2007 END : 5/4/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.8 | 20.0 – 21.5 | 1.3 | SS-5 | 3-4-5 (9) | **Clayey Sand (SC)** 20.0-21.3' - yellowish gray, (5Y 8/1), moist to wet, loose, very fine to fine grained, no HCl reaction, 18% medium to high plastic fines, silica sand | | |
| 25 | 25.0 | | | | | | |
| 17.8 | 26.5 | 1.3 | SS-6 | 8-20-49 (69) | **Clayey Sand (SC)** 25.0-25.2' - Same as 20.0-21.3' except dark yellowish brown, (10YR 4/2), clay lens<br>**Silty Sand With Limestone (SM)** 25.2-26.3' - grayish orange to dark yellowish orange, (10YR 7/4 to 10YR 6/6), moist to wet, very dense, low plasticity, moderate HCl reaction, 15-20% low plastic fines, fine gravel-sized limestone, fine to coarse sand-sized, carbonate materials | | |
| 30 | 30.0 | | | | | | |
| 12.8 | 31.5 | 1.5 | SS-7 | 31-31-55 (86) | **Silty Sand With Limestone (SM)** 30.0-31.1' - Same as 25.2-26.3'<br>**Silt (ML)** 31.1-31.5' - light brown, (5YR 6/4), moist, hard, low plasticity, rapid dilatancy, mild HCl reaction, trace very fine sand-sized, carbonate material | | |
| 35 | 35.0 | | | | | | |
| 7.8 | 36.5 | 1.3 | SS-8 | 39-47-45 (92) | **Silty Sand (SM)** 35.0-36.3' - dark yellowish brown, (10YR 4/2), moist, very dense, fine to coarse grained, mild to moderate HCl reaction, 30% nonplastic fines, trace to 10% fine gravel-sized limestone, carbonate material | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
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# SOIL BORING 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

DRILLING METHOD AND EQUIPMENT : CME 55 S/N 252345, mud rotary, auto hammer, AWJ rods, 2-15/16" tri-cone bit ORIENTATION : Vertical

WATER LEVELS : 5.5 ft bgs on 5/02/07 START : 5/2/2007 END : 5/4/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.8 | 40.0<br>40.6 | 0.6 | SS-9 | 56-50/1<br>(106/7") | **Sandy Silt (ML)**<br>40.0-40.6' - grayish orange to pale yellowish brown, (10YR 7/4 to 10YR 6/2), mottled, moist, hard, fine to coarse grained, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 38% fine to coarse sand-sized, trace fine gravel-sized, carbonate material | | |
| 45<br>-2.2 | 45.0<br>45.8 | 0.3 | SS-10 | 36-50/4<br>(86/10") | **Sandy Silt (ML)**<br>45.0-45.8' - Same as 40.0-40.6' except 1/4" thick vertically extended black organic seam from 45.4-45.8' | | |
| 50<br>-7.2 | 50.0<br>51.5 | 0.2 | SS-11 | 25-43-45<br>(88) | **Sandy Silt (ML)**<br>50.0-51.2' - yellowish gray, (5Y 7/2), moist, hard, fine to coarse grained, nonplastic, rapid dilatancy, mild HCl reaction, 33% fine to coarse sand-sized, trace gravel-sized, carbonate material, trace organics | | |
| 55<br>-12.2 | 55.0<br>55.8 | 0.8 | SS-12 | 43-50/4<br>(93/10") | **Silt With Sand (ML)**<br>55.0-55.8' - Same as 50.0-51.2' except grading to moderate brown, (5YR 4/4), 10-15% sand-sized and thin organic lenses | | |
| 60 | | | | | | | |

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# SOIL BORING 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

DRILLING METHOD AND EQUIPMENT : CME 55 S/N 252345, mud rotary, auto hammer, AWJ rods, 2-15/16" tri-cone bit ORIENTATION : Vertical

WATER LEVELS : 5.5 ft bgs on 5/02/07 START : 5/2/2007 END : 5/4/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -17.2 | 60.0 | 0.1 | SS-13 | 50/1.5 (50/1.5") | **Limestone Fragments** 60.0-60.1' - yellowish gray, (5Y 7/2), fine to coarse grained, mild to moderate HCl reaction, sand-sized fragments | | |
| 65 -22.2 | 65.0 65.2 | 0.2 | SS-14 | 50/2.0 (50/2.0") | **Limestone Fragments** 65.0-65.2' - Same as 60.0-60.1' | | |
| | | | | | Begin Rock Coring at 66.0 ft bgs See the next sheet for the rock core log | | |
| 70 -27.2 | | | | | | | |
| 75 -32.2 | | | | | | | |
| 80 | | | | | | | |

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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

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

WATER LEVELS : 5.5 ft bgs on 5/02/07 START : 5/2/2007 END : 5/4/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 66.0 | | | | | | |
| | R1-NQ 5 ft 78% | 8 | 5 | 66.0' - Fracture, horizontal, rough<br>66.2' - Fracture, horizontal, rough<br>66.4' - Fracture, 45 deg, rough, semi planar | | **Limestone**<br>66.0-69.9' - pale yellowish brown, (10YR 6/2), fine to medium grained, strong HCl reaction, weak (R2), dissolution along bedding plane lamination, spaced (1/16"-1/4"), voids (1/16"-3/16") cover 10% surface | Numerous low angle to vertical healed fractures |
| | | | 1 | 66.6, 66.8, 67.3' - Fracture, 45 deg and 60 deg, non-planar | | | |
| | | | 4 | 68.1-68.2' - sandy interbed<br>68.1, 68.5, 68.8, 68.9' - Fracture (4), rough, undulating, irregular, non-planar | | | |
| | | | >10 | 69.0-69.9' - Fracture zone (>10) | | | |
| 70<br>-27.2 | | | NR | | | **No Recovery 69.9-71.0'** | R1: 5 minutes |
| | 71.0 | | | | | | |
| | R2-NQ 5 ft 72% | 23 | >10 | 71.0-72.0' - Fracture zone, fragments | | **Limestone**<br>71.0-72.3' - Same as 66.0-69.9' except very weak (R1), increasing percent small voids, friable<br>72.3-75.6' - moderate yellowish brown, (10YR 5/4), very fine to fine grained, very weak to weak (R1 to R2), finely laminated, trace voids/cavities, dissolution texture along the bedding plane (1/4" thick) | 0.5" organic seam |
| | | | >10 | 72.0-73.0' - Fracture zone, fragments | | | |
| | | | 1 | 73.1' - Fracture, vertical, rough, undulating | | | |
| | | | 7 | 74.1, 74.2, 74.4, 74.5, 74.6, 74.8, 74.8, 74.9' - Bedding plane or mechanical break (8), <5 deg, rough, planar, open <1/16" | | | |
| 75<br>-32.2 | | | 2 | 75.1-75.2' - Fracture or mechanical break, 80 deg and vertical, rough, planar, tight | | | R2: 8 minutes |
| | 76.0 | | NR | | | **No Recovery 75.6-76.0'** | |
| | R3-NQ 5 ft 46% | 33 | 0 | | | **Limestone**<br>76.0-78.3' - grayish yellow to orangish gray, (5Y 8/4 to 10YR 7/4), strong HCl reaction, weak (R2), voids (up to 1/16") cover 15-20% of the surface, cavities up to 3/4" diameter (10-20 per foot), fossil molds and solution cavities, dark brown /black staining on some larger cavities, light to dark gray fine grained inclusions, rip up clasts between 77.0-77.5', needle-like organic imprints on fracture surface, dark brown layering visible over 3/4" zone | Intact core 19.2" (76.1-77.7') break to reduce size SC-1 collected at 76.1-76.9' |
| | | | >10 | | | | |
| | | | 0 | 77.7-78.1' - Fracture zone, <1/2" fragments | | | |
| 80<br>-37.2 | | | NR | | | | R3: 4 minutes |
| | 81.0 | | | | | | |
| | R4-NQ 5 ft 60% | 37 | 4 | 81.1, 81.2, 81.4, 81.5' - Fracture or mechanical break (4), rough, irregular | | **No Recovery 78.3-81.0'**<br>**Limestone**<br>81.0-84.0' - Same as 76.0-78.3' except strong HCl reaction, voids (1/16") and cavities cover 15-25% of the surface, fossiliferous with molds and casts (lot more than molds) | |
| | | | 2 | 82.1' - Fracture, rough, planar, dark gray/black, possible organic pyrite<br>82.4' - Fracture, rough, undulating | | | |
| | | | >10 | 82.9-83.3' - Fracture zone, percent of large cavities (>1/2") increasing in this zone | | | |
| 85<br>-42.2 | | | NR | | | **No Recovery 84.0-86.0'** | R4: 4 minutes |
| | 86.0 | | | | | | |

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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

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

WATER LEVELS : 5.5 ft bgs on 5/02/07 START : 5/2/2007 END : 5/4/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | | | **No Recovery 86.0-89.7'** | Driller's Remark: 86.0-89.5' very soft; possible void, lost 20 % circulation, no recovery likely in this zone |
| | R5-NQ 5 ft 26% | 7 | NR | | | | |
| 90 -47.2 | | | >10 | 89.9' - Discontinuity (sharp) between moderately dense limestone and limestone with large percent voids, possible missing material | | **Limestone** 89.7-89.9' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl 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 molds) molds and casts, black infilling in some voids, sharp contact with below | R5: 3 minutes |
| | 91.0 | | | | | | |
| | R6-NQ 5 ft 70% | 15 | >10 | 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) | | | Clay interbed 91.7-92.2' |
| | | | 2 | 91.0-91.2' - Fracture zone, 3/4"-1-3/45" size fragments | | 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 | |
| | | | 2 | 91.6' - Fracture or mechanical break, rough, undulating | | | SC-2 collected at 92.6-93.4' |
| | | | 1 | 91.7, 92.2' - Fracture, sharp contact between limestone and gravelly lean clay (CL) interbed | | | |
| 95 -52.2 | | | NR | 92.7' - Fracture, planar and stepped, parting surface on end of core piece, fine laminations | | | R6: 8 minutes Steady drill rate across run |
| | 96.0 | | | 93.5' - silt interbed (nonplastic) | | 91.2-91.7' - Same as 89.9-91.2' except yellowish gray, (5Y 7/2), very fine to fine grained, 1/16"-1/8" voids cover the surface | |
| | | | | 93.9' - sharp contact with limestone | | | Driller's Remark: 100% loss of circulation at 97.0' below ground surface |
| | | | 0 | 94.1' - Fracture or mechanical break, vertical, rough, undulating | | | |
| | R7-NQ 5 ft 14% | 11 | NR | | | **Lean Clay (CL)** 91.7-92.2' - yellowish gray, (5Y 7/2), medium plasticity, strong HCl 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 HCl reaction, medium strong to strong (R3 to R4), fine grained silt | |
| 100 -57.2 | | | | | | **Limestone** 92.2-92.6' - yellowish gray, (5Y 7/2), fine grained, weak (R2), finely laminated (1/10"-1/4") | R7: 3 minutes Driller's Remark: Possible void 100.0-102.0' |
| | 101.0 | | | | | | |
| | | | NR | | | **Silt (ML)** 93.5-93.9' - moderate yellowish brown, (10YR 5/4), nonplastic, few gravel-sized (1/16-3/16") limestone fragments (<10%) | Driller's Remark: Void at 100.0-102.0' based on barrel advancement ("fell"), setting temporary casing at 106.0' |
| | | | 0 | | | | |
| | R8-NQ 5 ft 20% | 0 | NR | | | **Limestone** 93.9-94.5' - moderate yellowish brown, (10YR 5/4), moderate HCl reaction, weak (R2), small voids cover 20-30% of surface **No Recovery 94.5-96.0'** | |
| 105 -62.2 | | | | | | | R8: 4 minutes |
| | 106.0 | | | | | | |

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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

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

WATER LEVELS : 5.5 ft bgs on 5/02/07 START : 5/2/2007 END : 5/4/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R9-NQ 5 ft 84% | 39 | 1 | 106.8-107.7' - Fracture zone, limestone fragments | | **Limestone** 96.0-96.7' - pale yellowish brown, (10YR 6/2), strong HCl reaction, very weak (R1), fossiliferous, up to 1/16" voids cover 20-25% of surface, cavities/molds up to 1/2" cover 5-7%, easily broken by hand, punky texture | |
| | | | >10 | 107.7-108.5' - Bedding plane, horizontal, smooth to slightly rough, planar, 1/2"-1" spacing | | **No Recovery 96.7-102.0'** | |
| | | | >10 | | | **Limestone Fragments** 102.0-103.0' - Same as 96.0-96.7' except yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, weak (R2), 1"-2" fragments, medium strong to strong, almost conchoidal fracture | |
| | | | 1 | 109.4, 110.0' - Fracture (2), horizontal, rough, undulating | | | |
| 110 -67.2 | | | 1 | | | | R9: 5 minutes |
| | | | NR | | | **No Recovery 103.0-106.0'** | |
| 111.0 | | | | | | | |
| | R10-NQ 5 ft 42% | 0 | >10 | 111.0-112.0' - Bedding plane, <5 deg, rough, planar, 1/2"-2" spacing, open to 1/8" | | **Limestone** 106.0-110.2' - grayish orange, (10YR 7/4), strong HCl reaction, very weak (R1), voids (1/16"-1/8") cover 10-15% of the surface, larger cavities/fossil molds (up to 1/2") 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) from 107.7-108.5' | Driller's Remark: 112.5-114.0' possible void |
| | | | 0 | | | | |
| | | | NR | | | | |
| 115 -72.2 | | | | | | | R10: 2 minutes |
| 116.0 | | | | | | **No Recovery 110.2-111.0'** | |
| | R11-NQ 5 ft 98% | 70 | 2 | 116.0-116.2' - Fracture zone, limestone fragments | | **Limestone** 111.0-112.0' - Same as 106.0-110.2' except 1/2"-2" horizontal partings | Easily broken by hand "rotten rock" |
| | | | 3 | 116.2, 116.7, 117.1, 117.2, 117.6, 118.0, 118.5, 118.8, 119.2, 119.3' - Bedding plane (10), horizontal, rough, undulating | | **Silt (ML)** 112.0-112.6' - grayish orange, (6YR 7/4), nonplastic, strong HCl reaction | |
| | | | 3 | | | **Limestone** 112.6-113.1' - Same as 111.0-112.0' | |
| | | | | | | **No Recovery 113.1-116.0'** | |
| | | | 2 | | | **Limestone** 116.0-120.9' - very pale orange, (10YR 8/2), medium to coarse grained, strong HCl reaction, very weak to weak (R1 to R2), up to 1/16" size voids cover 25% of the surface, 1/4" cavities and fossil molds cover up to 5% surface | |
| 120 -77.2 | | | | 119.7-119.9' - Fracture zone, limestone fragments | | | R11: 4 minutes |
| | | | 2 | 120.2' - Fracture (60), rough, semi planar | | | |
| 121.0 | | | NR | 120.9' - Bedding plane, horizontal, slightly rough, planar | | **No Recovery 120.9-121.0'** | |
| | R12-NQ 5 ft 100% | 60 | 4 | 121.3, 121.7, 121.8' - Fracture (3), horizontal, rough, undulating | | **Limestone** 121.0-126.0' - Same as 116.0-120.9' except slightly more competent, 123.5-126.0' zone of weak rock (R2) | |
| | | | 2 | 121.9' - Fracture, 30 deg, rough, undulating 122.2' - Fracture, 45 deg, rough, semi planar 122.6' - Fracture, 45 deg, rough, semi planar | | | |
| | | | 0 | | | | |
| | | | 2 | 124.4, 124.7, 125.3' - Fracture or bedding plane (3), horizontal, slightly rough, undulating, open to <1/8" | | | |
| 125 -82.2 | | | 1 | | | | R12: 4 minutes |
| 126.0 | | | | | | | |

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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

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

WATER LEVELS : 5.5 ft bgs on 5/02/07 START : 5/2/2007 END : 5/4/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R13-NQ 5 ft 88% | 45 | 1 | 126.5' - Fracture, 45 deg, rough, undulating, non planar, irregular | | **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) | SC-3 collected at 126.6-127.6' |
| | | | 3 | 127.6, 127.8' - Fracture (2), horizontal, rough, irregular | | | |
| | | | 3 | 127.9' - Fracture, 60 deg, rough, semi planar, dark gray thin coating on surface (possible pyrite) | | | |
| | | | 3 | 128.1, 128.3, 128.4' - Fracture (3), rough, undulating, semi planar parting | | | |
| 130 -87.2 | | | 3 | 129.0-130.0' - Fractures, vertical, undulating, dark gray coating, 1.3' length | | | R13: 5 minutes |
| | 131.0 | | NR | | | **No Recovery 130.4-131.0'** | |
| | R14-NQ 5 ft 66% | 33 | >10 | 131.0-131.3' - Fracture, limestone fragments | | **Limestone** 131.0-133.3' - Same as 126.0-130.4' | |
| | | | 1 | 132.9' - Fracture, horizontal, smooth | | | |
| | | | >10 | 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, weak to medium strong (R2 to R3), trace fine lamination (<1/16") | |
| | | | 0 | | | | |
| 135 -92.2 | | | NR | | | **No Recovery 134.3-136.0'** | R14: 6 minutes |
| | 136.0 | | | | | | |
| | R15-NQ 5 ft 40% | 0 | >10 | 136.0' - Dark gray/black fine grained particulate staining/coating on some fracture faces (possible pyrite) | | **Limestone** 136.0-138.0' - very light gray, (N8), strong HCl reaction, weak to medium strong (R2 to R3), cavities lenticular in shape up to 3/4", fossil casts and molds up to 1/2" (gastropod) | Driller's Remark: Void 135.0-138.0' |
| | | | >10 | 136.4' - Fracture, <10 deg, rough, undulating, open | | | |
| | | | NR | 136.55' - Fracture or mechanical break, 60 deg and 70 deg, rough, undulating, tight<br>136.7' - Mechanical break, 10 deg and 20 deg, rough, undulating, tight<br>137.2-137.4' - Fracture zone, no visible orientation, 1/2" width total core diameter fragments | | **No Recovery 138.0-141.0'** | |
| 140 -97.2 | | | | | | | R15: 5 minutes |
| | 141.0 | | | | | | |
| | R16-NQ 5 ft 60% | 15 | >10 | 141.35-141.7' - Fracture zone, fragments to 2" angular to sub angular, fine black particles on fracture faces (possibly pyrite or organics) | | **Limestone** 141.0-143.6' - yellowish gray to olive gray, (5Y 7/2 to 5Y 5/2), strong HCl reaction, medium strong (R3), variable zones of voids/cavities (up to 1/2") | |
| | | | >10 | 141.7-142.3' - Fracture (3), 45 deg and 60 deg, rough, planar, healed | | | |
| | | | >10 | 141.8, 142.3' - Fracture (2), 50 deg, rough, planar, open 1/8" | | | |
| | | | NR | 142.4, 142.55' - Mechanical break (2), <5 deg, rough, planar, open<br>142.55-143.8' - Fracture zone, 40 deg and 60 deg, fragments to 3" angular<br>143.9' - Mechanical break, <5 deg, rough, planar, open (1/4") | | 143.6-144.0' - moderate olive brown, (5Y 4/4), strong HCl reaction, weak (R2), porous limestone, numerous voids (1/16"-1/8") and cavities (1/4"-3/4"), weak slightly friable medium coarse sand-sized particles<br>**No Recovery 144.0-146.0'** | |
| 145 -102.2 | | | | | | | R16: 12 minutes |
| | 146.0 | | | | | | |

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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

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

WATER LEVELS : 5.5 ft bgs on 5/02/07 START : 5/2/2007 END : 5/4/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R17-NQ 5 ft 74% | 29 | >10 | 146.0-147.0' - Bedding plane, horizontal, planar, numerous partings spaced at 1/2"-1-1/2" apart | | **Limestone** 146.0-147.0' - dark yellowish orange, (10YR 8/6), coarse grained, strong HCl reaction, weak (R2), friable disaggregates into medium sand-sized particles, numerous small voids over 30% of surface | |
| | | | 2 | 147.3' - Fracture, 60 deg, rough, undulating, semi planar fracture | | | |
| | | | 2 | 147.6' - Fracture, 30 deg, rough, semi planar<br>148.2' - Fracture, 10 deg, rough, planar<br>148.3' - Fracture, 50 deg, slightly rough, semi planar | | 147.0-149.4' - medium gray to yellowish gray, (N5 to 5Y 7/2), very fine to fine grained, mild HCl reaction, medium strong (R3), 1/16"-3/16" size voids concentrated in thin (<1/10") horizontal zones spaced at 6"-1.2' apart | SC-4 collected at 148.3-149.4' |
| | | | 3 | 149.4-149.7' - Bedding plane, horizontal, planar | | | |
| 150 -107.2 | | | NR | | | | R17: 7 minutes |
| | 151.0 | | | | | 149.4-149.7' - moderate yellow brown and yellowish gray, (10YR 5/4), laminated, contorted wavy bedding planes<br>**No Recovery 149.7-151.0'** | |
| | R18-NQ 5 ft 90% | 33 | 2 | 151.1' - Fracture, horizontal, rough, undulating | | **Limestone** 151.0-155.5' - light olive gray to yellow gray, (5Y 5/2 to 5Y 7/2), moderate HCl reaction, very weak to weak (R1 to R2), sparse voids (1/16"-1/8"), and cavities (up to 1/2") above 152.5', percent of voids increase beyond 152.5', 25-30% porous by volume, somewhat friable disaggregates into medium sand-sized particles, voids/cavities oriented horizontally, cavities increase in size (up to 1-1/4") with depth | |
| | | | 3 | 151.3' - Fracture, vertical, rough, undulating to non planar, 3" long<br>152.1' - Fracture or mechanical break, 60 deg, rough, undulating | | | |
| | | | 9 | 152.1, 152.5' - Fracture, horizontal, rough<br>153.0, 155.5' - Fractures (2), horizontal, rough, planar to undulating | | | |
| | | | 4 | | | | |
| 155 -112.2 | | | 3 | | | | R18: 5 minutes |
| | 156.0 | | NR | | | **No Recovery 155.5-156.0'** | |
| | R19-NQ 5 ft 60% | 35 | 2 | 156.0-156.4' - Fracture zone, limestone fragments<br>156.4, 156.7' - Bedding plane, horizontal, smooth, planar | | **Limestone Fragments** 156.0-156.4' - Same as 151.0-155.0' except slough | |
| | | | 1 | 157.5' - Fracture or mechanical break, 15 deg, rough, undulating | | | Redox changes possibly |
| | | | 1 | 157.7' - Fracture, sharp contact with grayish yellow limestone (surfaces do not match) | | **Limestone** 156.4-157.7' - very pale orange, (10YR 8/2), fine to medium grained, strong HCl reaction, weak (R2), very small voids (1/16"), fossiliferous (1/16"-1/8") | |
| | | | | 158.9' - Fracture, horizontal, smooth, planar | | | |
| 160 -117.2 | | | NR | | | 157.7-159.0' - yellowish gray to grayish yellow, mottled with light gray, (5Y 7/2 to 5Y 8/2 mottled with N7), very fine to medium grained, strong HCl reaction, medium strong (R3), sharp contact | R19: 7 minutes |
| | 161.0 | | | | | **No Recovery 159.0-161.0'** | |
| | R20-NQ 5 ft 88% | 0 | 4 | 161.3, 161.4, 161.5' - Bedding plane (3), horizontal, smooth, planar | | **Limestone** 161.0-162.4' - medium gray, (N 5), moderate HCl reaction, medium strong (R3), with thin yellowish gray lamination zones of small cavities (<3/4"), 6"-8" spacing otherwise tight and dense, sharp contact | |
| | | | 3 | 161.9' - Fracture, horizontal, rough, planar | | | |
| | | | | 162.5-162.6' - Fracture zone, contact with olive brown limestone, limestone fragments | | | Change in redox conditions |
| | | | >10 | 162.7' - Fracture or mechanical break, vertical<br>162.9' - Fracture, horizontal, rough, non planar | | | |
| | | | >10 | 163.3, 163.4, 163.5, 163.6' - Fracture (4), horizontal, smooth, planar | | | |
| 165 -122.2 | | | | 163.5-163.8' - Fracture zone, limestone fragments | | | R20: 9 minutes |
| | 166.0 | | NR | | | | |

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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

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

WATER LEVELS : 5.5 ft bgs on 5/02/07 START : 5/2/2007 END : 5/4/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R21-NQ 5 ft 88% | 40 | >10 | 164.2-165.4' - Fracture, <25 deg and >70 deg, non planar | | **Limestone** | |
| | | | >10 | 166.0-166.5' - Fracture zone, limestone fragments | | 162.4-163.4' - moderate olive brown, (5Y 4/4), medium strong to strong (R3 to R4), voids (1/16-1/8") cover 20-30% of surface, horizontally oriented cavities (up to 1") in zones, thin medium gray limestone fragments | |
| | | | 4 | 166.5' - Fracture or mechanical break, horizontal, rough, undulating | | 163.4-163.6' - medium strong to strong (R3 to R4) | |
| | | | >10 | 167.1-167.4' - Bedding plane, horizontal, smooth, 3/4" thick limestone fragments | | 163.6-165.4' - moderate olive brown, (5Y 4/4), coarse grained, moderate HCl reaction, medium strong (R3), fossiliferous, voids (1/16-1/4") cover 5-25% of surface | |
| 170 -127.2 | | | 2 | 167.7' - Bedding plane, horizontal | | **No Recovery 165.4-166.0'** | R21: 10 minutes |
| | 171.0 | | NR | 168.4, 168.5' - Fracture (2), horizontal, rough | | **Limestone** | |
| | R22-NQ 5 ft 68% | 0 | >10 | 168.5' - Fracture or mechanical break, 45 deg, smooth | | 166.0-170.4' - grayish yellow, (5Y 8/4), fine grained, weak (R2), poorly fossiliferous, 1/16"-1/8" voids over less than 10% of surface in thin zones (1/2"-1-1/2" thick) on 1.0-1.5' spacing, cavities (up to 1/2") sparse and occur in zones with higher void content, thinly bedded zones 4"-6" thick on 2.0-3.0' intervals, with fine grained zones rock is weak (R2) to medium strong (R3) | |
| | | | >10 | 168.9' - Fracture, horizontal, rough, undulating | | | |
| | | | >10 | 169.1' - Bedding plane, horizontal, smooth | | | |
| | | | >10 | 169.4' - Fracture, horizontal, fine grained limestone | | | |
| | | | >10 | 169.4-169.7' - Bedding plane, horizontal, smooth, planar, limestone fragments (1/4"-1/2" thick) | | | |
| | | | >10 | 170.1-170.4' - Fracture, horizontal, slightly rough, fracture faces indicate partial recrystallization | | | |
| 175 -132.2 | | | NR | 171.0-171.2' - Fracture zone, angular limestone fragments | | **No Recovery 170.4-171.0'** | R22: 10 minutes Start of shift 5/4/07 |
| | 176.0 | | | 171.2, 171.4' - Fracture or mechanical break, horizontal, smooth, 45 deg fracture on 3" core piece | | **Limestone** | |
| | R23-NQ 5 ft 88% | 42 | 1 | 171.4-171.8' - Mechanical break, 80 deg, rough, undulating, fracture is on a 5" core piece | | 171.0-174.4' - grayish yellow grading to yellowish gray, (5Y 8/4 to 5Y 7/2), fine grained, moderate to strong HCl reaction, weak (R2), finer grained than above, voids (1/16"-1/8") concentrated in thin horizontal zones along bedding plane/lamination (1/16"-1/4") and very thin beds (1/2"-1-1/2") void rich zones, fine grained laminated zones, high void zones spaced at 1.0' | |
| | | | 3 | 171.8' - Fracture, horizontal, rough | | | |
| | | | 5 | 171.9' - Mechanical break, 45 deg, rough | | | |
| | | | 4 | 172.1-172.2' - Fracture zone, limestone fragments | | | |
| 180 -137.2 | | | 2 | 172.2-172.4' - Bedding plane, horizontal, smooth, planar, numerous partings across the zone, parting interval range from 1/4"-4" with most between 1/2"-2", laminated to very thinly bedded limestone | | **No Recovery 174.4-176.0'** | |
| | 181.0 | | NR | 176.3' - Fracture, horizontal, rough, undulating | | **Limestone** | R23: 12 minutes |
| | R24-NQ 5 ft 100% | 30 | 1 | 177.6, 177.7, 177.8' - Bedding plane (3), horizontal, smooth | | 176.0-178.3' - moderate olive brown, (5Y 4/4), weak (R2), cavities ranging in size from 1/4"-1" cover 5-8% of surface, cavities elongated in horizontal direction, horizontal partings 1"-2" spacing in 177.3-178.3' | |
| | | | 2 | 178.0, 178.1, 178.15' - Bedding plane (3), horizontal, smooth | | | |
| | | | 9 | 178.3' - Fracture, horizontal, smooth, planar, contact with fine grained limestone | | 178.3-178.6' - moderate yellowish gray, (5Y 7/2), very fine to fine grained, mild HCl reaction, medium strong to strong (R3 to R4), sharp contact with the above, interbed | |
| | | | 2 | 178.8' - Fracture, horizontal, smooth, planar, contact with void rich limestone below | | 178.6-180.4' - Same as 178.3-178.6' except olive brown, (5Y 4/4), strong HCl reaction, weak (R2), 1/16"-1/8" size voids cover 20-30% of surface, porous, laminated | |
| 185 -142.2 | | | 3 | 178.8-179.0' - Fracture zone, limestone fragments | | **No Recovery 180.4-181.0'** | |
| | 186.0 | | | 179.1' - Fracture or mechanical break, 75 deg, rough | | | |
| | | | | 179.6, 179.7' - Fracture, rough, non planar and undulating | | | |
| | | | | 179.95' - Bedding plane, horizontal, smooth | | | |
| | | | | 180.15' - Bedding plane, horizontal, smooth, planar | | | |
| | | | | 180.4' - Bedding plane, horizontal, smooth, planar | | | |

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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

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

WATER LEVELS : 5.5 ft bgs on 5/02/07 START : 5/2/2007 END : 5/4/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES | | | SYMBOLIC LOG | LITHOLOGY | COMMENTS |
|---|---|---|---|---|---|---|---|
| | | R Q D (%) | FRACTURES PER FOOT | DESCRIPTION<br>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. |
| | | | | 181.5' - Fracture or mechanical break, high angle deg, rough, undulating, 8" long<br>182.6, 182.8' - Fracture, horizontal, smooth, planar, partings at zones of increased small voids<br>183.0-184.0' - Bedding plane, horizontal, slightly to moderately rough, planar, Variable spacing from 1/2"-2-3/4"<br>184.25' - Fracture, horizontal, rough, non planar, inclined lamination<br>184.7' - Fracture, horizontal, smooth, planar<br>185.6, 185.7' - Fracture (2), horizontal, rough, undulating, contacts of thin fine grained interbed<br>185.9' - Fracture, horizontal, slightly rough, planar | | **Limestone**<br>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"), 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<br>Bottom of Boring at 186.0 ft bgs on 5/4/2007 | R24: 12 minutes<br>Inclined laminations in sections, cross bedding possible<br>Complete coring at 08:50 AM |

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|---|---|
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# SOIL BORING LOG

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 bgs on 6/06/07 START : 6/5/2007 END : 6/7/2007 LOGGER : J. Burkard, C. Dellaria, B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 41.7 | 0.0 – 1.5 | 1.1 | SS-1 | 1-2-2 (4) | **Organic Material (OL)** 0.0-0.1' - plant roots<br>**Poorly Graded Sand (SP)** 0.1-1.1' - olive gray to light olive gray, (5Y 3/2 to 5Y 5/2), moist, loose, no HCl reaction, silica present | | |
| 5 | 5.0 – 6.5 | 1.0 | SS-2 | 8-8-6 (14) | **Poorly Graded Sand With Silt (SP-SM)** 5.0-6.0' - dusky yellow to yellowish gray, (5Y 6/4 to 5Y 7/2), wet, loose, no HCl reaction, mottling at 5.6-5.7' | | |
| 36.7 | | | | | | | |
| 10 | 10.0 – 10.9 | 0.9 | SS-3 | 25-50/5 (75/11") | **Lean Clay (CL)** 10.0-10.1' - pale blue, (5BP 6/2), low plasticity<br>**Organic Material (OL)** 10.1-10.3' - brownish black, (5YR 2/1), contains roots<br>**Silt (ML)** 10.3-10.9' - grayish yellow, (5Y 8/4), wet, soft, moderate to strong HCl reaction | | |
| 31.7 | | | | | | | |
| 15 | 15.0 – 15.4 | 0.4 | SS-4 | 50/4.5 (50/4.5") | **Silt (ML)** 15.0-15.4' - grayish yellow, (5Y 8/4), wet, soft to medium stiff, moderate to strong HCl reaction | | |
| 26.7 | | | | | | | |
| 20 | | | | | | | |

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|---|---|---|

# SOIL BORING LOG

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 bgs on 6/06/07 START : 6/5/2007 END : 6/7/2007 LOGGER : J. Burkard, C. Dellaria, B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 21.7 | 20.0 | 0.0 | SS-5 | 50/3 (50/3") | **Limestone Fragments** 20.0' - grayish yellow, (5Y 8/4), mild HCl reaction, trace voids on fragment surfaces, trace fossil casts and molds, very little recovery | | |
| 25 | 25.0 | | | | | | |
| 16.7 | 26.5 | 1.0 | SS-6 | 18-25-35 (60) | **Silt With Sand (ML)** 25.0-26.0' - grayish orange, (10YR 7/4), wet to moist, soft to medium stiff, delayed moderate HCl reaction | | |
| 30 | 30.0 | | | | | | |
| 11.7 | 31.5 | 0.9 | SS-7 | 4-13-6 (19) | **Silty Sand (SM)** 30.0-30.9' - dark yellowish orange, (10YR 6/6), wet, soft, delayed moderate HCl reaction | | |
| 35 | 35.0 | | | | | | |
| 6.7 | 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 | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | E-07 SHEET 3 OF 10 |

# SOIL BORING LOG

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 bgs on 6/06/07 START : 6/5/2007 END : 6/7/2007 LOGGER : J. Burkard, C. Dellaria, B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 1.7 | 40.0 – 41.5 | 1.3 | SS-9 | 5-11-13 (24) | **Silt With Limestone Fragments (ML)** 40.0-41.25' - moderate yellowish brown, (10YR 5/4), wet, medium stiff, moderate to strong HCl reaction, gravel size particles up to 1" | | |
| 45 -3.3 | 45.0 – 45.3 | 0.3 | SS-10 | 50/3 (50/3") | **Silt With Limestone Fragments (ML)** 45.0-45.25' - Same as 40.0-41.25' | | Driller's Remark: Lost 100% circulation from 47.5-48.0' 11:36 Pump chain broken, repair took 40 minutes 13:20 Drill crew begins to insert HW casing |
| 50 -8.3 | 50.0 – 51.5 | 0.7 | SS-11 | 8-2-1 (3) | **Poorly Graded Sand With Silt (SP)** 50.0-50.7' - grayish yellow, (5Y 8/4), wet, loose, delayed mild HCl reaction | | |
| 55 -13.3 | 55.0 – 56.5 | 1.0 | SS-12 | 4-10-2 (12) | **Silt With Limestone Fragments (ML)** 55.0-56.0' - pale yellowish brown, (10YR 6/2), wet, soft, moderate to strong HCl reaction | | |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | E-07 SHEET 4 OF 10 |

# SOIL BORING LOG

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 bgs on 6/06/07 START : 6/5/2007 END : 6/7/2007 LOGGER : J. Burkard, C. Dellaria, B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -18.3 | 60.0 – 61.5 | 1.1 | SS-13 | 9-5-5 (10) | **Silt With Limestone Fragments (ML)** 60.0-61.1' - moderate yellowish brown, (10YR 5/4), wet, soft, delayed strong HCl reaction, organic black (N1) limestone fragments up to 3/4" | | Driller's Remark: Keep losing circulation, now advancing casing to 60' |
| 65 -23.3 | 65.0 – 66.5 | 0.9 | SS-14 | 3-10-11 (21) | **Silty Limestone Fragments (GM)** 65.0-65.9' - yellowish brown, (10YR 5/4), wet, medium dense, strong HCl reaction, limestone fragments up to 1" | | |
| 70 -28.3 | 70.0 – 70.1 | 0.0 | SS-15 | 50/0.75 (50/0.75") | **Limestone Fragments** 70.0' - yellowish gray, (5Y 7/2), delayed mild to moderate HCl reaction, trace fossil casts/molds, few thin fragments 3/4"-1" Begin Rock Coring at 70.0 ft bgs See the next sheet for the rock core log | | Driller's Remark: Casing set to 70.0', will begin rock coring on 6/6/07 |
| 75 -33.3 | | | | | | | |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | E-07 SHEET 5 OF 10 |

# ROCK CORE LOG

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 ORIENTATION : Vertical

WATER LEVELS : 3.0 ft bgs on 6/06/07 START : 6/5/2007 END : 6/7/2007 LOGGER : J. Burkard, C. Dellaria, B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | RQD (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -28.3 | 70.0 | | | | | | |
| | R1-NQ 1.5 ft 60% | 33 | 0 | 70.5, 70.8' - Mechanical break (2), <5 deg and 10-20 deg, rough, undulating, open 1/16" and tight, respectively | | **Limestone** 70.0-70.9' - pale yellowish brown to grayish orange, (10YR 6/2 to 10YR 7/4), fine grained, strong HCl reaction, medium strong (R3), voids (<1/16") over 5-10% of surface | Start coring at 08:00 on 6/6/07 Water level at 3.0' below ground surface R1: 1 minute |
| | | | NR | | | **No Recovery 70.9-71.5'** | |
| | 71.5 | | | | | | |
| | R2-NQ 5 ft 60% | 28 | 0 | 71.7, 72.0, 72.4-72.8' - Mechanical break (3) | | **Limestone** 71.5-74.5' - pale yellowish brown to grayish orange, (10YR 6/2 to 10YR 7/4), medium to fine grained, strong HCl reaction, medium strong (R3), voids (<1/16") over 5-10% of surface, 10% cavities up to 5/8", black organic infill | Driller's Remark: Possible sand at bottom of run, could have resulted in loss of recovery SC-1 collected at 72.9-74.0' |
| | | | 1 | 73.0' - Fracture, 5 deg, smooth, undulating | | | |
| | | | 0 | 74.0, 74.2' - Mechanical break (2), <10 deg, rough, undulating, open 1/8" | | | |
| 75 -33.3 | | | NR | | | **No Recovery 74.5-76.5'** | R2: 4 minutes |
| | 76.5 | | | | | | |
| | R3-NQ 5 ft 96% | 87 | >10 | 76.5-76.7' - Fracture zone, rough, undulating, no visible orientation | | **Limestone** 76.5-79.5' - dusky yellow, (5Y 6/4), medium grained, mild to moderate HCl reaction, medium strong (R3), fossil casts and molds, voids (<1/16") over 25-50% of surface, cavities up to 3/8" | |
| | | | 0 | 78.1' - Mechanical break | | | |
| | | | 0 | | | | |
| 80 -38.3 | | | 1 | 79.4, 79.6' - Mechanical break (2), <5 deg deg, rough, undulating, open 80.1' - Fracture, 5 deg, smooth, undulating | | 79.5-81.3' - Same as 76.5-79.5' except voids (<1/16") over 10-30% of surface | |
| | | | 0 | | | | R3: 5 minutes |
| | 81.5 | | NR | | | **No Recovery 81.3-81.5'** | |
| | R4-NQ 5 ft 40% | 8 | 4 | 81.6, 81.8, 82.0, 82.3' - Bedding plane or mechanical break (4), <10 deg, rough, undulating, tight to <1/16" open | | **Limestone** 81.5-82.6' - dusky yellow, (5Y 6/4), medium grained, mild HCl reaction, weak to medium strong (R2 to R3), surface cavities up to 1/2", fossil casts and molds | |
| | | | >10 | 82.5-83.0' - Fracture zone, rough, undulating, angles undeterminable | | | |
| | | | | 83.4' - Mechanical break or bedding plane, <5 deg, rough, undulating, tight | | 82.6-83.5' - yellowish gray, (5Y 7/2), fine to medium grained, strong HCl reaction, very strong (R5), trace surface voids | Core barrel got rock sample jammed in the barrel causing the lost recovery |
| 85 -43.3 | | | NR | | | **No Recovery 83.5-86.5'** | R4: 3 minutes |
| | 86.5 | | | | | | |
| | R5-NQ 5 ft 82% | 48 | >10 | 86.7' - Mechanical break, 5-10 deg, rough, undulating, tight | | **Limestone** 86.5-90.6' - dusky yellow, (5Y 6/4), medium grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), voids (<1/16") over 80-75% of surface, surface cavities up to 1", trace amount of fossil casts and molds | |
| | | | >10 | 87.2-88.1' - Fracture zone, rough, undulating, angles between 70-90 degrees | | | |
| | | | 0 | 88.4' - Mechanical break, <5 deg, rough, stepped, open 1/8" | | | |
| 90 | | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: E-07 | SHEET 6 OF 10 |
|---|---|---|

# ROCK CORE LOG

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 ORIENTATION : Vertical

WATER LEVELS : 3.0 ft bgs on 6/06/07 START : 6/5/2007 END : 6/7/2007 LOGGER : J. Burkard, C. Dellaria, B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -48.3 | | | 0 | 90.4' - Fracture or mechanical break, <5 deg, rough, undulating, open | | **No Recovery 90.6-91.5'** | R5: 5 minutes |
| | | | NR | | | | |
| | 91.5 | | | | | **Limestone** 91.5-94.8' - Same as 86.5-90.6' | |
| | R6-NQ 5 ft 82% | 68 | 0 | | | | |
| | | | 0 | 92.7' - Fracture or mechanical break, 5-10 deg, rough, planar, open | | | |
| | | | 0 | 93.3' - Fracture or mechanical break, 10 deg, rough, undulating, tight | | | |
| 95 -53.3 | | | 1 | 94.5' - Fracture or bedding plane, 5 deg, rough, undulating, open; 95.2' - Fracture, 10 deg, smooth, undulating, trace clay infilling | | 94.8-95.6' - dusky yellow, (5Y 6/4), medium to fine grained, strong HCl reaction, weak to medium strong (R2 to R3), trace surface voids, organic staining | R6: 6 minutes |
| | | | NR | 95.4' - Mechanical break or fracture | | **No Recovery 95.6-96.5'** | |
| | 96.5 | | | 96.5-96.7' - Fracture zone | | **Limestone** 96.5-98.4' - pale yellowish brown to grayish orange, (10YR 6/2 to 10YR 7/4), fine grained, moderate HCl reaction, medium strong (R3), 15% surface voids | |
| | R7-NQ 5 ft 62% | 48 | 4 | 97.0' - Fracture or mechanical break | | | SC-2 collected at 97.0-98.0' |
| | | | 0 | | | | |
| | | | 0 | 98.4' - Bedding plane, <5 deg, rough, undulating, tight | | 98.4-99.6' - pale yellowish brown to very pale orange, (10YR 6/2 to 10YR 8/2), medium grained, strong HCl reaction, medium strong to strong (R3 to R4), voids (<1/16") over 20-40% of surface, cavities up to 1/2", fossil casts and molds | |
| 100 -58.3 | | | NR | | | **No Recovery 99.6-101.5'** | R7: 5 minutes |
| | 101.5 | | | | | **Limestone** 101.5-102.7' - Same as 98.4-99.6' except increase in the number of surface cavities | |
| | R8-NQ 5 ft 24% | 15 | 0 | 102.3-102.4' - Fracture, <5 deg, rough, undulating, open 1" with 1" fragment | | **No Recovery 102.7-106.5'** | |
| 105 -63.3 | | | NR | | | | R8: 3 minutes |
| | 106.5 | | | | | **Limestone** 106.5-108.5' - grayish orange, (10YR 7/4), medium grained, strong HCl reaction, weak (R2), 15-20% surface voids | |
| | R9-NQ 5 ft 56% | 40 | 0 | 106.9' - Mechanical break, 10-20 deg, rough, undulating, tight | | | SC-3 collected at 106.9-107.9' |
| | | | 0 | 107.9' - Mechanical break, <5 deg, rough, planar, tight | | | |
| | | | 1 | 108.5' - Fracture, 5-10 deg, rough to smooth, undulating | | | |
| 110 | | | | | | | |

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|---|---|
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# ROCK CORE LOG

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 ORIENTATION : Vertical

WATER LEVELS : 3.0 ft bgs on 6/06/07 START : 6/5/2007 END : 6/7/2007 LOGGER : J. Burkard, C. Dellaria, B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -68.3 | | | NR | | | **Limestone**<br>108.5-109.3' - pale yellowish brown, (10YR 6/2), medium grained, mild HCl reaction, weak to medium strong (R2 to R3), voids (<1/16") over 20-40% of surface, no surface cavities<br>**No Recovery 109.3-111.5'**<br>**Limestone**<br>111.5-115.0' - Same as 108.5-109.3' | R9: 2 minutes |
| 111.5 | R10-NQ<br>5 ft<br>70% | 43 | >10 | 111.6' - Bedding plane or mechanical break, <5 deg, rough, undulating, open<br>111.9-112.2' - Fracture zone, rough, undulating, angle undeterminable | | | |
| | | | 0 | 113.3' - Mechanical break, <5 deg, rough, undulating, open <1/16"<br>113.4-113.8' - Fracture zone, rough, undulating, angle undeterminable | | | |
| | | | >10 | 114.2, 114.6' - Bedding plane or mechanical break (2), <5 deg, rough, undulating, open to 1/8" | | | |
| 115<br>-73.3 | | | 2 | | | **No Recovery 115.0-116.5'** | |
| | | | NR | | | | R10: 3 minutes |
| 116.5 | R11-NQ<br>5 ft<br>20% | 13 | 1 | 117.2' - Bedding plane or mechanical break, <5 deg, rough, planar, open to 1/8" | | **Limestone**<br>116.5-117.5' - Same as 108.5-109.3'<br>**No Recovery 117.5-121.5'** | |
| 120<br>-78.3 | | | NR | | | | R11: 3 minutes |
| 121.5 | R12-NQ<br>5 ft<br>70% | 48 | 0 | 121.6, 121.8-122.0' - Mechanical break (2), vertical, rough, undulating, tight | | **Limestone**<br>121.5-123.4' - grayish orange, (10YR 7/4), medium grained, mild HCl reaction, weak to medium strong (R2 to R3), trace fossil casts and molds, voids (<1/16") over 15-20% of surface, cavities up to 1/4"<br>123.4-123.7' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, strong (R4), fragmented<br>123.7-125.0' - Same as 121.5-123.4'<br>**No Recovery 125.0-126.5'** | |
| | | | 2 | 122.8, 123.0' - Mechanical break or fracture (2), <5 deg, rough, undulating, tight | | | |
| | | | 2 | 123.4-123.7' - Fracture, 5 deg, smooth, planar | | | |
| 125<br>-83.3 | | | 1 | 124.4' - Bedding plane or mechanical break, <10 deg, rough, undulating, open 1" with 1" fragment | | | |
| | | | NR | | | | R12: 3 minutes |
| 126.5 | R13-NQ<br>5 ft<br>28% | 13 | 0 | 126.7, 126.8, 126.9' - Mechanical break (3), 10-20 deg, rough, undulating, open <1/16" | | **Limestone**<br>126.5-127.9' - yellowish gray, (5Y 7/2), medium grained, mild HCl reaction, medium strong (R3), fossil casts and molds, voids (<1/16") over 20-30% of surface<br>**No Recovery 127.9-131.5'** | |
| | | | 0 | 127.6, 127.8' - Mechanical break (2), <5 deg, rough, undulating, tight to open 1/16" | | | |
| 130 | | | NR | | | | |

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

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 ORIENTATION : Vertical

WATER LEVELS : 3.0 ft bgs on 6/06/07 START : 6/5/2007 END : 6/7/2007 LOGGER : J. Burkard, C. Dellaria, B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (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 | 131.5' - Fracture, 5 deg, rough, planar<br>131.6' - Fracture, 5 deg, smooth, planar<br>132.1' - Bedding plane or mechanical break, <5 deg, rough, planar, tight | | **Limestone**<br>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 | |
| | | | 0 | 132.5-133.1' - Bedding plane (multiple), <5 deg, rough, planar, open <1/16" | | | |
| | | | >10 | 133.8' - Mechanical break or fracture<br>134.0-134.7' - Fracture zone | | | |
| 135<br>-93.3 | | | 3 | 134.7-135.3' - Fracture, 80 deg, tight<br>135.1' - Mechanical break, <5 deg, rough, planar, tight | | | |
| | | | NR | | | **No Recovery 135.5-136.5'** | R14: 5 minutes |
| | 136.5 | | | | | | |
| | R15-NQ 5 ft 84% | 22 | >10 | 136.5-137.3' - Fracture zone, rough, undulating, no visible orientation, organic staining | | **Limestone**<br>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<br>137.1-140.7' - yellowish gray, (5Y 7/2), fine grained, mild to moderate HCl reaction, voids (<1/16") over 10-15% of surface, organic staining, surface cavities up to 1" | |
| | | | 6 | 137.7-138.3' - Fracture zone, rough, undulating, no visible orientation | | | |
| | | | 0 | 138.9, 139.4' - Mechanical break (2) | | | |
| 140<br>-98.3 | | | >10 | 139.5-140.5' - Fracture zone, rough, undulating, no visible orientation | | | |
| | | | NR | | | **No Recovery 140.7-141.5'** | R15: 7 minutes |
| | 141.5 | | | | | | |
| | R16-NQ 5 ft 90% | 40 | >10 | 141.5-142.5' - Fracture zone, rough, undulating, no visible orientation | | **Limestone**<br>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<br>142.6-144.5' - yellowish brown, (10YR 6/2), fine to medium grained, strong HCl reaction, weak to medium strong (R2 to R3), 10% voids on surface<br>144.5-146.0' - moderate olive brown, (5Y 4/4), medium grained, mild HCl reaction, very weak to weak (R1 to R2), voids (<1/16") over 40-60% of surface, fossil casts molds | |
| | | | 2 | 142.7' - Fracture, 5 deg, smooth, undulating<br>143.1' - Mechanical break | | | |
| | | | 0 | 143.3' - Fracture, 15 deg, smooth, undulating<br>143.5-145.9' - Mechanical break (4), <5 deg, rough, undulating, open <1/16" | | | SC-4 collected at 143.4-144.5' |
| 145<br>-103.3 | | | 0 | | | | |
| | | | 0 | | | | R16: 7 minutes |
| | 146.5 | | NR | 145.9' - Fracture, 70-80 deg, rough, undulating, tight | | **No Recovery 146.0-146.5'** | |
| | R17-NQ 5 ft 100% | 97 | 0 | 146.9, 147.5, 147.8' - Mechanical break (3), <5 deg, rough, undulating, tight | | **Limestone**<br>146.5-148.1' - dusky yellow to light olive gray, (5Y 6/4 to 5Y 5/2), medium grained, mild HCl reaction, weak to medium strong (R2 to R3), 30-50% voids, trace cavities | |
| | | | 0 | | | | |
| | | | 0 | 148.8' - Mechanical break, <10 deg, rough, undulating to planar, open to 1/4" | | | |
| 150 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | E-07 SHEET 9 OF 10 |

# ROCK CORE LOG

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 ORIENTATION : Vertical

WATER LEVELS : 3.0 ft bgs on 6/06/07 START : 6/5/2007 END : 6/7/2007 LOGGER : J. Burkard, C. Dellaria, B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -108.3 | | | 0 | 150.2' - Mechanical break, <5 deg, rough, undulating | | 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 | SC-5 collected at 149.4-150.3' |
| | | | 1 | 150.4' - Fracture, 50-60 deg, rough, undulating, tight | | 150.5-151.5' - Same as 148.1-150.5' except yellowish gray, (5Y 7/2), 20-30% voids | R17: 5 minutes |
| | 151.5 | | | | | | |
| | R18-NQ 5 ft 94% | 43 | 2 | 151.1' - Bedding plane or fracture, 5 deg, smooth, undulating, trace silica sand infill | | 151.5-154.0' - Same as 148.1-150.5' | |
| | | | 0 | 151.6' - Bedding plane or fracture, 5 deg, rough, undulating | | | |
| | | | 0 | 151.7' - Fracture, <5 deg, rough, undulating | | | |
| | | | 0 | 152.2' - Bedding plane, <5 deg, rough, undulating to planar, tight | | | |
| | | | | 152.7-153.2' - Fractures, 55-65 deg, rough, undulating, open <1/16" to partially healed | | 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 -113.3 | | | >10 | 154.7' - Mechanical break, 5-10 deg, rough, undulating | | | |
| | | | 3 | 155.0-155.9' - Fracture zone, possibly mechanical breaks | | 155.4-155.9' - moderate yellowish brown, (10YR 5/4), medium grained, mild HCl reaction, weak to medium strong (R2 to R3), 20-40% voids | R18: 5 minutes |
| | 156.5 | | NR | | | | |
| | | | >10 | 156.5-157.7' - Fracture zone, dominantly <10 deg, angular to subangular fragments 1"-3-1/2" | | 155.9-156.2' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, medium strong to strong (R3 to R4), no voids | |
| | | | 0 | 157.7-158.2' - Mechanical break (3), rough, undulating, open <1/8" | | **No Recovery 156.2-156.5'** | |
| | R19-NQ 5 ft 60% | 20 | 0 | 158.7, 159.0' - Mechanical break (2), <10 deg, rough, undulating to planar, open | | **Limestone** 156.5-156.8' - Same as 155.9-156.2' | |
| 160 -118.3 | | | NR | | | 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 | 161.5-161.6' - Mechanical break, multiple breaks, no visible orientation, limestone fragments to 1" | | **Limestone** 161.5-165.2' - Same as 156.8-159.5' except medium grained, mild HCl reaction, 20-40% voids | |
| | | | >10 | 161.9' - Mechanical break or fracture 162.3-163.2' - Fracture zone, rough, undulating, angles undeterminable | | | |
| | R20-NQ 5 ft 74% | 37 | 0 | 163.4, 164.5' - Mechanical break (2) | | | SC-6 collected at 163.4-164.5' |
| 165 -123.3 | | | 0 | | | | |
| | | | NR | | | **No Recovery 165.2-166.5'** | R20: 5 minutes |
| | 166.5 | | | | | | |
| | | | 0 | 167.0, 167.4' - Mechanical break or fractures (2) | | **Limestone** 166.5-175.5' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine grained, moderate to strong HCl reaction, weak (R2), 10-20% voids, fossiliferous zone from 167.3-167.6' (molds and casts) | |
| | | | 0 | 167.8, 167.9, 168.3' - Mechanical break or fractures (3) | | | |
| | R21-NQ 5 ft 100% | 62 | 4 | 168.7-169.0' - Fracture, 10-30 deg, rough, undulating | | | |
| 170 | | | | 169.3, 169.6, 170.0' - Mechanical break (3) | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: E-07 | SHEET 10 OF 10 |
|---|---|---|

# ROCK CORE LOG

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 ORIENTATION : Vertical

WATER LEVELS : 3.0 ft bgs on 6/06/07 START : 6/5/2007 END : 6/7/2007 LOGGER : J. Burkard, C. Dellaria, B. Ellis

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -128.3 | | | 1 | | | | |
| | | | 0 | 170.6' - Fracture, 5 deg, rough, undulating<br>170.9' - Mechanical break | | | R21: 5 minutes |
| | 171.5 | | | | | | |
| | | | >10 | 171.7' - Mechanical break<br>172.1-172.9' - Fracture zone | | | |
| | | | >10 | | | | |
| | R22-NQ<br>5 ft<br>80% | 7 | >10 | 173.3' - Mechanical break<br>173.6-175.5' - Fracture zone | | | |
| 175<br>-133.3 | | | >10 | | | | |
| | | | NR | | | **No Recovery 175.5-176.5'** | R22: 5 minutes |
| | 176.5 | | | | | | |
| | | | 3 | 176.5-176.7' - Fracture zone, irregular, angular rock fragments to 1" | | **Limestone**<br>176.5-177.5' - light olive gray, (5Y 5/2), fine grained, moderate to strong HCl reaction, extremely weak to weak (R0 to R2), 10-30% voids, 10% cavities<br>177.5-181.0' - moderate yellowish brown, (10YR 5/4), fine grained, weak to medium strong (R2 to R3), 10-20% voids | |
| | | | 2 | 177.3' - Fracture, 30 deg, rough, planar<br>177.4' - Fracture, horizontal, rough, planar<br>177.8-178.1' - Fracture zone, irregular angular rock fragments, top and bottom fractures are horizontal, rough, planar | | | |
| | R23-NQ<br>5 ft<br>90% | 37 | 3 | 178.6, 179.1, 179.4' - Fractures (3), 0-5 deg, rough, planar | | | |
| 180<br>-138.3 | | | 1 | 179.5' - Fracture, 50 deg, rough, undulating | | | |
| | | | 4 | 180.5, 180.6, 180.85, 180.9' - 0-10 deg, rough, planar | | | R23: 5 minutes |
| | 181.5 | | NR | | | **No Recovery 181.0-181.5'** | |
| | | | 1 | | | **Limestone**<br>181.5-182.5' - moderate yellowish brown, (10YR 5/4), fine to medium grained, weak to medium strong (R2 to R3), 10-30% voids<br>182.5-185.0' - pale yellowish brown, (10YR 6/2), fine grained, medium strong (R3), 10-20% voids, trace cavities | |
| | | | 1 | 182.3' - Fracture, 30 deg, rough, undulating, possible mechanical break<br>182.9' - Fracture, 20 deg, smooth, planar | | | |
| | R24-NQ<br>5 ft<br>94% | 72 | 4 | 183.75' - Fracture, 60 deg, rough, undulating<br>184.1' - Fracture, horizontal, rough, undulating | | | Used natural break at 183.75' to box to preserve specimen |
| 185<br>-143.3 | | | 1 | 184.3' - Fracture, 10 deg, smooth, planar<br>184.4' - Fracture, horizontal, smooth, planar | | 185.0-186.2' - pale yellowish brown, (10YR 6/2), fine to medium grained, weak to medium strong (R2 to R3), 20-40% voids, 20-30% cavities up to 5/8", fossil casts and molds | |
| | | | 2 | 184.8' - Fracture, horizontal, smooth, undulating | | | R24: 7 minutes |
| | 186.5 | | NR | 185.7' - Fracture, 50 deg, rough, undulating<br>186.4' - Fracture, 5 deg, rough, undulating | | **No Recovery 186.2-186.5'**<br>Bottom of Boring at 186.5 ft bgs on 6/7/2007 | Bottom of hole at 186.5', end of boring at 09:53, 6/7/07 |

| 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

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 : 4.41 ft bgs on 3/06/07 START : 2/15/2007 END : 2/23/2007 LOGGER : R. Gomez, R. Bitely, T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.4 | | | | | | | Start drilling at 10:57 AM using 3-7/8" drag bit<br><br>Water level is based on Ground Water Monitoring at LNP site (FSAR Table 2.4.12.08) |
| | 3.5 | | | | | | |
| | | 1.0 | SS-1 | 3-3-4 (7) | **Silty Sand (SM)**<br>3.5-4.5' - dark yellow, (10YR 6/6), wet, loose, fine grained silica sand, 15% nonplastic fines, trace organics | | |
| 5 37.4 | 5.0 | | | | | | |
| | | | | | | | Driller's Remark: Silts and sands at 7.0', harder drilling |
| | 8.5 | | | | | | |
| | | 1.5 | SS-2 | 4-7-6 (13) | **Silty Sand With Limestone Fragments (SM)**<br>8.5-10.0' - yellowish gray mottled with light brown, (5Y 8/1 with 5YR 5/6), wet, medium dense, fine to coarse grained, strong HCl reaction, 20% nonplastic fines, 15% fine to coarse gravel sized limestone fragments, carbonate material | | Driller's Remark: Switch to 3-7/8" tri-cone roller drill bit |
| 10 32.4 | 10.0 | | | | | | |
| | | | | | | | Driller's Remark: Hard drilling at 11' |
| | 13.5 | | | | | | |
| | | 1.5 | SS-3 | 10-5-6 (11) | **Silty Sand (SM)**<br>13.5-15.0' - Same as 8.5-10.0' except 40-45% fine to coarse gravel sized, 35% fine to coarse sand sized, 15-20% nonplastic fines | | |
| 15 27.4 | 15.0 | | | | | | |
| | 18.5 | | | | | | |
| | | 1.5 | SS-4 | 4-6-6 (12) | **Silty Sand With Limestone Gravel (SM)**<br>18.5-20.0' - Same as 8.5-10.0' | | |
| 20 | 20.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | E-08 SHEET 2 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

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 : 4.41 ft bgs on 3/06/07 START : 2/15/2007 END : 2/23/2007 LOGGER : R. Gomez, R. Bitely, T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.4 | | | | | | | |
| | 23.5 | | | | | | |
| | 25.0 | 1.5 | SS-5 | 4-21-29 (50) | **Silt (ML)** 23.5-25.0' - grayish orange, (10YR 7/4), moist, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 5% very fine grained sand-sized, carbonate material | | Driller's Remark: Lost 40% circulation |
| 25 17.4 | | | | | | | |
| | 28.5 | | | | | | |
| | 30.0 | 1.0 | SS-6 | 8-12-11 (23) | **Silt (ML)** 28.5-29.5' - Same as 23.5-25.0' except 15-20% fine to coarse sand-sized | | |
| 30 12.4 | | | | | | | |
| | 33.5 | | | | | | |
| | 35.0 | 1.0 | SS-7 | 21-18-21 (39) | **Silt With Sand (ML)** 33.5-34.5' - pale brown to pale yellowish brown, (5YR 5/2 to 10YR 6/2), dry to moist, hard, nonplastic, rapid dilatancy, mild HCl reaction, 20-25% fine to coarse sand-sized, trace fine gravel-sized | | Set 4" HW casing to 35.0' |
| 35 7.4 | | | | | | | Stopped at 12:45 PM after setting casing to 35.0'<br>Leave casing in at 35.0' until next shift<br>Start drilling 02/20/2007, continue with 3-7/8" tri-cone from 35.0' below ground surface<br>4" HW casing at 35.0' below ground surface |
| | 38.5 | | | | | | |
| | 40.0 | 1.4 | SS-8 | 20-23-19 (42) | | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | E-08 SHEET 3 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

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 : 4.41 ft bgs on 3/06/07 START : 2/15/2007 END : 2/23/2007 LOGGER : R. Gomez, R. Bitely, T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.4 | | | | | **Silt With Sand (ML)** 38.5-39.9' - moderate yellowish brown, (10YR 5/4), moist, hard, nonplastic, rapid dilatancy, mild HCl reaction, 15-20% fine to coarse sand-sized, carbonate material | | |
| | 43.5 | 0.0 | SS-9 | 50/1.5 (50/1.5") | **No Recovery 43.5-43.6'** | | Driller's Remark: Slow drilling through dense zone, light chatter |
| 45 -2.6 | | | | | | | Driller's Remark: Softer drilling, quick drilling, little to no chatter |
| | 48.5 | 1.2 | SS-10 | 30-48-50/5 (98/11") | **Silt (ML)** 48.5-49.7' - pale brown, (5YR 5/2), moist to wet, hard, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 10-15% fine to medium sand-sized, carbonate material | | |
| 50 -7.6 | 49.9 | | | | | | Driller's Remark: Rapid advancement no chatter |
| | 53.5 | 1.2 | SS-11 | 18-12-36 (48) | **Silt With Sand And Limestone (ML)** 53.5-54.7' - Same as 48.5-49.7' except 20-25% fine to coarse sand-sized, 4-8 interbeds of limestone up to 1/2" thick | | |
| 55 -12.6 | 55.0 | | | | | | |
| | 58.5 | 1.2 | SS-12 | 25-35-41 (76) | **Sandy Silt (ML)** 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" thick | | |
| 60 | 60.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | E-08 SHEET 4 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

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 : 4.41 ft bgs on 3/06/07 START : 2/15/2007 END : 2/23/2007 LOGGER : R. Gomez, R. Bitely, T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -17.6 | | | | | | | Light chatter to 61.0' |
| | | | | | | | Driller's Remark: Rapid advancement, no chatter, few cemented silt grains (coarse to fine gravel size ) in cuttings |
| | 63.5 | | | | | | |
| | | 1.3 | SS-13 | 28-33-21 (54) | **Sandy Silt And Limestone (ML)**<br>63.5-64.8' - Same as 58.5-59.7' except 35-40% of sample is limestone fragments | | |
| 65 -22.6 | 65.0 | | | | | | |
| | | | | | | | Driller's Remark: Light to moderate chatter Steady advancement, cemented silt to limestone fragments in cuttings<br>Slow advancement from 66.0'-68.0' |
| | | | | | | | Driller's Remark: Light to no chatter |
| | 68.5 | | | | | | Moderate chatter |
| | 68.6 | 0.0 | SS-14 | 50/1 (50/1") | **No Recovery 68.5-68.6'**<br>Begin Rock Coring at 68.5 ft bgs<br>See the next sheet for the rock core log | | Switch to NQ tooling at 68.5'<br>16:20 PM begin cleaning boring with NQ tooling |
| 70 -27.6 | | | | | | | |
| 75 -32.6 | | | | | | | |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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 ORIENTATION : Vertical

WATER LEVELS : 4.41 ft bgs on 3/06/07 START : 2/15/2007 END : 2/23/2007 LOGGER : R. Gomez, R. Bitely, T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | RQD (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| 68.5 | R1-NQ 1.5 ft 47% | 0 | 4 | 68.75' - Mechanical break, 10 deg, smooth, undulating | | **Limestone** 68.5-69.2' - light olive gray, (5Y 5/2), very fine grained, mild HCl reaction, weak to medium strong (R2 to R3), fossiliferous, trace 15% organics | 68-70' advancement slow with heavy chatter 68.5-69', little to no chatter 69.0-70.0' |
| | | | NR | 68.85, 69.0, 69.1, 69.2' - Mechanical break (4), 10 deg, smooth, undulating | | **No Recovery 69.2-70.0'** | R1: No time recorded |
| 70 -27.6 / 70.0 | | | >10 | 70.55- 70.8' - Fracture zone, rough, stepped, no visible orientation | | **Limestone** 70.0-73.3' - light olive gray, (5Y 5/2), very fine grained, mild HCl reaction, very weak to weak (R1 to R2), fossiliferous, voids up to 3/16" cover 50% of surface | |
| | | | 5 | 70.8-71.15' - Mechanical break, vertical, smooth, undulating | | | |
| | R2-NQ 5 ft 66% | 38 | 1 | 71.15' - Mechanical break, 25 deg, rough, undulating | | | |
| | | | 1 | 71.3-71.45' - Mechanical break, vertical, smooth, undulating | | | |
| | | | NR | 71.5' - Mechanical break<br>71.75' - Mechanical break, <10 deg, rough, undulating<br>72.5' - Fracture, 50 deg, smooth, undulating | | **No Recovery 73.3-75.0'** | R2: 6 minutes |
| 75 -32.6 / 75.0 | | | | | | | 2/20/07 Stop drilling for the day<br>Resume drilling 2/21/07 at 08:13 |
| | | | 1 | 75.1' - Mechanical break, <10 deg, smooth, undulating | | **Limestone** 75.0-78.3' - light olive gray, (5Y 5/2), very fine grained, mild to moderate HCl reaction, weak to medium strong (R2 to R3), bedding plane laminations, some with organics (black laminations), voids up to 3/16" cover 25-50% of the surface | SC-1 collected at 76.3-77.4' |
| | | | 1 | 76.35' - Fracture, 20 deg, smooth, undulating | | | |
| | R3-NQ 5 ft 66% | 57 | 1 | 77.4' - Fracture, 20 deg, smooth, undulating | | | |
| | | | 3 | 78.05' - Mechanical break, 30 deg, smooth, undulating | | **No Recovery 78.3-80.0'** | |
| | | | NR | 78.15' - Bedding plane, 10 deg, smooth, undulating, intersecting a vertical fracture<br>78.35' - Bedding plane, <10 deg, smooth, undulating | | | R3: 6 minutes |
| 80 -37.6 / 80.0 | | | | | | | |
| | | | 5 | 80.1' - Mechanical break, 80 deg, rough, undulating | | **Limestone** 80.0-82.8' - light olive gray, (5Y 5/2), very fine grained, mild to moderate HCl reaction, very weak to medium strong (R1 to R3), moderately competent at 80.0-80.55' and 81.2-82.8', voids up to 3/16" over 50% of surface, fossiliferous, trace bedding plane laminations, very weak rock (R1) with very fine granular surface at 80.55-81.2' | |
| | | | 1 | 80.3' - Bedding plane, <10 deg, smooth, undulating<br>80.55' - Bedding plane, <10 deg, smooth, undulating | | | |
| | R4-NQ 5 ft 56% | 38 | 2 | 80.9-81.0' - Fracture zone, <10 deg, rough, undulating, multiple fractures<br>81.2' - Fracture, 15 deg, smooth, undulating | | | Driller's Remark: Lost up to 80% circulation at 82.0' |
| | | | NR | 82.5' - Mechanical break, <45 deg, rough, undulating<br>82.7' - Fracture, 65 deg, smooth, undulating | | **No Recovery 82.8-85.0'** | R4: 6 minutes |
| 85 -42.6 / 85.0 | | | | | | | |
| | | | >10 | 85.0-85.45' - Fracture zone, rough, undulating, multiple fractures, multiple angles<br>85.45' - Mechanical break, 20 deg, rough, undulating | | **Limestone** 85.0-88.8' - dark yellowish brown to light olive gray, (10YR 4/2 to 5Y 5/2), very fine grained, mild to moderate HCl reaction, very weak to medium strong (R1 to R3), voids up to 1/2" cover 20-30% of the surface, small voids (<3/16") cover 60-80% of surface, fossiliferous (molds/casts) | |
| | | | >10 | 85.75' - Fracture, 60 deg, smooth, undulating<br>86.0' - Mechanical break, 25 deg, rough, undulating | | | |
| | R5-NQ 5 ft 76% | 43 | 2 | 86.0-86.3' - Fracture zone, <20->70 deg, multiple fractures, rock fragments | | | |

| PROJECT NUMBER: | BORING 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 ORIENTATION : Vertical

WATER LEVELS : 4.41 ft bgs on 3/06/07 START : 2/15/2007 END : 2/23/2007 LOGGER : R. Gomez, R. Bitely, T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | 2 | 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'<br>R5: 5 minutes |
| | | | NR | | | | |
| 90<br>-47.6 | 90.0 | | | | | | |
| | R6-NQ<br>5 ft<br>100% | 45 | 1 | 90.65' - Fracture, 15 deg, rough, undulating | | **Limestone**<br>90.0-95.0' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 6/1), very fine grained, moderate HCl reaction, extremely weak to medium strong (R0 to R3), fossiliferous (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 w/depth), extremely weak (R0) rock zone at 91.8-92.8', friable along bedding plane laminations | |
| | | | 4 | 91.15, 91.4, 91.55, 91.8' - Bedding plane (4), <10 deg, smooth, undulating | | | |
| | | | 8 | 92.05, 92.15, 92.25' - Mechanical break (3)<br>92.4, 92.8' - Bedding plane, <10 deg, smooth, undulating | | | |
| | | | 2 | 92.7' - Fracture, 75 deg, smooth, undulating<br>92.9' - Fracture, 75 deg, smooth, undulating, mirror of fracture at 92.7 | | | |
| | | | 4 | 93.0' - Mechanical break, 10 deg, rough, undulating<br>93.25' - Mechanical break, 50 deg, rough, undulating | | | R6: 3 minutes |
| 95<br>-52.6 | 95.0 | | | | | | |
| | R7-NQ<br>5 ft<br>40% | 20 | 1 | 93.55, 94.25, 94.45' - Mechanical break (3), <10 deg and 50 deg, rough, undulating | | **Limestone**<br>95.0-97.0' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), very fine grained, moderate HCl reaction, weak (R2), voids up to 3/16" cover 30-40% of the surface, voids increase with depth, fossiliferous with few macrofossils, trace bioturbation indications, trace organics<br>**No Recovery 97.0-100.0'** | |
| | | | 4 | 94.55' - Bedding plane, smooth, undulating, organics<br>95.75' - Fracture, 20 deg, rough, undulating, low angle | | | |
| | | | NR | 96.25, 96.45, 96.65, 96.75' - Fracture (4), <10 deg, smooth, undulating | | | R7: 7 minutes |
| 100<br>-57.6 | 100.0 | | | | | | |
| | R8-NQ<br>5 ft<br>72% | 47 | 0 | | | **Limestone**<br>100.0-102.9' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), very fine grained, mild to moderate HCl reaction, weak (R2), voids (3/16") cover 30% of the surface decreasing w/depth to no voids, less than 5% voids from 102.15-102.9', fossiliferous with few small macrofossil molds, trace bioturbation and trace organics<br>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 sand-sized grains, bioturbation<br>**No Recovery 103.6-105.0'** | Driller's Remark: Lost 100% circulation at 100.0'<br>SC-3 collected at 100.85-101.9' |
| | | | 1 | 100.85' - Mechanical break | | | |
| | | | 3 | 101.9, 102.15, 102.65, 102.9' - Fracture or bedding plane (4), <10 deg, smooth, undulating | | | |
| | | | >10 | 102.9-103.6' - Fracture zone, rough, stepped, multiple intersecting fractures | | | |
| | | | NR | | | | R8: 11 minutes |
| 105<br>-62.6 | 105.0 | | | | | | |
| | R9-NQ<br>5 ft<br>74% | 28 | 5 | | | | |
| | | | >10 | 105.8' - Mechanical break, 40-70 deg, rough, undulating<br>105.85-106.1' - Fracture zone, multiple intersecting fractures | | | |
| | | | >10 | 106.35' - Fracture, 50 deg, rough, undulating<br>106.55' - Mechanical break | | | |
| | | | 6 | 106.8' - Fracture, 75 deg, smooth, undulating | | | |

| PROJECT NUMBER: | BORING 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 ORIENTATION : Vertical

WATER LEVELS : 4.41 ft bgs on 3/06/07 START : 2/15/2007 END : 2/23/2007 LOGGER : R. Gomez, R. Bitely, T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | NR | 106.9-107.4' - Fracture zone, rough, stepped, multiple intersecting fractures<br>107.4, 107.7' - Fractures, 60 deg and 70 deg, rough, undulating | | **Limestone**<br>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), 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 | R9: 5 minutes |
| 110<br>-67.6 | 110.0 | | | | | | |
| | R10-NQ<br>5 ft<br>48% | 20 | 7 | 107.7-108.0' - Fracture zone, rough, stepped, gravel-sized rock fragments<br>108.35-108.7' - Fracture zone, rough, stepped | | | |
| | | | 3 | 110.0-110.65' - Fracture zone, smooth, undulating, bedding plane and other intersecting fractures | | | |
| | | | 1 | 111.25' - Fracture, 60 deg, smooth, undulating | | **No Recovery 108.7-110.0'**<br>**Limestone**<br>110.0-112.4' - 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), 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 organics | |
| | | | NR | 111.5' - Fracture, 60 deg, smooth, undulating<br>111.75' - Bedding plane, <10 deg, smooth, undulating<br>112.0' - Fracture, 70 deg, smooth, undulating | | | R10: 5 minutes |
| 115<br>-72.6 | 115.0 | | | | | | |
| | R11-NQ<br>5 ft<br>74% | 38 | 5 | 115.1, 115.3, 115.45, 115.6' - Bedding plane (4), <10 deg, smooth, stepped | | **No Recovery 112.4-115.0'**<br>**Limestone**<br>115.0-118.7' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 3/2), very 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 | |
| | | | 3 | 116.0' - Fracture, 50 deg, smooth, stepped<br>116.3, 116.45, 116.9, 117.05' - Bedding plane (4), <10 deg, smooth, undulating | | | |
| | | | 4 | 117.2' - Mechanical break, 20 deg, rough, stepped, open 1" | | | |
| | | | 2 | 117.3, 117.55' - Mechanical break (2), <10 deg, smooth, undulating | | | |
| | | | NR | 118.1, 118.4' - Fracture (2), 40 deg and 70 deg, smooth, undulating, trace staining on fracture at 118.4' | | | R11: 8 minutes |
| 120<br>-77.6 | 120.0 | | | | | **No Recovery 118.7-120.0'** | |
| | R12-NQ<br>5 ft<br>24% | 0 | 8 | 120.0-120.35' - Fracture zone, multiple intersecting fractures including a 60 deg fracture with trace staining | | **Limestone**<br>120.0-121.2' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 3/2), very fine grained, mild HCl reaction, very 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' | |
| | | | 1 | 120.65, 120.75, 121.05' - Mechanical break (3), 0-20 deg, rough, undulating | | | |
| | | | NR | | | **No Recovery 121.2-125.0'** | R12: 5 minutes |
| 125<br>-82.6 | 125.0 | | | | | | |
| | R13-NQ<br>5 ft<br>22% | 7 | >10 | 125.0-125.2' - Fracture zone, rough, undulating, multiple intersecting fractures | | **Limestone**<br>125.0-126.1' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 3/2), very fine grained, mild HCl 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) | |
| | | | 0 | 125.6' - Mechanical break, horizontal, rough, undulating | | | |
| | | | | 125.8' - Fracture or mechanical break, 40 deg, rough, undulating<br>125.95' - Mechanical break, horizontal, rough, undulating | | | |
| | | | NR | | | **No Recovery 126.1-130.0'** | |

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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 ORIENTATION : Vertical

WATER LEVELS : 4.41 ft bgs on 3/06/07 START : 2/15/2007 END : 2/23/2007 LOGGER : R. Gomez, R. Bitely, T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 130<br>-87.6 | 130.0 | | | | | | R13: 9 minutes<br>14:00-15:00 PM HW casing unscrewed at 10.0', removed NQ to retrieve HW<br>15:00-16:30 PM Advanced HW casing from 35.0'-70.0'<br>17:30-18:30 PM NQ tooling locked in slough at 100' below ground surface, back hammering to retrieve<br>18:00-18:30 PM little to no movement, stop for the day<br>2/21/07 Stop drilling for the day<br>2/22/07, 07:00-12:30 PM Retrieved tooling and cleaned out boring from 85.0-130.0'<br>Advanced HW casing to 85.0'<br>R14: 10 minutes<br>Very fine sand-sized grains in drilling mud (identified by grit between fingers), black grains (possibly heavy minerals) present in grit only, not sample<br>Continuous slow advancement through interval, no void<br>R15: 13 minutes<br>15:15 PM 0.8'-long section of core retrieved from cutting shoe of core barrel, logged as R15 core from 138.0-138.8'<br>2/22/07 Stop drilling for the day at 140.0'<br>Begin drilling 2/27/07 at 08:45<br>R16: 10 minutes |
| | R14-NQ<br>5 ft<br>30% | 18 | 4<br>1<br>NR | 130.05' - Fracture, rough, undulating, open<br>130.4' - Fracture, smooth, undulating, open<br>130.75' - Fracture or mechanical break, 20 deg, smooth, undulating<br>131.0' - Fracture or mechanical break, <10 deg, smooth, undulating<br>131.3' - Fracture, rough, undulating, open | | **Limestone**<br>130.0-131.5' - light olive gray, (5Y 5/2), very fine grained, mild HCl reaction, weak to medium strong (R2 to R3), voids up to 3/16" cover 50% of surface, few cavities up to 1/4" diameter, few macrofossil molds, potential gaps from fines washing out at 130.05', 130.4', and 131.3', 3/4" iron cemented sand (no HCl reaction, very fine grained, medium strong [R3]) at 130.0-130.05'<br>**No Recovery 131.5-135.0'** | |
| 135<br>-92.6 | 135.0 | | | | | | |
| | R15-NQ<br>5 ft<br>24% | 0 | 0<br>NR<br>0<br>NR | 135.0, 135.2' - Fracture (2), <10 deg, smooth, undulating<br>138.15, 138.25' - Mechanical break, variable angles, variably open<br>138.25-138.65' - Fracture zone, coarse gravel-size rock fragments, visible signs of mechanical wear | | **Limestone**<br>135.0-135.2' - pale yellowish brown to olive gray, (10YR 6/2 to 5Y 4/1), very fine grained, mild HCl reaction, weak to medium strong (R2 to R3), voids up to 1/16" cover 30% of surface, possible worm burrows at 135.0-135.2'<br>**No Recovery 135.2-138.0'**<br>**Limestone**<br>138.0-138.8' - light olive gray to olive gray, (5Y 6/1 to 5Y 4/1), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), crystalline surfaces visible to naked eye, macrofossil molds up to 3/4"x1/4" (spiral gastropod), voids up to 3/16" variable 0-30% over surface, bedding plane laminations rare, trace organics<br>**No Recovery 138.8-140.0'** | |
| 140<br>-97.6 | 140.0 | | | | | | |
| | R16-NQ<br>5 ft<br>74% | 23 | >10<br>10<br>6<br>3<br>NR | 140.0-140.25' - Fracture zone, rough, stepped, infilling<br>140.45' - Bedding plane, horizontal, rough, undulating, 1/4" open<br>140.9-141.6' - Fractures or bedding plane, 70-90 deg, rough, undulating<br>141.9' - Mechanical break, 10 deg, rough, undulating<br>141.95-142.1' - Fracture zone, 50-70 deg, smooth, undulating<br>142.2' - Bedding plane, horizontal, smooth, undulating<br>142.4' - Fracture, 70 deg, rough, undulating<br>142.6, 143.0, 143.2, 143.55' - Fractures (4), rough, stepped, variably open (<1/8") | | **Limestone**<br>140.0-140.45' - dark yellowish brown to light olive gray, (10YR 4/2 to 5Y 5/2), fine to medium grained, moderate to strong HCl reaction, extremely weak (R0), poorly competent with some silty sand and gravel, angular grains up to gravel size, trace bedding plane laminations and organics | |
| 145<br>-102.6 | 145.0 | | | | | | |
| | R17-NQ<br>5 ft<br>70% | 13 | >10<br>8<br>>10<br>5 | 145.0-145.45' - Fracture zone or mechanical break, rough, undulating<br>145.8, 146.1, 146.26, 146.35, 146.5, 146.6, 146.7' - Bedding plane (7), <10 deg, smooth, undulating<br>146.7-148.0' - Fracture, 70-90 deg, smooth to rough, undulating to stepped, with multiple intersecting bedding plane and subhorizontal fractures<br>148.1' - Fracture, 50 deg, smooth, undulating | | | |

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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 ORIENTATION : Vertical

WATER LEVELS : 4.41 ft bgs on 3/06/07 START : 2/15/2007 END : 2/23/2007 LOGGER : R. Gomez, R. Bitely, T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | NR | 148.3' - Bedding plane, <10 deg, smooth, undulating to stepped, <1/4" open | | 140.45-143.7' - dark yellowish brown to grayish olive with light gray mottling, (10YR 4/2 to 10Y 4/2 with N7), very fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids over 30-40% of surface and vesicles over 60-80% of the surface, unfilled voids/cavities up to 1"x1/2" especially at 143.5-143.7', heavy bioturbation and secondary infill of voids | R17: 17 minutes |
| 150 -107.6 | 150.0 | | | | | | |
| | R18-NQ 5 ft 84% | 30 | 6 | 150.15' - Bedding plane, <10 deg, rough, undulating | | | |
| | | | 5 | 150.3, 150.55, 150.6' - Bedding plane (3), <10 deg, rough, undulating | | | |
| | | | 8 | 150.7' - Mechanical break, 50-90 deg, rough, stepped<br>151.05, 151.25, 151.5, 151.8, 152.05' - Bedding plane (5), rough, undulating | | **No Recovery 143.7-145.0'**<br>**Limestone**<br>145.0-145.45' - Same as 140.45-143.7'<br>145.45-146.7' - light olive gray, (5Y 5/2), very fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), voids up to 3/16" cover 20% of the surface, few macro fossils, laminated subhorizontal bedding with organics, minor bioturbation decreasing with depth<br>146.7-148.5' - Same as 145.45-146.7' except rare laminations, no to trace organics | |
| | | | 5 | 151.95' - Mechanical break, vertical, rough, stepped | | | |
| | | | 1 | 152.05-152.25' - Fracture, vertical, smooth, undulating, with 3 horizontal intersecting fractures | | | R18: 9 minutes |
| 155 -112.6 | 155.0 | | NR | 152.5' - Fracture, 40 deg and 60 deg, rough, stepped | | | |
| | R19-NQ 5 ft 72% | 23 | 5 | 152.85' - Fracture, 10-70 deg, smooth, undulating | | | 155-156' Slow advancement |
| | | | 3 | 152.95' - Fracture, 75 deg, smooth, undulating<br>153.1' - Mechanical break | | | |
| | | | 5 | 153.4-153.65' - Fractures (4), 20-70 deg, smooth, undulating<br>154.0' - Bedding plane, rough, undulating, <1/4" open | | **No Recovery 148.5-150.0**<br>**Limestone**<br>150.0-152.05' - dark yellowish brown to light olive gray, (10YR 4/2 to 5Y 5/2), very fine to fine grained, mild to moderate HCl reaction, weak to medium strong (R2 to R3), voids (<1/16") over 80-100% of surface, cavities up to 1/8" present | 156-158' Slightly faster advancement |
| | | | 2 | 155.15, 155.45, 155.5' - Bedding plane (3), <10 deg, smooth to rough, undulating | | | |
| | | | NR | 156.0' - Mechanical break, 20 deg, rough, undulating<br>156.15, 156.4' - Bedding plane, <10 deg, smooth, undulating | | | R19: 7 minutes<br>158-160' Slow advancement<br>Lost circulation at 160.0' |
| 160 -117.6 | 160.0 | | | | | | |
| | R20-NQ 5 ft 44% | 7 | 4 | 157.0' - Fracture, 75 deg, rough, undulating<br>157.2, 157.4, 157.6, 157.8, 157.9, 158.0' - Bedding plane (6), <10 deg, smooth, undulating | | 152.05-154.2' - very light gray to light olive gray, (N8 to 5Y 6/1), very fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), voids cover 0-30% of the surface increasing with depth, fossiliferous, bioturbation and secondary infill, iron staining rare | |
| | | | 8 | 158.15, 158.3' - Bedding plane (2), smooth, undulating | | | |
| | | | 0 | 160.35' - Fracture, 20 deg, rough, undulating | | | |
| | | | NR | 160.65' - Bedding plane, horizontal, smooth, undulating<br>160.85' - Fracture, 65 deg, rough, undulating<br>161.0' - Fracture, 15 deg, rough, undulating<br>161.25' - Mechanical break, 45 deg, rough, undulating<br>161.25-161.5' - Fracture zone, rough, undulating, multiple intersecting fractures | | **No Recovery 154.2-155.0'**<br>**Limestone**<br>155.0-155.5' - dark yellowish brown to light olive gray, (10YR 4/2 to 5Y 5/2), very fine to fine grained, weak (R2), 10-20% organic laminations on bedding plane, fractures in poorly competent seams and laminae<br>155.5-158.0' - dark yellowish brown to light olive gray, (10YR 4/2 to 5Y 5/2), very fine grained, mild to moderate HCl reaction, weak (R2), voids cover 10-40% of the surface | Very slow, continuous advancement<br>R20: 20 minutes |
| 165 -122.6 | 165.0 | | | | | | |
| | R21-NQ 5 ft 48% | 12 | 5 | 161.7' - Fracture, 15 deg, smooth, undulating<br>161.95' - Fracture, 65 deg, smooth, undulating | | | SC-4 collected at 165.2-165.75' |
| | | | >10 | 165.0-165.2' - Fracture zone, rough, stepped to undulating | | | |
| | | | 3 | 165.75-165.95' - Bedding plane, horizontal, smooth, undulating<br>165.95-166.65' - Fracture zone, smooth to rough, undulating<br>166.85' - Fracture or mechanical break, 60 deg, rough, stepped | | | |

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|---|---|
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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 ORIENTATION : Vertical

WATER LEVELS : 4.41 ft bgs on 3/06/07 START : 2/15/2007 END : 2/23/2007 LOGGER : R. Gomez, R. Bitely, T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | NR | 166.95' - Fracture, horizontal, rough, undulating<br>167.1' - Fracture, vertical, rough, undulating<br>167.3' - Bedding plane, horizontal, smooth, undulating | | 158.0-158.6' - very light gray to yellowish gray, (N8 to 5Y 8/1), moderate HCl reaction, weak to medium strong (R2 to R3), minor to trace voids, minor iron staining on surface<br>**No Recovery 158.6-160.0'**<br>**Limestone**<br>160.0-162.2' - very light gray to light brownish gray, (N7 to 5YR 6/1), very fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), voids cover 0-80% of surface, no voids at 160.4-160.65' | R21: 7 minutes |
| 170<br>-127.6 | 170.0 | | | | | | |
| | R22-NQ<br>5 ft<br>96% | 38 | 4 | 170.1' - Bedding plane, horizontal, smooth, undulating, 1/2" open<br>170.6' - Fracture, 60 deg, rough, undulating | | | |
| | | | 2 | 170.7' - Bedding plane, horizontal, rough, undulating | | | |
| | | | 8 | 171.0, 171.3, 171.85' - Fractures (3), 40 deg and 30 deg, rough, undulating, <1/4" open<br>172.15' - Bedding plane, horizontal, rough, undulating | | | |
| | | | >10 | 172.35-172.7' - Fracture zone, rough, undulating, intersecting fractures at varying angles | | **No Recovery 162.2-165.0'**<br>**Limestone**<br>165.0-167.4' - very light gray to light olive gray, (N8 to 5Y 6/1), very fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids cover 30-60% of surface | |
| | | | 2 | 173.05' - Fracture, 20 deg, rough, undulating<br>173.15-173.3' - Fracture zone, intersecting fractures at varying angles | | | R22: 8 minutes |
| 175<br>-132.6 | 175.0 | | NR | | | | |
| | | | 4 | 173.55, 173.75, 173.95, 174.3, 174.6' - Bedding plane or fracture (5), <10 deg, rough to smooth, undulating, <1/2" open | | **No Recovery 167.4-170.0'**<br>**Limestone**<br>170.0-170.1' - Same as 165.0-167.4' except few voids on surface<br>170.1-170.6' - moderate yellowish brown, (10YR 5/4), very fine to medium grained, mild to moderate HCl reaction, weak to medium strong (R2 to R3), trace laminated bedding with few infill features | |
| | | | 5 | 175.1' - Fracture, 70 deg, smooth, undulating<br>175.2, 175.5, 175.9, 176.05, 176.25, 176.35, 176.6, 176.8, 177.4, 177.65, 177.8' - Bedding plane (11), <10 deg, smooth, undulating, <1/8" open to tight | | | |
| | R23-NQ<br>5 ft<br>56% | 22 | 2 | | | | |
| | | | NR | | | 170.6-174.8' - very light gray to light olive gray, (N8 to 5Y 6/1), very fine to medium grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids cover 50-80% surface, cavities and dissolution features up to 1/4" cover 20% surface from 170.9-171.8', bedding plane laminations at 178.6-178.9', contacts from very fine to medium grained lithologies at 170.1', 170.6', and 172.15-172.2'<br>**No Recovery 174.8-175.0'**<br>**Limestone**<br>175.0-177.8' - very light gray to light olive gray, (N8 to 5Y 6/1), very fine to medium grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids cover 10-30% of surface, voids up to 1/2" rare<br>**No Recovery 177.8-180.0'**<br>**Limestone**<br>180.0-181.0' - light olive gray, (5Y 6/1), very fine to fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids cover 30% of surface, bedding plane laminations, trace fossils<br>**No Recovery 181.0-185.0'** | R23: 8 minutes<br>Core not retained in sample barrel; NQ tooling removed to retreive sample from core barrel<br>2.5' of slough or sand in borehole from apparent flow zone at 177.5'; hole cleaned out to 180.0'<br>R24: 6 minutes<br>Drill stem sand-locked at 185.0'; back hammered 3 hours to free tooling<br>Sand flow zone likely at 180.0-183.0' |
| 180<br>-137.6 | 180.0 | | | | | | |
| | | | 10 | 180.1, 180.25, 180.6, 180.7, 180.85, 180.9' - Bedding plane (6), <10 deg, rough, undulating to stepped | | | |
| | R24-NQ<br>5 ft<br>20% | 7 | NR | | | | |
| 185<br>-142.6 | 185.0 | | | | | | |
| | | | | | | Bottom of Boring at 185.0 ft bgs on 2/23/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-01 SHEET 1 OF 6 |

# SOIL BORING LOG

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 ORIENTATION : Vertical

WATER LEVELS : 4.5 ft bgs on 4/5/2007 START : 4/4/2007 END : 4/5/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 43.1 | 0.0 – 1.5 | 1.3 | SS-1 | 2-2-2 (4) | **Topsoil** 0.0-0.3' - very dusky red, (10R 2/2), moist, 20-30% fine to coarse rootlets<br>**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 | | SS-1 collected at 08:45<br>140-lb hammer<br>NW rod 5.0' sections<br>4.75" tricone roller bit<br>Added 1/8 52-lb bag QuikGel bentonite to full mud vat |
| 5 | 5.0 – 6.5 | 0.9 | SS-2 | 2-3-3 (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' of sample | | SS-2 collected at 09:07<br>SS-2 is wet so water level is placed at 3.0' bgs |
| 38.1 | | | | | | | |
| 10 | 10.0 – 11.5 | 1.0 | SS-3 | 7-8-7 (15) | **Poorly Graded Sand (SP)** 10.0-11.0' - very pale orange, (10YR 8/2), wet, medium dense, fine silica sand, 5% nonplastic fines, trace very fine black particles | | SS-3 collected at 09:14 |
| 33.1 | | | | | | | |
| 15 | 15.0 – 16.5 | 0.9 | SS-4 | 5-8-12 (20) | **Silty Sand (SM)** 15.0-15.9' - pale yellowish brown, (10YR 6/2), wet, medium dense, fine silica sand, 20% nonplastic fines, trace very fine black particles | | SS-4 collected at 09:23 |
| 28.1 | | | | | | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-01 SHEET 2 OF 6 |

# SOIL BORING LOG

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 ORIENTATION : Vertical

WATER LEVELS : 4.5 ft bgs on 4/5/2007 START : 4/4/2007 END : 4/5/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 23.1 | 20.0 – 21.5 | 1.0 | SS-5 | 11-19-24 (43) | **Silty Sand (SM)** 20.0-21.0' - Same as 15.0-15.9' except dense | | SS-5 collected at 09:32 |
| 25 | 25.0 | | | | | | |
| 18.1 | 25.0 – 26.5 | 1.1 | SS-6 | 20-35-50 (85) | **Silty Sand (SM)** 25.0-26.1' - Same as 20.0-21.0' except very dense | | SS-6 collected at 09:47 |
| 30 | 30.0 | | | | | | |
| 13.1 | 30.0 – 31.3 | 1.3 | SS-7 | 23-48-50/4 (98/10") | **Silty Sand (SM)** 30.0-31.3' - pale yellowish orange, (10YR 6/2), wet, very dense, fine silica sand, 20% nonplastic fines, trace very fine black particles, 5% medium to coarse sand-sized concretions in the upper 0.3' of sample | | SS-7 collected at 10:08 |
| 35 | 35.0 | | | | | | |
| 8.1 | 35.0 – 36.5 | 1.3 | SS-8 | 24-43-50 (93) | **Silty Sand (SM)** 35.0-36.3' - pale yellowish orange, (10YR 6/2), wet, very dense, fine silica sand, 20% nonplastic fines, 5-10% very fine black particles, trace medium grain-sized concretions, trace organics | | SS-8 collected at 10:22 |
| 40 | | | | | | | |

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| 338884.FL | GSC-01 SHEET 3 OF 6 |

# SOIL BORING LOG

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 ORIENTATION : Vertical

WATER LEVELS : 4.5 ft bgs on 4/5/2007 START : 4/4/2007 END : 4/5/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 3.1 | 40.0<br>41.0 | 1.0 | SS-9 | 30-50/6 (80/12") | **Silty Sand (SM)**<br>40.0-41.0' - pale yellowish brown, (10YR 5/4), wet, very dense, fine silica sand, 15-20% nonplastic fines, trace very fine black particles | | SS-9 collected at 10:38 |
| 45 | 45.0 | | | | | | |
| -1.9 | 45.9 | 0.9 | SS-10 | 34-50/4.5 (84/10.5") | **Silty Sand (SM)**<br>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% nonplastic fines, trace very fine to medium black particles, trace medium sand-sized concretions, similar to above | | SS-10 collected at 10:57<br><br>Driller's Remark: 11:05 added 1/2 50-lb bag of QuikGel bentonite after removing sand cuttings from tub and refilling with clean water; maintained circulation since start |
| 50 | 50.0 | | | | | | |
| -6.9 | 51.5 | 1.2 | SS-11 | 28-44-50 (94) | **Silty Sand (SM)**<br>50.0-51.2' - light olive gray, (5Y 5/2), wet, very dense, fine silica sand, 20-25% nonplastic fines, trace very fine black particles | | SS-11 collected at 11:35 |
| 55 | 55.0 | | | | | | |
| -11.9 | 56.5 | 1.2 | SS-12 | 22-34-44 (78) | **Silty Sand (SM)**<br>55.0-56.2' - Same as 50.0-51.2' except trace coarse sand-sized concretions over first 0.1' (slough) | | SS-12 collected at 13:54 |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-01 SHEET 4 OF 6 |

# SOIL BORING LOG

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 ORIENTATION : Vertical

WATER LEVELS : 4.5 ft bgs on 4/5/2007 START : 4/4/2007 END : 4/5/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -16.9 | 60.0 – 61.5 | 1.2 | SS-13 | 25-43-50 (93) | **Silty Sand (SM)** 60.0-61.2' - Same as 55.0-56.2' except no concretions and color changes from yellowish gray (5Y 7/2) in upper 0.25' to light olive gray (5Y 5/2) from 60.25-61.2' | | SS-13 collected at 14:13 |
| 65 | 65.0 | | | | | | |
| -21.9 | 65.9 | 0.9 | SS-14 | 32-50/4.5 (82/10.5") | **Silty Sand (SM)** 65.0-65.9' - light olive gray, (5Y 5/2), wet, very dense, fine silica sand, 15-20% nonplastic fines, trace very fine black particles | | SS-14 collected at 14:39 |
| 70 | 70.0 | | | | | | |
| -26.9 | 71.0 | 0.9 | SS-15 | 35-50/6 (85/12") | **Silty Sand (SM)** 70.0-70.9' - yellowish gray, (5Y 7/2), wet, very dense, fine silica sand, 15-20% nonplastic fines, trace very fine black particles | | SS-15 collected at 15:00<br>Added water and 1/4 bag QuikGel bentonite |
| 75 | 75.0 | | | | | | |
| -31.9 | 75.9 | 0.8 | SS-16 | 33-50/5 (83/11") | **Silty Sand (SM)** 75.0-75.8' - Same as 70.0-70.9' | | SS-16 collected at 15:25 |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-01 SHEET 5 OF 6 |

# SOIL BORING LOG

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 ORIENTATION : Vertical

WATER LEVELS : 4.5 ft bgs on 4/5/2007 START : 4/4/2007 END : 4/5/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -36.9 | 80.0 – 81.5 | 1.4 | SS-17 | 18-32-44 (76) | **Silty Sand (SM)** 80.0-81.4' - yellowish gray, (5Y 7/2), wet, very dense, grayish blue (5PB 5/2) mottling/staining of sand from 80.7-81.0', medium light gray (N6) staining from 81.0-81.4', fine silica sand, 20-25% nonplastic fines, trace very fine black particles | | SS-17 collected at 15:50<br>Added 1/4 50-lb bag of QuikGel bentonite |
| 85 | 85.0 – 86.5 | 1.1 | SS-18 | 15-12-12 (24) | **Silty Sand (SM)** 85.0-86.1' - Same as 80.0-81.4' except medium dense, 1" thick grayish blue seam near the top and very bottom of sample, 25-30% nonplastic fines | | SS-18 collected at 16:15 |
| -41.9 | 90.0 – 91.5 | 1.3 | SS-19 | 11-11-10 (21) | **Silty Sand (SM)** 90.0-91.3' - grayish yellow, (5Y 8/4), wet, medium dense, very fine to fine silica sand, 20-25% nonplastic 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 gravel-sized sand concretions, possible pyrite | | SS-19 collected at 16:39 |
| 90 | 95.0 – 96.5 | 0.7 | SS-20 | 6-7-8 (15) | **Silty Sand (SM)** 95.0-95.7' - pale yellowish brown, (10YR 6/2), wet, medium dense, fine silica sand, 30% nonplastic fines, trace fine sand-sized angular black particles, 1" concretion with a hollowed out section | | SS-20 collected at 17:05 |
| -46.9 | | | | | | | |
| 95 | | | | | | | |
| -51.9 | | | | | | | |
| 100 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-01 SHEET 6 OF 6 |

# SOIL BORING LOG

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 ORIENTATION : Vertical

WATER LEVELS : 4.5 ft bgs on 4/5/2007 START : 4/4/2007 END : 4/5/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -56.9 | 100.0<br>101.5 | 1.5 | SS-21 | 10-24-49 (73) | **Silty Sand (SM)**<br>100.0-101.5' - Same as 90.0-91.2' except very dense, no seams, trace angular dark gray (N3) concretions | | SS-21 collected at 17:39<br>18:03 Driller tape measures hole<br>Total depth at 97.0'<br>Water level at 4.5' below ground surface 4/05/07 07:36<br>Water level at 3.5' bgs<br>Grouted to surface with three 92 lb bags of Holcim brand Portland cement and two 47-lb bags of Quikrete brand Portland cement |
| | | | | | Bottom of Boring at 101.5 ft bgs on 4/5/2007 | | |
| 105<br>-61.9 | | | | | | | |
| 110<br>-66.9 | | | | | | | |
| 115<br>-71.9 | | | | | | | |
| 120 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, NW rods, 4-3/4" tri-cone and 3-7/8" drag bit ORIENTATION : Vertical

WATER LEVELS : 3.0 ft bgs on 4/6/07 START : 4/5/2007 END : 4/6/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.9 | 0.0 – 1.5 | 1.5 | SS-1 | 1-2-2 (4) | **Poorly Graded Sand With Organics (SP)** 0.0-1.0' - very light gray, (N8), moist, very loose, very fine to fine grained silica sand, trace nonplastic fines, 15% organics | | SS-1 collected at 10:12 |
| | 1.5 – 5.0 | | | | **Sandy Organic Soil (OL)** 1.0-1.5' - brownish black and medium brown, (5YR 3/1, 5YR 3/4), moist, soft, low plasticity, 30-40% very fine silica sand, roots | | Glen Davis is cathead operator<br>140-lb hammer<br>24" split spoon (SS)<br>5.0' sections of NW rod<br>4.75" tricone roller drill bit<br>1/2 50-lb bag QuikGel bentonite added to mud vat |
| 5 | 5.0 – 6.5 | 0.9 | SS-2 | 3-6-8 (14) | **Clayey Sand (SC)** 5.0-5.5' - yellowish gray, (5Y 7/2), wet, medium dense, no HCl reaction, very fine to fine silica sand, 30% low plastic fines, 10-15% rootlets | | SS-2 collected at 10:39 |
| 37.9 | 6.5 – 10.0 | | | | **Poorly Graded Sand (SP)** 5.5-5.9' - very pale orange, (6YR 8/2), wet, medium dense, fine silica sand, trace nonplastic fines | | |
| 10 | 10.0 – 11.5 | 1.3 | SS-3 | 6-7-9 (16) | **Silty Sand (SM)** 10.0-11.3' - light olive gray, (5Y 6/1), wet, medium dense, fine silica sand, 30-35% nonplastic fines, trace very fine black particles | | SS-3 collected at 10:46 |
| 32.9 | 11.5 – 15.0 | | | | | | |
| 15 | 15.0 – 16.5 | 1.1 | SS-4 | 8-10-13 (23) | **Silty Sand (SM)** 15.0-16.1' - Same as 10.0-11.3' except very pale orange, (10YR 8/2), 25% nonplastic fines | | SS-4 collected at 10:52 |
| 27.9 | 16.5 – | | | | | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-01A SHEET 2 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

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, NW rods, 4-3/4" tri-cone and 3-7/8" drag bit ORIENTATION : Vertical

WATER LEVELS : 3.0 ft bgs on 4/6/07 START : 4/5/2007 END : 4/6/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.9 | 20.0 – 21.5 | 1.1 | SS-5 | 16-22-31 (53) | **Silty Sand (SM)** 20.0-21.1' - Same as 15.0-16.1' except very dense, slight hue change at bottom 4" toward pale yellowish brown (10YR 6/2), 20-25% nonplastic fines | | SS-5 collected at 11:00 |
| 25 | 25.0 | | | | | | |
| 17.9 | 26.5 | 1.2 | SS-6 | 20-38-55 (93) | **Silty Sand (SM)** 25.0-26.2' - Same as 15.0-16.1' except very pale orange to pale yellowish brown, (10YR 8/2 to 10YR 6/2), 20% high plasticity fines | | SS-6 collected at 11:07 |
| 30 | 30.0 | | | | | | |
| 12.9 | 31.5 | 1.2 | SS-7 | 21-31-41 (72) | **Silty Sand (SM)** 30.0-31.2' - Same as 25.0-26.2' except trace very fine sand-sized pale yellowish orange (10YR 8/6) particles, trace coarse sand-sized concretions | | SS-7 collected at 11:17 |
| 35 | 35.0 | | | | | | |
| 7.9 | 36.5 | 1.5 | SS-8 | 12-18-20 (38) | **Silty Sand (SM)** 35.0-36.5' - pale yellowish brown, (10YR 6/2), wet, dense, fine silica sand, 30-35% nonplastic fines, black (N1) mottling of sands in a 1/4" thick seam at 35.75', similar to above (30.0-31.2') | | SS-8 collected at 11:26 |
| | | | | | | | Driller's Remark: 12:50 empty mud vat, remove sandy cuttings, refill, add 1/4 50-lb bag of QuikGel bentonite<br>13:15 Resume drilling to 40.0' |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, NW rods, 4-3/4" tri-cone and 3-7/8" drag bit ORIENTATION : Vertical

WATER LEVELS : 3.0 ft bgs on 4/6/07 START : 4/5/2007 END : 4/6/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.9 | 40.0 – 41.5 | 1.2 | SS-9 | 16-21-19 (40) | **Silty Sand (SM)** 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" seams | | SS-9 collected at 13:24 |
| 45 -2.1 | 45.0 – 46.5 | 1.2 | SS-10 | 15-18-19 (37) | **Silty Sand (SM)** 45.0-46.2' - pale yellowish brown, (10YR 6/2), wet, dense, fine silica sand, 30% low plasticity fines, no mottling, sample relatively homogenous | | SS-10 collected at 13:36<br>Driller's Remark: Change out rope on hammer after noticing a weakened/frayed zone in it |
| 50 -7.1 | 50.0 – 51.5 | 1.5 | SS-11 | 5-6-9 (15) | **Fat Clay (CH)** 50.0-51.5' - predominantly dusky yellow green, (5GY 5/2), moist, stiff, high plasticity, no dilatancy, mottled with dusky blue and very pale orange (5PB 3/2, 10YR 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 | | SS-11 collected at 14:00 |
| 55 -12.1 | 55.0 – 56.5 | 1.5 | SS-12 | 4-5-5 (10) | **Sandy Fat Clay (CH)** 55.0-56.5' - predominantly yellowish gray, (5Y 7/2), moist, stiff, high plasticity, no dilatancy, mottled with dark gray and grayish green (N3 and 10GY 5/2), 25-30% very fine silica sand in irregular lenses, trace to 5% fine carbonate sand, mild HCl reaction in carbonate particles | | SS-12 collected at 14:22 |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-01A SHEET 4 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

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, NW rods, 4-3/4" tri-cone and 3-7/8" drag bit ORIENTATION : Vertical

WATER LEVELS : 3.0 ft bgs on 4/6/07 START : 4/5/2007 END : 4/6/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -17.1 | 60.0 – 61.5 | 1.5 | SS-13 | 3-5-5 (10) | **Fat Clay With Sand (CH)** 60.0-61.5' - Same as 55.0-56.5' except no dark gray mottling, 10% very fine silica sand and 10-15% medium sand-sized very pale orange (10YR 8/2) carbonate particles throughout, mild HCl reaction in carbonates | | SS-13 collected at 14:53 |
| 65 | 65.0 | | | | | | |
| -22.1 | 66.5 | 1.5 | SS-14 | 3-5-7 (12) | **Fat Clay (CH)** 65.0-66.5' - grayish green, (10GY 5/2), moist, stiff, high plasticity, no dilatancy, no HCl reaction, mottled 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 | | SS-14 collected at 15:25<br>Driller's Remark: Will switch to a 3-7/8" drag bit to help drilling rate through clay<br>Driller's Remark: NW rod (5 sections) |
| 70 | 70.0 | | | | | | |
| -27.1 | 71.5 | 1.5 | SS-15 | 5-8-10 (18) | **Fat Clay (CH)** 70.0-71.5' - pale blue, (5B 6/2), moist, very stiff, high plasticity, no dilatancy, no HCl reaction, trace mottling 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 | | SS-15 collected at 16:10 |
| 75 | 75.0 | | | | | | |
| -32.1 | 76.5 | 1.4 | SS-16 | 19-21-23 (44) | **Silty Sand (SM)** 75.0-76.4' - pale yellowish brown, (10YR 6/2), wet, dense, no HCl reaction, fine silica sand, 20-30% nonplastic fines, trace very fine sand-sized black particles | | SS-16 collected at 16:37 |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-01A SHEET 5 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

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, NW rods, 4-3/4" tri-cone and 3-7/8" drag bit ORIENTATION : Vertical

WATER LEVELS : 3.0 ft bgs on 4/6/07 START : 4/5/2007 END : 4/6/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -37.1 | 80.0 – 81.5 | 1.2 | SS-17 | 24-41-50 (91) | **Silty Sand (SM)** 80.0-81.2' - medium dark gray, (N4), wet, very dense, fine silica sands, trace very fine black particles, 20% nonplastic fines, first 4-13/16" of sample is irregularly bedded silty sand (SM) from 75.0-76.4' and the remaining 9-5/8" sand is as described above | | SS-17 collected at 17:01 |
| 85 | 85.0 | | | | | | |
| -42.1 | 86.5 | 1.2 | SS-18 | 26-48-50/5.5 (98/11.5") | **Silty Sand (SM)** 85.0-86.2' - pale yellowish brown, (10YR 6/2), wet, very dense, medium dark gray (N4) staining, fine silica sand, 25-30% nonplastic fines, trace medium sand-sized concretions | | SS-18 collected at 17:28<br>Driller's Remark: 04/05/07 Stop drilling for the day at 17:34 |
| 90 | 90.0 | | | | | | |
| -47.1 | 91.5 | 1.5 | SS-19 | 14-9-9 (18) | **Silty Sand (SM)** 90.0-91.5' - pale yellowish brown, (10YR 6/2), wet, medium dense, fine silica sand, 30-40% low plastic fines including 7-10% very fine sand-sized black particles, trace medium dark gray (N4) staining, trace angular fine gravel-sized pyrite at top of sample (possibly slough) | | SS-19 taken at 09:24<br>Driller's Remark: Glen Davis is cathead operator on 04/06/07<br>N-rod (5.0' sections NW)<br>3-7/8" drag bit<br>140-lb cathead hammer<br>50-lb bags of QuikGel brand bentonite in use<br>08:15 water level at 3.0' below ground surface<br>08:50 pump not circulating (Rods/pump?) Clogged with sand<br>Rods broke out, cleared, re-assembled<br>Mud vat mixed 1/2 bag bentonite for drilling |
| 95 | 95.0 | | | | | | |
| -52.1 | 96.5 | 1.5 | SS-20 | 15-8-7 (15) | **Silty Sand (SM)** 95.0-96.5' - pale yellowish brown, (10YR 6/2), wet, medium dense, fine silica sand, 25% low plastic fines, trace very fine sand-sized black particles | | Driller's Remark: 09:35 sand clogs rods again during installation into borehole |
| 100 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-01A SHEET 6 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

DRILLING METHOD AND EQUIPMENT : CME 550 S/N 186073, mud rotary, cathead, NW rods, 4-3/4" tri-cone and 3-7/8" drag bit ORIENTATION : Vertical

WATER LEVELS : 3.0 ft bgs on 4/6/07 START : 4/5/2007 END : 4/6/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -57.1 | 100.0 | 1.2 | SS-21 | 3-4-3 (7) | **Silty Sand (SM)** 100.0-101.2' - pale yellowish brown, (10YR 6/2), wet, very loose, fine silica sand, 20% nonplastic fines, trace fine to coarse gravel-sized pyrite | | SS-21 collected at 10:46 |
| | 101.5 | | | | Bottom of Boring at 101.5 ft bgs on 4/6/2007 | | Driller's Remark: Circulation has been maintained at all times during drilling, No casing was installed<br>10:46 End of drilling for GSC-01A (20.0' offset for sand delineation from GSC-01) |
| 105<br>-62.1 | | | | | | | |
| 110<br>-67.1 | | | | | | | |
| 115<br>-72.1 | | | | | | | |
| 120 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-01B SHEET 1 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 bgs on 03/10/07 START : 4/6/2007 END : 4/9/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.8 | 0.0 – 1.5 | 1.3 | SS-1 | 1-2-2 (4) | **Poorly Graded Sand (SP)** 0.0-1.3' - very light gray, (N8), moist, very loose, very fine to fine silica sand, 5% nonplastic fines, trace very fine sand-sized black particles, trace organics and brown mottling | | SS-1 taken at 15:26<br>24" split spoon (SS)<br>50-lb bags of QuikGel brand bentonite<br>Added 1/4 bag bentonite to full mud vat<br>Water level at 3.0' below ground surface at 15:35 based on moist SS-1, wet SS-2 samples |
| 5 | 5.0 – 6.5 | 0.9 | SS-2 | 7-9-8 (17) | **Poorly Graded Sand (SP)** 5.0-5.9' - yellowish gray, (5Y 8/1), wet, medium dense, fine grained, silica sand, trace nonplastic fines including trace sand-sized black particles | | SS-2 taken at 15:49 |
| 37.8 | | | | | | | |
| 10 | 10.0 – 11.5 | 1.3 | SS-3 | 8-11-12 (23) | **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, silica sand, 25-35% low plastic fines including trace very fine sand-sized black particles, trace fine gravel-sized concretions | | SS-3 taken at 15:54 |
| 32.8 | | | | | | | |
| 15 | 15.0 – 16.5 | 1.2 | SS-4 | 12-15-13 (28) | **Silty Sand (SM)** 15.0-16.2' - very light gray to yellowish gray, (N8 to 5Y 8/1), wet, medium dense, fine grained, nonplastic, silica sand, 20-25% nonplastic fines, trace very fine grain black particles | | SS-4 taken at 15:59 |
| 27.8 | | | | | | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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

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 bgs on 03/10/07 START : 4/6/2007 END : 4/9/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.8 | 20.0 – 21.5 | 1.1 | SS-5 | 12-15-14 (29) | **Silty Sand (SM)** 20.0-21.1' - Same as 15.0-16.2' | | SS-5 taken at 16:04 |
| 25 | 25.0 | | | | | | |
| 17.8 | 25.0 – 26.5 | 1.0 | SS-6 | 12-75-72 (147) | **Silty Sand (SM)** 25.0-26.0' - Same as 20.0-21.1' | | |
| 30 | 30.0 | | | | | | |
| 12.8 | 30.0 – 31.5 | 1.5 | SS-7 | 5-7-6 (13) | **Fat Clay (CH)** 30.0-31.5' - mixed CH materials in irregular lenses and pockets, 30.0-30.4' is grayish green (10GY 5/2), with medium gray to dark gray mottling (N3 to N4), 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 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 | | SS-7 taken at 16:21<br>Driller's Remark: change to tricone roller bit 3-7/8" at 34.0', hit hard rock |
| 35 | 35.0 | | | | | | |
| 7.8 | 35.0 – 36.5 | 0.8 | SS-8 | 15-13-13 (26) | **Clayey Limestone Gravel With Sand (GC)** 35.0-35.8' - yellowish gray with light olive gray staining, (5Y 8/1 with 5Y 5/6), wet, medium dense, strong HCl reaction, angular gravel-sized limestone, 20-25% fine to coarse sand-sized, 20% medium to high plastic fines, carbonate materials | | SS-8 taken at 16:44 |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-01B SHEET 3 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 bgs on 03/10/07 START : 4/6/2007 END : 4/9/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.8 | 40.0 – 41.5 | 0.4 | SS-9 | 11-8-9 (17) | **Clayey Sand (SC)** 40.0-40.4' - white to yellowish gray, (N9 to 5Y 8/1), moist, medium dense, fine to medium grained, low to medium plasticity, very strong HCl reaction, 25% low to medium plastic fines, carbonate materials | | SS-9 taken at 16:54 |
| | | | | | | | Driller's Remark: 17:02 43.5' hard drilling, loss of circulation (LOC) up to 100% |
| 45 -2.2 | 45.0 – 46.5 | 1.0 | SS-10 | 7-9-8 (17) | **Clayey Sand With Limestone Fragments (SC)** 45.0-46.0' - Same as 40.0-40.4' except 25% fine to coarse gravel-sized limestone fragments, fossiliferous | | SS-10 taken at 17:06<br>Installed 40.0' HW casing |
| 50 -7.2 | 50.0 – 51.5 | 1.5 | SS-11 | 20-14-11 (25) | **Clayey Sand With Limestone Fragments (SC)** 50.0-51.5' - Same as 45.0-46.0' except staining over upper most 4.0', 40% fine to coarse gravel-sized limestone, trace moderate brown to dusky brown (5YR 3/4 to 5YR 2/2) concretions | | |
| | | | | | | | 8:22 water level at 18.0' below ground surface on 4/7/07<br>N-rod (5.0' sections)<br>45.0' HW casing in hole<br>1/8 50-lb bag of QuikGel brand bentonite added to mud vat<br>3-7/8" tricone roller drill bit<br>SS-11 taken at 09:42 |
| 55 -12.2 | 55.0 – 56.5 | 1.2 | SS-12 | 22-15-14 (29) | **Clayey Gravel With Sand (GC)** 55.0-56.2' - Same as 50.0-51.5' except 60% fine to coarse gravel-sized, 20-25% sand-sized, highly fossiliferous | | 100% circulation loss; refill vat, add 1/2 bag bentonite |
| | | | | | | | 11:02 Driller's Remark: hard at 53.0', light to moderate chatter, soft from 54.0'-55.0', hole collapse at bottom so that split spoon resting on 1.5' of cave-in material<br>11:15 N-rod pulled out to install NW casing with advancer and tricone roller drill bit wireline accessory (Serial Number: 83963-CN)<br>Refill mud vat, add 1/4 bag bentonite<br>SS-12 taken at 13:55 |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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 bgs on 03/10/07 START : 4/6/2007 END : 4/9/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -17.2 | 60.0 – 61.5 | 1.0 | SS-13 | 30-22-23 (45) | **Silty Limestone Gravel With Sand (GM)** 60.0-61.0' - Same as 55.0-56.2' except low plasticity fines, 50% fine to coarse gravel-sized, 35% fine to coarse sand-sized, 15% fines, highly fossiliferous | | Driller's Remark: 14:05 switch to N-rod (5.0' sections) 2-7/8" tricone roller bit due to continued down-hole cave-in SS-13 taken at 14:32 Switch back to NW casing advancer tricone roller drill bit, maintaining some circulation through HW set to 45.0' below ground surface |
| 65 | 65.0 | | | | | | |
| -22.2 | 66.5 | 1.2 | SS-14 | 19-16-10 (26) | **Clayey Sand With Limestone Fragments (SC)** 65.0-66.2' - Same as 60.0-61.0' except white to very light gray, (N9 to N8), low plasticity, medium light gray (N6) staining over bottom half of sample, fine to coarse sand-sized, 35% fine to coarse gravel, 20-25% fines, highly fossiliferous | | SS-14 taken at 16:02 Last run of 4/7/07 |
| 70 | 70.0 | | | | | | |
| -27.2 | 71.5 | 1.5 | SS-15 | 6-7-8 (15) | **Sandy Fat Clay (CH)** 70.0-71.5' - pale green with pale olive gray sands, (6G 6/2 with 5Y 5/2), moist, stiff, high plasticity, no dilatancy, trace dusky blue (5PB 3/2) mottling, 30% very fine to fine silica sand, 5% carbonate sand in irregular pockets, carbonate clasts with mild HCl reaction | | 08:35 water level at 3.0' below ground surface on 4/8/07 65.0' NW installed Using NW casing advancer with wireline tricone drill bit accessory N-rod (5.0' sections) 140-lb hammer via cathead SS-15 taken at 09:02 5.0' NW casing added to advance boring |
| 75 | 75.0 | | | | | | |
| -32.2 | 76.5 | 1.5 | SS-16 | 12-17-15 (32) | **Clayey Sand With Limestone Fragments (SC)** 75.0-76.5' - white to bluish white, (N9 to 5B 9/1), wet, dense, fine to coarse grained, very strong HCl reaction, trace dark gray (N3) mottling or staining, 25-30% low to medium plastic fines, 15-20% fine gravel-sized, 1-1/2" silty sand (SM) seam and fat clay (CH) seam, highly fossiliferous | | Driller's Remark: 09:20 he'll have to switch back to 2-7/8" tricone drag bit to get through clay - will no longer be advancing NW casing 70.0' NW currently installed Driller's Remark: 09:40 good circulation through NW casing Two irregular blows in SS-16 SPT SS-16 taken at 09:58 Driller's Remark: adding another 5.0' section of NW casing, losing depth to cave-in |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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

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 bgs on 03/10/07 START : 4/6/2007 END : 4/9/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -37.2 | 80.0 – 81.5 | 1.5 | SS-17 | 4-6-11 (17) | **Clayey Sand With Limestone Gravel (SC)** 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 coarse grained, strong HCl reaction, low to medium plastic fines, trace medium dark gray (N4) staining, 35-40% plastic fines, 15% fine gravel-sized limestone, all carbonate | | SS-17 taken at 10:42 |
| 85 | 85.0 | | | | | | |
| -42.2 | 86.5 | 1.5 | SS-18 | 4-5-12 (17) | **Interbedded Sands And Clays, Silty Sand (SM)** 85.0-85.2' - yellowish gray, (5Y 7/2), wet, medium dense, nonplastic, mild HCl reaction, silica sand, trace fine carbonate sand, 25% nonplastic fines, mild HCl reaction in carbonate sand | | SS-18 taken at 11:19<br>Driller's Remark: 75% circulation loss at 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 | | |
| 90 | 90.0 | | | | **Clayey Sand (SC)** 85.3-86.5' - moderate yellowish brown, (10YR 5/4), moist, medium dense, fine silica sand, trace fine carbonate sand, 40-45% medium plastic fines, mild HCl reaction in carbonate grains | | |
| -47.2 | 91.5 | 1.5 | SS-19 | 5-14-22 (36) | **Interbedded Silty Sand And Fat Clay, And Clayey Sand (SM)** 90.0-91.5' - Same as 85.0-86.5' | | SS-19 taken at 11:27 |
| 95 | 95.0 | | | | | | |
| -52.2 | 96.5 | 1.4 | SS-20 | 5-12-15 (27) | **Fat Clay (CH)** 95.0-95.9' - Same as 85.0-86.5' except no yellowish gray lens, white fine sand-sized particles in pockets | | SS-20 taken at 11:55 |
| | | | | | **Clayey Sand (SC)** 95.9-96.4' - Same as 85.0-86.5' except 35-40% low to medium plastic fines | | |
| 100 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-01B SHEET 6 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 bgs on 03/10/07 START : 4/6/2007 END : 4/9/2007 LOGGER : T. Stewart

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -57.2 | 100.0<br>101.5 | 1.5 | SS-21 | 7-8-8<br>(16) | **Silty Sand (SM)**<br>100.0-101.5' - yellowish gray, (5Y 7/2), wet, medium dense, fine grained, no HCl reaction, silica sand, 15-20% nonplastic fines, trace very fine sand-sized black particles, trace black staining near bottom of sample<br>Bottom of Boring at 101.5 ft bgs on 4/9/2007 | | SS-21 taken at 12:22<br>SS-21 (100.0-101.5') is the last sample for GSC-01B, end of drilling<br>Hole abandoned on 4/9/07 with 50-55 gallons of grout mix, 12 bags of 47-lb each of Quick Portland cement Type I/II |
| 105<br>-62.2 | | | | | | | |
| 110<br>-67.2 | | | | | | | |
| 115<br>-72.2 | | | | | | | |
| 120 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-02 SHEET 1 OF 8 |

# SOIL BORING 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

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 bgs on 5/16/07 START : 5/15/2007 END : 5/17/2007 LOGGER : R. Bitely, D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 40.4 | 0.0 – 1.5 | 1.1 | SS-1 | 1-2-3 (5) | **Topsoil (OL)** 0.0-0.3' - brownish black, (5YR 2/1), moist, very soft, 60% organic no fines, <40% roots/vegetative detritus | | |
| | | | | | **Poorly Graded Sand With Some Limestone Fragments (SP)** 0.3-1.1' - very pale beige, (10YR 8/2), moist, very loose, very fine to fine grained, nonplastic, trace nonplastic fines, 10-15% organics, silica sand | | |
| 5 | 5.0 | | | | | | |
| 35.4 | 5.0 – 6.5 | 0.4 | SS-2 | 5-18-10 (28) | **Sandy Clay And Organic Wood Debris (SC)** 5.0-5.4' - light gray to yellowish gray, (N/7, 5Y81), moist, very stiff, medium plasticity, no to mild HCl reaction, <30% very fine to medium grained carbonate sands, 50% of sample is wood debris | | Driller's Remark: Wood from 5.0-8.5' below surface, several scoops of wood chips removed from mud pit<br>Driller's Remark: Smooth, easy drilling, light chatter at 7.0' and 9.5' |
| 10 | 10.0 | | | | | | |
| 30.4 | 10.0 – 10.3 | 0.3 | SS-3 | 50/4 (50/4") | **Silt (ML)** 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 <1/4" diameter, carbonate materials | | |
| 15 | 15.0 | | | | | | |
| 25.4 | 15.0 – 16.5 | 0.5 | SS-4 | 13-3-8 (11) | **Silt (ML)** 15.0-15.5' - grayish yellow with moderate yellow lenses, (5Y 8/4 with 5Y 7/6), moist to wet, stiff, nonplastic, rapid dilatancy, moderate HCl reaction, 10-15% very fine to medium sand, carbonate materials | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-02 SHEET 2 OF 8 |

# SOIL BORING 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

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 bgs on 5/16/07 START : 5/15/2007 END : 5/17/2007 LOGGER : R. Bitely, D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 20.4 | 20.0 | 0.2 | SS-5 | 50/5 (50/5") | **Sandy Silt (ML)** 20.0-20.2' - grayish yellow, (5Y 8/4), moist to wet, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 30-35% fine to coarse sand-sized limestone fragments, lenses <1/4" thick, carbonate materials | | |
| 25 15.4 | 25.0 26.5 | 1.2 | SS-6 | 35-40-35 (75) | **Sandy Silt With Limestone Lenses (ML)** 25.0-26.2' - grayish yellow, (5Y 8/4), moist to wet, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 25% fine to medium sand, <30% limestone lenses <1/4" thick, carbonate materials | | |
| 30 10.4 | 30.0 31.5 | 1.0 | SS-7 | 15-15-40 (55) | **Silt With Limestone Lenses (ML)** 30.0-31.0' - Same as 25.0-26.2' except dark yellowish orange, (10YR 6/6) | | Stop drilling for the day at 17:30, resume drilling 5/16/07 08:00, water level at 1.4' below ground surface |
| 35 5.4 | 35.0 35.7 | 0.5 | SS-8 | 35-50/2 (85/8") | **Silty Sand (SM)** 35.0-35.5' - yellowish gray, (5Y 7/2), moist, very dense, moderate HCl reaction, fine to coarse sand, 30% nonplastic fines, carbonate materials | | Driller's Remark: Moderate to light chatter from 35.0-39.0' |
| 40 | | | | | | | Driller's Remark: 39.0-40.0' rapid smooth drilling |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-02 SHEET 3 OF 8 |

# SOIL BORING 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

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 bgs on 5/16/07 START : 5/15/2007 END : 5/17/2007 LOGGER : R. Bitely, D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 0.4 | 40.0 | 0.3 | SS-9 | 50/3.5 (50/3.5") | **Silty Sand And Limestone Fragments (SM)** 40.0-40.3' - Same as 35.0-35.5' except 35-40% fine gravel-sized limestone fragments | | Driller's Remark: Smooth drilling with moderate to fast movement, intermittent light chatter |
| 45 -4.6 | 45.0 | 1.3 | SS-10 | 18-20-35 (55) | **Sandy Silt And Limestone Lenses/fragments (ML)** 45.0-46.3' - Same as 40.0-40.3' except 25% nonplastic fines, 35% fine gravel-sized limestone fragments in lenses | | |
| | 46.5 | | | | | | |
| 50 -9.6 | 50.0 | 0.8 | SS-11 | 50-50/5 (100/11") | **Limestone And Silty Sand** 50.0-50.8' - Same as 45.0-46.3' except 60% fine to coarse gravel-sized limestone fragments, 30-35% fine to coarse sand, 15-20% of nonplastic fines | | |
| | 50.9 | | | | Begin Rock Coring at 51.0 ft bgs<br>See the next sheet for the rock core log | | |
| 55 -14.6 | | | | | | | |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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

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

WATER LEVELS : 1.4 ft bgs on 5/16/07 START : 5/15/2007 END : 5/17/2007 LOGGER : R. Bitely, D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 51.0 | | | | | | |
| | R1-NQ 5 ft 89% | 58 | 2 | 51.2' - Bedding plane, horizontal, smooth, undulating, open <1/4" | | **Limestone** 51.0-55.45' - pale yellow brown, (10YR 6/2), fine to medium grained, moderate to high HCl reaction, extremely weak to weak (R0 to R2), voids <1/16" diameter over 50% of surface, trace fossil molds <1/2" diameter, trace cavities <1/2" diameter, trace crystallized limestone infill | Establish rock contact at 51.0' below ground surface, set HW casing to 51.0' below ground surface Begin rock coring using NQ wireline tooling from 51.0' below ground surface |
| | | | 0 | 51.7' - Fracture or mechanical break, 30 deg, rough, undulating, open <1/4" 52.35' - Mechanical break | | | |
| | | | 6 | 53.05' - Fracture or mechanical break, 30 deg, rough, undulating, open <1/4" | | | |
| | | | 3 | 53.25, 53.6, 53.85' - Bedding plane or mechanical break (3), horizontal, smooth, undulating, open <1/4"-1/2" 53.5' - Mechanical break | | | R1:2 minutes |
| 55 -14.6 | | | 1 | 53.9' - Fracture or mechanical break, 20 deg and 40 deg, rough, undulating, open <1/4" | | | |
| | 56.0 | | NR | 54.3' - Bedding plane or mechanical break, horizontal, smooth, undulating, open <1/4"-1/2" | | **No Recovery 55.45-56.0'** | |
| | R2-NQ 5 ft 100% | 92 | 2 | 54.5' - Fracture or mechanical break, 20 deg and 40 deg, rough, undulating, open <1/4" | | **Limestone** 56.0-61.0' - pale yellowish brown, (10YR 6/2), fine to medium grained, high HCl reaction, very weak to weak (R1 to R2), voids (<1/16") over 40-50% of surface, trace fossil molds | |
| | | | 2 | 54.6, 54.7' - Mechanical break (2) | | | |
| | | | 1 | 54.75' - Fracture or mechanical break, 20 deg and 40 deg, rough, undulating, open <1/4" | | | |
| | | | 1 | 55.15, 55.4' - Bedding plane or mechanical break (2), horizontal, smooth, undulating, open <1/4"-1/2" | | | |
| 60 -19.6 | | | 1 | 56.4, 56.8, 57.1, 57.7, 58.7, 59.2' - Bedding plane or mechanical break (6), <10 deg, rough, undulating, open <1/4" | | | R2:3 minutes |
| | 61.0 | | | 60.1' - Fracture or mechanical break, 65 deg, smooth, undulating, tight to open <1/4" | | | |
| | R3-NQ 5 ft 70% | 44 | 3 | 61.5' - Bedding plane or mechanical break, <10 deg, smooth to rough, undulating, open <1/2"-1/4" | | 61.0-64.5' - pale yellowish brown to light gray, (10YR 6/2 to N7), very fine to medium grained, strong HCl reaction, 61.0-62.0' and 62.45-63.0' very weak to weak (R1 to R2) rock, 62.0-62.45' extremely weak (R0) rock, 63.0-64.5' medium strong to strong (R3 to R4) rock, voids (<1/16") over 30-50% surface except trace voids from 62.0-62.45', trace fossil molds <1/2"diameter, trace cavities <1/2" diameter from 61.0-62.0', trace organics | |
| | | | 2 | 61.7' - Mechanical break or fractures, 20 deg, rough, undulating, tight to open <1/2" | | | |
| | | | 2 | 62.0' - Bedding plane or mechanical break, <10 deg, smooth to rough, undulating, open <1/2"-1/4" | | | R3:3 minutes |
| | | | 2 | 62.7' - Mechanical break or fractures, 20 deg, rough, undulating, tight to open <1/2" | | | |
| 65 -24.6 | | | NR | 62.95' - Bedding plane or mechanical break, <10 deg, smooth to rough, undulating, open <1/2-1/4" | | **No Recovery 64.5-66.0'** | |
| | 66.0 | | | 63.15' - Mechanical break or fractures, 50 deg, rough, undulating, tight to open <1/2" | | | |
| | R4-NQ 5 ft 98% | 88 | 1 | 63.35' - Mechanical break or fractures, 10 deg, rough, undulating, tight to open <1/2" | | **Limestone** 66.0-70.9' - pale yellow brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), very fine to fine grained, strong HCl reaction, very weak to weak (R1 to R2), except 67.5-67.9' that is extremely weak (R0) to very weak (R1) rock, voids (<1/16") over 30-50% of surface, 10-20% fossil molds <1/4" diameter, trace cavities <3/4" by 1/2", trace organics | |
| | | | 3 | 63.5' - Mechanical break 64.25' - Bedding plane or mechanical break, <10 deg, smooth to rough, undulating, open <1/2-1/4" | | | |
| | | | 0 | 64.4' - Mechanical break or fractures, 50 deg, rough, undulating, tight to open <1/2" | | | |
| | | | 1 | 66.5, 67.45' - Fractures or mechanical break (2), 20 deg and 30 deg, rough, undulating, open <1/4" | | | |
| 70 -29.6 | | | 2 | 67.7, 68.85' - Bedding plane or mechanical break (2), <10 deg, rough, undulating, open <1/2" | | | R4:5 minutes |
| | 71.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-02 SHEET 5 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

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

WATER LEVELS : 1.4 ft bgs on 5/16/07 START : 5/15/2007 END : 5/17/2007 LOGGER : R. Bitely, D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R5-NQ 5 ft 100% | 84 | NR | 69.1, 70.1, 70.5' - Bedding plane or mechanical break (3), <10 deg, smooth to rough, undulating, open <1/4" | | **No Recovery 70.9-71.0'** | |
| | | | 2 | 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" | | **Limestone** 71.0-76.0' - pale yellowish brown to light gray, (10YR 6/2 to N7), very fine to medium grained, strong HCl 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' | |
| | | | 0 | | | | |
| | | | 3 | | | | |
| | | | 2 | 74.65' - Fracture or mechanical break, 30 deg, rough, undulating, open <1/4" | | | |
| 75 -34.6 | | | 2 | | | | R5:4 minutes |
| | 76.0 | | | | | | |
| | R6-NQ 5 ft 73% | 18 | 3 | 75.7, 75.8' - Bedding plane or mechanical break (2), <10 deg, smooth to rough, undulating, open <1/2" | | 76.0-79.65' - pale yellowish brown to light gray, (10YR 6/2 to N7), very fine to medium grained, strong HCl 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 <1/2" diameter especially from 77.8-78.7' | |
| | | | >10 | 76.1, 76.3' - Fractures or mechanical break (2), <10 deg, rough, undulating, tight to open <3/4" | | | |
| | | | >10 | 76.9' - Fracture or mechanical break, 40 deg, rough, undulating, open <1/2" | | | |
| | | | 3 | 77.3' - Fracture or mechanical break, <10 deg, rough, undulating, tight to open <3/4" | | | |
| | | | NR | 77.5-78.8' - Fracture zone, rough, undulating, gravel-sized fragment, <2" diameter | | | |
| 80 -39.6 | | | | 79.0, 79.15' - Fractures (2), rough, undulating, intersecting fractures at 90, 60, and 80 degrees, tight to open <1/4" | | **No Recovery 79.65-81.0'** | R6:8 minutes |
| | 81.0 | | | | | | |
| | R7-NQ 5 ft 98% | 60 | >10 | 79.25' - Fracture or mechanical break, <10 deg, rough, undulating, tight to open <3/4" | | **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 |
| | | | 3 | 81.0-81.6' - Fracture zone, smooth to rough, undulating, gravel-sized fragments <1"-1/2" diameter | | | Resume drilling 5/17/07 07:30, water level at 3.0' below ground surface |
| | | | 0 | 81.6' - Bedding plane, <10 deg, smooth, undulating, unknown open thickness, adjacent to fragments above | | | |
| | | | 1 | 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" | | | |
| 85 -44.6 | | | >10 | 83.5' - Mechanical break | | | R7:5 minutes |
| | 86.0 | | | 85.0-85.2' - Fracture zone, rough, undulating, gravel-sized fragments <1" diameter | | | |
| | R8-NQ 5 ft 70% | 56 | NR | 85.5, 85.6' - Fractures (2), 30 deg and 40 deg, rough, undulating, 2 intersecting fractures, tight to open <3/4" | | **No Recovery 85.9-86.0'** | |
| | | | 2 | 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" | | **Limestone** 86.0-89.5' - moderate yellowish brown, (10YR 5/4), very fine to fine grained, moderate to stong HCl 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 | |
| | | | 1 | 87.25' - Fracture or mechanical break, 50 deg, rough, undulating, tight | | | |
| | | | 0 | 87.45, 87.9, 88.2, 88.45, 88.65' - Mechanical break (5) | | | |
| | | | >10 | 89.0-89.5' - Fracture zone, rough, undulating, gravel-sized fragments <1"-1/2" diameter | | | |
| 90 -49.6 | | | NR | | | **No Recovery 89.5-91.0'** | Driller's Remark: Light chatter (89.5-91.0') R8:7 minutes |
| | 91.0 | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: GSC-02 | SHEET 6 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

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

WATER LEVELS : 1.4 ft bgs on 5/16/07 START : 5/15/2007 END : 5/17/2007 LOGGER : R. Bitely, D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R9-NQ 5 ft 90% | 64 | 0 | | | **Limestone** 91.0-95.5' - pale yellowish brown to moderate yellowish brown transitioning to yellowish gray beyond 94.0', (10YR 6/2 to 10YR 5/4 to 5Y 8/1), fine to very fine grained, grain size fining with depth, weak to medium strong (R2 to R3) rock to 94.3', 93.46-93.05' and 94.3-94.7' extremely weak (R0) rock with red organic soils, 94.7-95.5' very weak to weak (R0 to R2) rock, 93.45-93.85' fracture zone with interbedded organic silts up to 3/4" in the beds, 93.45-93.85' fracture zone with poorly competent silts to no competent elastic silts (MH) up to 2" thick as beds, 91.0-93.45' voids (<1/16") over 50-60% of surface, highly fossiliferous with molds/casts <1" diameter, few cavities <3/4" diameter, moderate to stong HCl reaction, 93.45-93.85' fragments with organics interbedded, 93.85-94.3' no voids, no cavities, very fine grained medium strong (R3) rock; 94.3-94.7' fragments with silt/elastic silt interbedded; 94.7-95.5' voids (<1/16") over 10-50% of surface, few cavities <1/4" diameter, poorly fossiliferous | |
| | | | 2 | 92.1, 91.65, 93.45' - Bedding plane or mechanical break (3), <10 deg, rough, undulating, open <1/4" | | | |
| | | | >10 | 93.45-93.85' - Fracture zone, rough, undulating, organic zone, gravel-sized fragments <1" diameter | | | |
| | | | >10 | 94.1-94.7' - Fracture zone, smooth to rough, undulating, silt horizon, gravel-sized fragments <2" diameter | | | |
| 95 -54.6 | | | 0 | | | | R9:8 minutes |
| | 96.0 | | NR | | | | |
| | R10-NQ 5 ft 100% | 92 | 0 | | | | |
| | | | 1 | 97.05' - Mechanical break or bedding plane, horizontal and 70 deg, rough, undulating, tight | | | |
| | | | 0 | | | | |
| | | | 3 | 99.0, 99.15' - Fractures (2), undulating, intersecting fractures, tight to open <1/4" 99.5' - Mechanical break | | | |
| 100 -59.6 | | | 1 | 99.7' - Mechanical break or bedding plane, horizontal, rough, undulating, tight | | | R10:3 minutes |
| | 101.0 | | | 100.85' - Mechanical break or bedding plane, horizontal, smooth, undulating, open <1/4" | | | |
| | R11-NQ 5 ft 99% | 73 | 5 | 101.0, 101.1, 100.3, 101.6, 102.0' - Bedding plane or mechanical break (5), smooth, undulating, open <1/4" | | **No Recovery 95.5-96.0'** **Limestone** 96.0-101.0' - pale yellowish brown to yellowish brown, (10YR 6/2 to 5YR 5/2), very fine to fine grained, strong HCl reaction, very weak to weak (R1 to R2), voids (<1/16") over <20-50% of surface (variable), trace organics, trace infill, trace laminated bedding, moderately fossiliferous with fossil molds/casts <1" diameter, trace cavities | |
| | | | 0 | | | | |
| | | | 10 | 103.0' - Fractures (>5), smooth, undulating, 5 plus intersecting fractures from one main fracture, 70 degrees with 0 degree minor , open <1/4" | | | |
| | | | 0 | 103.6, 105.75' - Bedding plane or mechanical break (2), smooth, undulating, open <1/4" | | | |
| 105 -64.6 | | | 1 | | | | R11:5 minutes |
| | 106.0 | | NR | | | 101.0-105.95' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl reaction, weak (R2), voids (<1/16") over 30% of surface, moderately fossiliferous with molds/casts <1/2" diameter, trace organics | |
| | R12-NQ 5 ft 100% | 70 | 3 | 106.3, 106.6, 106.9, 107.1, 107.5, 107.9, 108.25, 108.7, 109.05' - Bedding plane or mechanical break (9), 40 deg, smooth to rough, undulating, tight to open <1/4" | | **No Recovery 105.95-106.0'** **Limestone** 106.0-111.1' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl reaction, weak (R2), voids (<1/16") over <20% of surface, moderately fossiliferous with molds/casts <1/2" diameter | |
| | | | 3 | | | | |
| | | | 2 | | | | |
| | | | 2 | 109.5' - Mechanical break | | | |
| 110 -69.6 | | | 4 | | | | R12:4 minutes |
| | 111.0 | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: GSC-02 | SHEET 7 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

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

WATER LEVELS : 1.4 ft bgs on 5/16/07 START : 5/15/2007 END : 5/17/2007 LOGGER : R. Bitely, D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | >10 | 109.55, 110.05, 110.65, 110.85, 111.0' - Bedding plane or mechanical break (5), 40 deg, smooth to rough, undulating, tight to open <1/4" | | 111.0-115.9' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl reaction, weak (R2), voids (<1/16") over <10% of surface, poorly fossiliferous, laminated bedding from 111.0-111.3' | |
| | | | 0 | 111.0-111.8' - Bedding plane (>10), horizontal, smooth, undulating, tight to open <1/4" | | | |
| | R13-NQ 5 ft 98% | 80 | 1 | 113.0' - Bedding plane, horizontal, smooth, undulating, tight to open <1/4" | | | |
| | | | 2 | 113.5' - Mechanical break<br>114.3' - Fracture or mechanical break, 80 deg, rough, undulating, tight to open <1/4" | | | |
| 115 -74.6 | | | 0 | | | | R13:7 minutes |
| | 116.0 | | NR | | | **No Recovery 115.9-116.0'** | |
| | | | 2 | 116.4, 116.8, 117.55, 117.65, 117.7, 117.8, 118.2' - Bedding plane or mechanical break (7), rough, undulating, tight to open <1/4" | | **Limestone**<br>116.0-120.95' - yellowish gray, (5Y 7/2), very fine to medium grained, strong HCl reaction, weak (R2), voids (<1/16") over 30% of surface increasing with depth, grain size and recrystallized texture increasing with depth, moderately fossiliferous with molds/casts <1/2" diameter, trace laminated organics, 10-20% cavities <1/2" diameter | |
| | | | 4 | | | | |
| | R14-NQ 5 ft 99% | 70 | 3 | 118.6' - Mechanical break | | | |
| | | | 6 | 118.85, 119.1, 119.2, 119.3, 119.4, 119.5, 119.6' - Bedding plane or mechanical break (7), rough, undulating, tight to open <1/4" | | | |
| 120 -79.6 | | | 1 | 120.2' - Mechanical break<br>120.5' - Bedding plane or mechanical break, rough, undulating, tight to open <1/4" | | | R14:3 minutes |
| | 121.0 | | NR | | | **No Recovery 120.95-121.0'** | |
| | | | 0 | | | **Limestone**<br>121.0-125.85' - yellowish gray, (5Y 7/2), fine to medium grained, strong HCl reaction, very weak to medium strong (R1 to R3), rock strength increasing with depth, highly fossiliferous from 122.8-125.7' with molds/casts and shells <1" diameter otherwise moderately fossiliferous, voids (<1/16") variable over surface from <10-20%, trace cavities <1/2" diameter | |
| | | | 3 | 122.15, 122.25, 122.6' - Bedding plane or mechanical break (3), smooth to rough, undulating, tight to open <1/2" | | | |
| | R15-NQ 5 ft 97% | 65 | 0 | 123.1, 123.6, 123.8' - Mechanical break | | | |
| | | | 4 | 124.4, 124.55, 124.7, 124.9, 125.1, 125.4' - Bedding plane or mechanical break (6), smooth to rough, undulating, tight to open <1/2" | | | |
| 125 -84.6 | | | 2 | | | | R15:3 minutes |
| | 126.0 | | NR | | | **No Recovery 125.85-126.0'** | |
| | | | 0 | | | **Limestone**<br>126.0-131.0' - yellowish gray to moderate yellowish brown, (5Y 7/2 to 10YR 5/4), very fine to medium grained, strong HCl reaction, very weak to weak (R1 to R2), voids (<1/16") over 30-50% of surface, few cavities <1" diameter, moderately fossiliferous with molds/casts <3/4" in diameter | |
| | | | 0 | 127.3, 128.5, 129.6, 130.8' - Mechanical break (4) | | | |
| | R16-NQ 5 ft 100% | 100 | 0 | | | | |
| | | | 0 | | | | |
| 130 -89.6 | | | 0 | | | | R16:3 minutes |
| | 131.0 | | | | | | |

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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

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

WATER LEVELS : 1.4 ft bgs on 5/16/07 START : 5/15/2007 END : 5/17/2007 LOGGER : R. Bitely, D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R17-NQ 5 ft 100% | 66 | 3 | 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" | | **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 | |
| | | | 1 | | | | |
| | | | 1 | 133.5' - Mechanical break | | | |
| | | | 5 | 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, undulating, tight to open <1/4" | | | |
| 135 -94.6 | | | 1 | | | | R17:4 minutes |
| | 136.0 | | | | | | |
| | R18-NQ 5 ft 93% | 44 | 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 open <1/4" | | 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 (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 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 136.0-138.6', many cavities up to 2" diameter some with infill | |
| | | | 2 | | | | |
| | | | 3 | 138.5' - Mechanical break | | | |
| | | | >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" | | | |
| 140 -99.6 | | | 1 | | | | R18:4 minutes |
| | 141.0 | | NR | | | **No Recovery 140.65-141.0'** | |
| | R19-NQ 5 ft 94% | 62 | 4 | 141.1' - Fracture or mechanical break, vertical and 0-3 deg, rough, undulating, intersecting fractures, 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 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 crystal faces, highly fossiliferous with fossil molds/casts to 1" diameter, trace laminated bedding especially 144.45-144.7' | |
| | | | >10 | 141.8' - Bedding plane, <10 deg, rough, undulating, tight to open <1/4" | | | |
| | | | >10 | 142.3, 142.45, 142.55' - Fracture or mechanical break (3), <10 deg and 70 deg, rough, undulating, variable orientation, open <1/2" | | | |
| | | | 2 | 142.9-143.2' - Fracture zone, rough, undulating, gravel-sized fragments <1" diameter | | | |
| 145 -104.6 | | | 0 | 143.25' - Bedding plane or mechanical break, <10 deg and 10 deg, rough, undulating, open <1/2" | | | R19:5 minutes |
| | 146.0 | | NR | | | **No Recovery 145.7-146.0'** | |
| | R20-NQ 5 ft 100% | 92 | 3 | 143.7-143.9' - Fracture zone, gravel-sized fragments <1" diameter | | **Limestone** 146.0-151.0' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl reaction, weak to medium strong (R2 to R3), voids <1/16" over <10% of surface, few fossils <1/2" diameter, laminated bedding over <15% of surface, trace infill | |
| | | | 3 | 143.9, 144.5, 144.7' - Bedding plane or mechanical break (3), <10 deg and 10 deg, rough, undulating, open <1/2" | | | |
| | | | 0 | 146.35, 146.5, 146.55, 147.2, 147.3, 147.7' - Bedding plane or mechanical break (6), <10 deg, smooth to rough, undulating, tight to open <1/2" | | | Drilling completed 5/17/07 12:30 |
| | | | 0 | 148.5' - Mechanical break | | | |
| 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.FL | GSC-03 SHEET 1 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

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 : 0.1 ft bgs on 6/3/07 START : 6/3/2007 END : 6/6/2007 LOGGER : D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 40.5 | 0.0 – 1.5 | 0.4 | SS-1 | 0-1-1 (2) | **Topsoil (OL)** 0.0-0.1' - brownish black, (5YR 2/1), wet, very soft, 60% organic nonplastic fines, 40% roots/vegetative detritus<br>**Poorly Graded Sand (SP)** 0.1-0.4' - moderate yellowish brown, (10YR 5/4), wet, very loose, fine silica sand, 15% organics decreasing with depth | | SS-1: first 6" = weight of hammer |
| 5 | 5.0 | | | | | | |
| 35.5 | 5.0 – 6.5 | 1.0 | SS-2 | 2-5-5 (10) | **Poorly Graded Sand (SP)** 5.0-6.0' - yellowish gray grades to pale yellowish brown, (5Y 8/1 to 10YR 6/2), wet, very fine to fine 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 | 10.0 – 11.5 | 1.3 | SS-3 | 0-6-7 (13) | **Silty Sand (SM)** 10.0-11.8' - grades from grayish orange (10.0-10.5') to pale yellowish brown (10.5-10.8') to very pale orange (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 | | SS-3: first 6" = weight of hammer |
| 15 | 15.0 | | | | | | |
| 25.5 | 15.0 – 16.5 | 1.3 | SS-4 | 4-6-6 (12) | **Silty Sand (SM)** 15.0-16.0' - pale yellowish brown, (10YR 6/2), wet, medium dense, very fine to fine grained, silica sand with 20% nonplastic fines<br>**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 | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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

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 : 0.1 ft bgs on 6/3/07 START : 6/3/2007 END : 6/6/2007 LOGGER : D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 20.5 | 20.0 – 21.5 | 1.3 | SS-5 | 0-2-3 (5) | **Fat Clay (CH)** 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, 5Y 6/1), high plasticity fines, mild HCl reaction possibly from interbedded silt, one limestone fragment or concretion, no HCl reaction | | SS-5: first 6" = weight of hammer |
| | | | | | **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 / 15.5 | 25.0 – 26.5 | 1.5 | SS-6 | 2-5-13 (18) | **Silt (ML)** 25.0-26.5' - grayish yellow, (5Y 8/4), wet, very stiff, nonplastic, rapid dilatancy, moderate HCl reaction, coarse sand to fine gravel-sized limestone fragments from 26.2-26.5', carbonate materials | | |
| 30 / 10.5 | 30.0 – 31.5 | 1.0 | SS-7 | 5-12-13 (25) | **Silty Sand (SM)** 30.0-31.0' - grayish orange to dark yellowish orange, (10YR 7/4 to 10YR 6/6), moist to wet, medium dense, mild HCl reaction, fine to coarse grained sand-sized, 20-25% nonplastic fines, fine gravel-sized limestone fragments, carbonate materials | | |
| 35 / 5.5 | 35.0 – 36.0 | 1.0 | SS-8 | 19-50/6 (69/12") | **Silty Sand And Limestone Fragments (SM)** 35.0-36.0' - light olive gray, (5Y 5/2), wet, very dense, moderate HCl reaction, very fine to coarse sand-sized grains, 25% nonplastic fines, 50% of sample is fine to coarse gravel-sized limestone fragments, carbonate materials | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-03 SHEET 3 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

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 : 0.1 ft bgs on 6/3/07 START : 6/3/2007 END : 6/6/2007 LOGGER : D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 0.5 | 40.0<br>40.8 | 0.7 | SS-9 | 16-50/4<br>(66/10") | **Silty Sand And Limestone Fragments (SM)**<br>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', mild HCl reaction from 40.2-40.7' | | |
| 45<br>-4.5 | 45.0<br>45.2 | 0.2 | SS-10 | 50/2.5<br>(50/2.5") | **Limestone Fragments**<br>45.0-45.2' - yellowish gray, (5Y 7/2), mild HCl reaction, coarse sand to fine gravel-sized material | | |
| 50<br>-9.5 | 50.0<br>51.5 | 1.4 | SS-11 | 0-3-2<br>(5) | **Silty Sand (SM)**<br>50.0-51.4' - yellowish gray, (5Y 7/2), wet, loose, fine to coarse grained, mild HCl reaction, 30% nonplastic fines, all carbonate | | SS-11: first 6" = weight of hammer |
| 55<br>-14.5 | 55.0<br>55.3 | 0.3 | SS-12 | 50/4<br>(50/4") | **Limestone Fragments**<br>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: |
|---|---|
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# 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

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 : 0.1 ft bgs on 6/3/07 START : 6/3/2007 END : 6/6/2007 LOGGER : D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -19.5 | 60.0<br>60.8 | 0.8 | SS-13 | 10-50/4<br>(60/10") | **Limestone And Silt**<br>60.0-60.8' - yellowish gray, (5Y 7/2), wet, hard, low plasticity, rapid dilatancy, mild HCl reaction, coarse sand to fine to coarse gravel-sized limestone fragments from 60.0-60.3' and 60.75-61.0', carbonate materials | | 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 |
| 65<br>-24.5 | 65.0<br>65.3 | 0.3 | SS-14 | 50/3<br>(50/3") | **Limestone Fragments**<br>65.0-65.3' - yellowish gray, (5Y 7/2), mild HCl reaction, coarse sand to fine to coarse gravel-sized fragments | | Begin SS sampling again at 65.0' at 16:30 |
| | 70.0<br>70.1 | 0.0 | SS-15 | 50/1<br>(50/1") | **No Recovery 70.0-70.1'** | | |
| 70<br>-29.5 | | | | | Begin Rock Coring at 70.0 ft bgs<br>See the next sheet for the rock core log | | |
| 75<br>-34.5 | | | | | | | |
| 80 | | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: 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 ORIENTATION : Vertical

WATER LEVELS : 0.1 ft bgs on 6/3/07 START : 6/3/2007 END : 6/6/2007 LOGGER : D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -29.5 | 70.0 | | | | | | |
| | R1-NQ 5 ft 72% | 67 | 1 | 70.05, 71.3, 71.8, 72.7' - Bedding plane or mechanical break (4), <10 deg, smooth to rough, undulating, open <1/2" with very fine-sized gravel infill except in fracture at 71.3' | | **Limestone** 70.0-73.6' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), fine grained, strong HCl reaction, weak to medium strong (R2 to R3), voids (<1/16") over 40% of surface, trace cavities >1/16", fossil molds | 08:30 Install 0.0-70.0' NW casing, 10:46 water level = 0.2', Depth = 70.0', 12:00 Begin Rock Coring |
| | | | 2 | | | | |
| | | | 1 | 72.4-72.5' - Mechanical break, horizontal and 80 deg, tight | | | Driller's Remark: 72.0-72.5' and 73.0-74.5' soft |
| | | | 0 | | | | |
| | | | NR | | | **No Recovery 73.6-75.0'** | R1: 6 minutes |
| 75 | 75.0 | | | | | | |
| -34.5 | R2-NQ 5 ft 44% | 14 | 4 | 75.0-75.05' - Fracture zone, angular fine gravel | | **Limestone** 75.0-77.2' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), strong HCl reaction 75.0-76.1' - very fine grained, medium strong (R3), voids (<1/16") over 5% of surface 76.1-77.2' - fine grained, very weak to extremely weak (R1 to R0), voids (<1/16") over 30% of surface, cavities throughout from fossil molds up to 1/2", 10% voids have recrystallization infill | |
| | | | >10 | 75.2, 76.2, 76.3, 75.35' - Bedding plane or mechanical break (4), <10 deg, rough, undulating, 76.2' smooth and fine angular gravel in fracture (15 deg at 75.35') open <1/2" | | | Driller's Remark: 76.0-77.0' void |
| | | | >10 | 75.3' - Fracture or mechanical break, vertical, smooth, undulating, tight 75.5' - Mechanical break | | | |
| | | | NR | 76.45-77.2' - Fracture zone, smooth to rough, undulating, fine to coarse <2" diameter gravel, subangular | | **No Recovery 77.2-80.0'** | R2: 6 minutes |
| 80 | 80.0 | | | | | | |
| -39.5 | R3-NQ 5 ft 25% | 0 | >10 | 80.1, 80.8, 80.95' - Bedding plane (3), <10 deg, smooth to rough, undulating to stepped, open <1/2", eroded surfaces | | **Limestone** 80.0-81.25' - moderate yellowish brown, (10YR 5/4), fine to medium grained, strong HCl reaction, strong (R4), voids (>1/16") over 40% of surface, up to 35% of core is cavity infill, trace cavities up to 1/4", fossil molds | Driller's Remark: 80.0-82.0' void, 82.0-83.0' soft, 83.0-84.0' rock, 84.0-85.0' void, at top of 85.0' felt rock (84.9-85.0') |
| | | | >10 | 80.25-80.4, 80.55-80.7' - Fracture zone (2), very fine to coarse angular to subangular gravel-sized limestone | | | |
| | | | NR | 81.0-81.35' - Fracture zone, very fine to coarse angular to subangular gravel-sized limestone | | **No Recovery 81.25-85.0'** | R3: 4 minutes |
| 85 | 85.0 | | | | | | |
| -44.5 | R4-NQ 5 ft 64% | 22 | >10 | 85.0-85.05' - Fracture zone, very fine angular gravel and coarse sand-sized material and silt, possible infill | | **Limestone** 85.0-85.6' - very pale orange, (10YR 8/2), fine grained, strong HCl reaction, extremely weak (R0), voids (<1/16") over 15-25% of surface, few cavities up to 3/16" diameter, trace fossils up to 1/16"x1/8" 85.6-88.2' - Same as 80.0-81.25' except very weak (R1) probably due to less recrystallization in voids and more cavities up to 3/4" | Driller's Remark: various soft spots throughout, could be silt or soft rock |
| | | | >10 | 85.6-85.8' - Fracture zone, angular to subangular rock crush, fine to coarse gravel-sized, trace silt infill | | | |
| | | | >10 | 86.3-86.5' - Fracture zone, fine to coarse-sized subangular to subrounded fragments | | | |
| | | | >10 | 86.8, 87.0, 87.2' - Bedding plane or mechanical break (3), <10 deg, smooth to rough, undulating, tight except open <1/2" at 87.0' | | | |
| | | | NR | | | **No Recovery 88.2-90.0'** | R4: 6 minutes |
| 90 | 90.0 | | | | | | |

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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 ORIENTATION : Vertical

WATER LEVELS : 0.1 ft bgs on 6/3/07 START : 6/3/2007 END : 6/6/2007 LOGGER : D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -49.5 | R5-NQ 5 ft 79% | 46 | 8 | 87.4-87.5, 87.85-88.2' - Fracture zone (2), fine to coarse-sized subangular to subrounded fragments | | **Limestone** 90.0-90.35' - grayish orange, (10YR 7/4), fine grained, strong HCl reaction, extremely weak (R0), voids (<1/16") over 15% of surface, 25% of rock has infilled molds or black organic material | Driller's Remark: lost circulation at 90.0-110.0', 94.5-94.8' void |
| | | | 3 | 90.1, 90.2, 90.3, 90.4, 90.55, 90.7, 90.8, 91.0' - Bedding plane or mechanical break (8), <10 deg, smooth, undulating, tight to open <1/2", 90.3' and 91.0' have fractured gravel-sized fragments in the fractures | | 90.35-91.3' - Same as 85.0-85.6' except 20-30% cavities up to 1-1/4" | |
| | | | 1 | 91.35-91.45' - Fracture zone | | 91.3-93.95' - Same as 86.6-88.2' except cavities up to 1" | |
| | | | 2 | 91.5, 92.5, 93.8' - Bedding plane or mechanical break (3), <10 deg, smooth, undulating, tight to open <1/2", 91.5' tight | | **No Recovery 93.95-95.0'** | R5: 5 minutes |
| | | | NR | | | | |
| 95 | 95.0 | | | | | | |
| -54.5 | R6-NQ 5 ft 26% | 0 | 6 | 95.0-95.1' - Bedding plane, 10 deg, rough, undulating, tight, eroded subrounded gravel fragments | | **Limestone** 95.0-96.3' - grayish orange, (10YR 7/4), very fine to fine grained, strong HCl reaction, weak (R2), voids (<1/16") over 5% of surface, trace cavities up to 1/4", light olive gray (5Y 5/2) clay/silty clay infill from 95.45-95.65' | Driller's Remark: 95.0-95.5' soft |
| | | | 2 | 95.25, 95.4' - Bedding plane or mechanical break (2), <10 deg, rough, planar to undulating, tight, open <1/4" with fine gravel at 95.4' | | | |
| | | | NR | 95.6' - Bedding plane, <10 deg, smooth, planar to undulating, 1" of infill, clay and fine to very fine gravel-sized fragments<br>95.75, 95.9' - Bedding plane or mechanical break (2), <10 deg, rough, planar to undulating, tight<br>96.1-96.2' - Fracture zone | | **No Recovery 96.3-100.0'** | R6: 5 minutes |
| 100 | 100.0 | | | | | | |
| -59.5 | R7-NQ 5 ft 10% | 0 | >10 | 100.0-100.1' - Fracture zone, trace black staining, subangular to subrounded, very fine to coarse-sized gravel | | **Limestone** 100.0-100.5' - very pale orange to grayish orange, (10YR 8/2 to 10YR 7/4), very fine grained, strong HCl reaction, very weak (R1), voids (<1/16") over 40% of surface, black organic staining, cavities up to 3/16", fossil molds, trace fossils <1/8" | |
| | | | NR | 100.25' - Fracture, vertical and 70 deg, rough, undulating, black staining, trace (thin layer) silt/clay infill <1/16", tight <1/16"<br>100.4-100.5' - Fracture zone, trace black staining, very fine to coarse-sized subangular to subrounded gravel | | **No Recovery 100.5-105.0'** | R7: 3 minutes |
| 105 | 105.0 | | | | | | |
| -64.5 | R8-NQ 5 ft 30% | 0 | >10 | 105.1-105.4' - Fracture zone, angular to subangular, very fine to coarse gravel-sized fragments | | **Limestone** 105.0-106.5' - yellowish gray to grayish yellow, (5Y 7/2 to 5Y 8/4), very fine to fine grained, very strong HCl reaction, extremely weak (R0), voids (<1/16") over 30-40% of surface, many recrystallized fossil casts up to 3/16", few black possibly carbon or organic material up to 1/8", fossiliferous | |
| | | | >10 | 105.4-106.5' - Bedding plane, smooth, undulating, open 1/4"-1", tight | | | |
| | | | NR | | | **No Recovery 106.5-110.0'** | R8: 2 minutes |
| 110 | 110.0 | | | | | | |

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|---|---|
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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 ORIENTATION : Vertical

WATER LEVELS : 0.1 ft bgs on 6/3/07 START : 6/3/2007 END : 6/6/2007 LOGGER : D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -69.5 | R9-NQ 5 ft 45% | 23 | 2<br>>10<br>3<br>NR | 110.05' - Bedding plane, <10 deg, smooth, planar, open <1/16"<br>110.2' - Bedding plane, <10 deg, smooth to rough, undulating, trace gravel fragments in fracture, open 1/2"-3/4"<br>111.4-111.9' - Fracture zone, medium sand to fine gravel-sized fragments, trace wet silt infill<br>112.1' - Bedding plane, <10 deg, rough, undulating, open 3/4" with rock fragments, eroded planes/surfaces<br>112.2' - Bedding plane, <10 deg, rough, undulating, open <1/4", eroded planes/surfaces | | **Limestone**<br>110.0-112.25' - grayish yellow to yellowish gray, (5Y 8/4 to 5Y7/2), very fine to fine grained, strong HCl reaction, extremely weak (R0), 111.5-111.8' silt and sand-sized material, voids (<1/16") over 50% of surface, 5+ cavities up to 9/16", few fossil molds | 16:10 core barrel retriever is boud and is pulling casing with it, 16:14 got it out but have to pull out all core barrel - tip is blocked<br>R9: 3 minutes |
| 115 | 115.0 | | | | | | |
| -74.5 | R10-NQ 5 ft 0% | 0 | NR | | | **No Recovery 112.25-120.0'** | When core barrel was brought out after a struggle, there was not any recovery. May have dropped into borehole on way up.<br>R10: 3 minutes |
| 120 | 120.0 | | | | | | |
| -79.5 | R11-NQ 5 ft 60% | 0 | >10<br>1<br>>10<br>NR | 120.1, 120.2, 120.25, 120.6, 120.4, 120.9, 121.0' - Bedding plane or mechanical break (6), <10 deg, smooth, planar to undulating, tight to 3/4" at 120.4', sand-sized material to fine gravel-sized in most fractures due to soft core, breaks easily<br>122.15-122.5, 122.8-123.0' - Bedding plane (2), <10 deg, smooth, planar to undulating, tight to 1/4", partings closely spaced<br>122.5-122.8' - Fracture zone, fine angular to subangular gravel-sized fragments | | **Limestone**<br>120.0-123.0' - very pale orange to grayish orange, (10YR 8/2 to 10YR 7/4), fine to medium grained, very strong HCl reaction, extremely weak (R0), voids (<1/16") over 25% of surface, trace cavities up to 3/16", 5% black organic material up to 1/2", many fossil molds, moderately to highly fossiliferous<br>121.1-121.9' - Same as 120.0-123.0' except loose material, wet, 70% silt, 30% fine to coarse sand<br>**No Recovery 123.0-125.0'** | R11: 4 minutes |
| 125 | 125.0 | | | | | | |
| -84.5 | R12-NQ 5 ft 66% | 16 | >10<br>>10<br>>10<br>2<br>NR | 125.0-125.2' - Fracture zone, fine to coarse-sized gravel and coarse sand-sized fragments, angular to subrounded<br>125.3, 125.7, 125.8, 126.1, 126.2' - Bedding plane (5), horizontal, smooth to rough, planar, tight<br>125.85-126.0' - Fracture zone, fine to coarse-sized gravel and coarse sand-sized fragments, angular to subrounded<br>126.1, 126.2' - Bedding plane (2), horizontal, smooth to rough, planar, tight<br>126.4-126.5, 126.75-126.95' - Fracture zone, fine to coarse-sized gravel and coarse sand-sized fragments, angular to subrounded | | **Limestone**<br>125.0-125.1' - Same as 120.0-123.0'<br>125.1-125.8' - light brownish gray, (5YR 6/1), fine to medium grained, strong HCl reaction, very weak (R1), voids (<1/16") over 50% of surface, cavities up to 3/8", highly fossiliferous, casts, molds, fossils<br>125.8-128.3' - Same as 120.0-123.0' except weak rock (R2)<br>**No Recovery 128.3-130.0'** | Driller's Remark: 125.5-126.0' void, 127.5-128.0' soft, lost circulation at 127.0', 08:04 lots of chatter at 128.0'<br>R12: 5 minutes |
| 130 | 130.0 | | | | | | |

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|---|---|
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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 ORIENTATION : Vertical

WATER LEVELS : 0.1 ft bgs on 6/3/07 START : 6/3/2007 END : 6/6/2007 LOGGER : D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -89.5 | R13-NQ 5 ft 64% | 20 | 4 | 126.95-127.75' - Bedding plane, horizontal, smooth to rough, planar, tight, partings (127.05-127.25'), 127.35-127.75' rock is eroded and rounded openings are up to <1-1/2" from rock's outer diameter to adjacent rock | | **Limestone** 130.0-133.05' - yellowish gray, (5Y 8/1), very fine to fine grained, strong HCl reaction, very weak (R1), voids (<1/16") over 40% of surface, many have infill, cavities up to 3/8", casts/molds, moderately fossiliferous | |
| | | | >10 | 128.2-128.3' - Bedding plane, horizontal and 86 deg, smooth, undulating | | | |
| | | | >10 | 130.0-130.1' - Bedding plane, horizontal, smooth, undulating, limestone fragments, very fine to coarse gravel-sized from 130.0-130.1' | | 133.05-133.2' - Same as 130.0-133.05' except fine to medium grained, more fossiliferous | |
| | | | 1 | | | | |
| | | | NR | 130.8, 131.0, 131.35' - Bedding plane or mechanical break (3), <10 deg, smooth, undulating, tight to open 1/4" | | **No Recovery 133.2-135.0'** | R13: 5 minutes |
| 135 | 135.0 | | | | | | |
| -94.5 | R14-NQ 5 ft 54% | 0 | >10 | 131.46-131.75' - Bedding plane, <10 deg, smooth, undulating, tight | | **Limestone** 135.0-135.3' - yellowish gray, (5Y 8/1), fine grained, strong HCl reaction, weak (R2), voids over 5% of surface, poorly fossiliferous | |
| | | | >10 | 131.75-131.9, 132.1-132.15,132.6-133.05' - Fracture zone (3), angular to subangular gravel-sized limestone fragments | | | |
| | | | >10 | 132.35' - Fracture, 35 deg, smooth, undulating, limestone fragments in fracture, open 1/2"-1" | | 135.3-135.5' - Same as 135.0-135.3' except very fine grained | |
| | | | >10 | 135.0-135.2, 135.75-136.05' - Fracture zone (2), very fine to coarse angular to subrounded gravel sized limestone fragments and coarse sand sized material | | 135.5-135.8' - Same as 120.0-123.0' | |
| | | | NR | 135.35, 135.45, 135.55, 135.7' - Bedding plane or mechanical break (4), <10 deg, smooth to rough, undulating, tight to 1/4" | | 135.8-135.95' - Same as 130.0-133.05' | |
| | | | | | | 135.95-136.5' - Same as 120.0-127.0' | |
| | | | | | | 136.5-137.7' - yellowish gray, (5Y 7/2), very fine to fine grained, extremely weak (R0), 50% limestone, 50% silt with sand-sized fragments, poorly fossiliferous, voids over 0-5% of surface | R14: 4 minutes |
| 140 | 140.0 | | | | | | |
| -99.5 | R15-NQ 5 ft 90% | 38 | 2 | 135.9' - Fracture, 75 deg, smooth to rough, undulating, eroding fracture planes, gravel in fracture | | **No Recovery 137.7-140.0'** | |
| | | | 8 | 136.0' - Bedding plane or mechanical break, <10 deg, smooth to rough, undulating, open 1/2" with fine gravel sand in fracture | | **Limestone** 140.0-143.65' - grayish orange, (10YR 7/4), fine to medium grained, strong HCl reaction, weak (R2), voids (<1/16") over 5-10% of surface, fossiliferous with several molds/casts, cavities up to 1/2" | |
| | | | >10 | 136.05' - Fracture, 65 deg, smooth to rough, undulating, eroding fracture planes, gravel in fracture | | | |
| | | | >10 | 136.3, 136.6, 136.75' - Bedding plane or mechanical break (3), <10 deg, smooth to rough, undulating, tight to open 1/4" except at 136.6', open 1/2" with fine gravel sand in fracture | | 143.65-144.5" - very light gray, (N8), very fine grained, strong HCl reaction, strong (R4), moderately fossiliferous, trace small voids, few cavities, fossil molds up to 3/4" | R15: 6 minutes |
| | | | >10 | | | | |
| | | | NR | 136.75-138.3' - rock has fissures/fractures vertically | | **No Recovery 144.5-145.0'** | |
| 145 | 145.0 | | | | | | |
| -104.5 | R16-NQ 5 ft 86% | 45 | >10 | 137.25' - Fracture, 85 deg, smooth to rough, undulating, eroding fracture planes, gravel in fracture | | **Limestone** 145.0-145.2' - Same as 143.0-144.5' | |
| | | | >10 | 140.45, 140.5, 141.4, 141.6-141.85, 142.06, 143.5, 143.7' - Bedding plane or mechanical break (8), <10 deg, smooth, planar to undulating, tight to open 1/4" | | 145.2-147.0' - pale yellowish brown, (10YR 6/2), fine to medium grained, weak to medium strong (R2 to R3), voids (<1/16") over 25% of surface, 60-70% recrystallized surface/voids, cavities up to 1"x3/8", trace black organic material, poorly fossiliferous | |
| | | | 3 | 142.6-142.8' - Bedding plane, <10 deg, smooth, undulating, tight | | | |
| | | | 2 | 143.5-143.7, 143.8-144.2' - Fracture zone (2), 75 deg, rough, undulating, limestone fragments between the two fractures | | | |
| | | | 1 | 145.0-145.2, 146.25-146.65' - Fracture zone (2), angular to subrounded fine to coarse-sized gravel limestone fragments | | | R16: 9 minutes |
| | | | NR | | | | |
| 150 | 150.0 | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: GSC-03 | SHEET 9 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 ORIENTATION : Vertical

WATER LEVELS : 0.1 ft bgs on 6/3/07 START : 6/3/2007 END : 6/6/2007 LOGGER : D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -109.5 | R17-NQ 5 ft 96% | 60 | 5 | 145.35' - Fracture, 30-35 deg, rough, undulating, open <1/4" with limestone fragments in fracture | | **Limestone** 147.0-149.0' - very fine grained, very strong (R5), black organic lineations, voids over <5% of surface, 90% recrystallized surfaces, many cavities up to 3/8" | Driller's Remark: 153.0-153.5' void |
| | | | 2 | 145.75, 145.85, 146.0, 148.5, 148.95, 149.0' - Bedding plane (6), <10 deg, rough, undulating to stepped, tight to 1/2", most with sand to fine gravel-sized limestone fragments in fractures | | 148.0-149.3' - Same as 125.8-128.3' | |
| | | | 2 | 146.95, 147.05' - Fractures (2), 25 deg, rough, undulating, open <1/2" with limestone fragments in fractures | | **No Recovery 149.3-150.0'** | |
| | | | 3 | 147.2, 147.5, 148.15' - Mechanical break (3) | | **Limestone** 150.0-151.8' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), fine to medium grained, strong HCl reaction, weak (R2), highly fossiliferous with molds and casts (3/8"), voids (<1/16") over 40% of surface, strong rock (R4) from 158.5-154.8' | |
| | | | 1 | 150.3, 150.4, 150.45, 150.55, 150.85, 151.2, 151.75, 152.35, 152.55, 153.2, 154.4' - Bedding plane or mechanical break (11), <10 deg, smooth, planar to undulating, tight to <1/4" | | | R17: 6 minutes |
| 155 | 155.0 | | NR | | | | |
| -114.5 | R18-NQ 5 ft 94% | 22 | 7 | 150.75-150.9, 151.42-151.6, 154.2-154.5' - Fracture zone (3) | | **No Recovery 154.8-155.0'** | |
| | | | >10 | 150.85-151.0' - Fracture zone, coarse gravel-sized | | **Limestone** 155.0-159.7' - Same as 150.0-154.8' except 155.0-156.4' strong rock (R4), 157.0-158.2' and 158.2-159.9' extremely weak rock (R0) | |
| | | | 2 | 151.1' - Fracture, 60 deg, rough, planar 152.4' - Mechanical break | | | |
| | | | >10 | 152.55, 153.0' - Bedding plane or mechanical break (2), <10 deg, smooth, planar to undulating, tight to <1/4" | | | |
| | | | >10 | 152.9-153.65' - Bedding plane, <10 deg, smooth to rough, undulating, tight 153.1' - Fracture, 75 deg, smooth, undulating, 2 bedding plane fractures perpendicular at 153.05', rough, planar open <1/4" | | | R18: 8 minutes |
| 160 | 160.0 | | NR | | | **No Recovery 159.7-160.0'** | |
| -119.5 | R19-NQ 5 ft 96% | 58 | 1 | 155.25, 153.4, 155.6, 155.75, 155.9, 156.2, 156.28, 156.3, 156.4, 156.42, 156.6, 156.7, 156.8, 156.85, 156.9, 156.95, 156.97, 157.05, 157.9, 159.2, 159.5' - Bedding plane or mechanical break (21), <15 deg, smooth to rough, undulating, tight to <1/4" | | **Limestone** 160.0-164.8' - Same as 150.0-154.8' and 155.0-159.2' except medium strong to strong (R3 to R4), 160.0-160.3' and other zones of recrystallized surface voids and limestone | |
| | | | 8 | | | | |
| | | | 1 | 160.3, 161.25, 161.5, 161.65, 161.7, 161.8, 161.95, 162.05, 162.2' - Bedding plane or mechanical break (9), <10 deg, smooth to rough, undulating, open up to <1/2", most open <1/4" or tight | | | |
| | | | 2 | 162.25, 162.5' - Mechanical break (2) | | | |
| | | | 2 | 163.1, 163.6, 164.3, 164.5' - Bedding plane or mechanical break (4), <10 deg, smooth to rough, undulating, open up to <1/2", most open <1/4" or tight | | | R19: 11 minutes |
| 165 | 165.0 | | NR | | | **No Recovery 164.8-165.0'** | |
| -124.5 | R20-NQ 5 ft 94% | 21 | 3 | 165.0-165.1, 166.07-166.15, 166.5-166.6, 166.9-166.95' - Fracture zone (4) | | **Limestone** 165.0-169.7' - Same as 150.0-165.0' except very fine grained and strong rock (R4) from 166.0-166.5' | |
| | | | 6 | 165.75, 165.85, 166.07, 166.15, 166.35, 166.5, 166.6, 166.9' - Bedding plane or mechanical break (8), <10 deg, smooth to rough, planar to undulating, few are partings, tight to open 1/2", sand to fine gravel-sized limestone fragments in fracture | | | |
| | | | 5 | | | | |
| | | | 5 | | | | |
| | | | 6 | | | **No Recovery 169.7-170.0'** | R20: 10 minutes |
| 170 | 170.0 | | NR | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-03 SHEET 10 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 ORIENTATION : Vertical

WATER LEVELS : 0.1 ft bgs on 6/3/07 START : 6/3/2007 END : 6/6/2007 LOGGER : D. Whitaker

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -129.5 | R21-NQ 5 ft 40% | 0 | >10<br>>10<br>NR | 166.95, 167.2, 167.4, 167.6, 167.7, 167.85, 168.1, 168.7, 168.2, 168.3, 168.5, 168.95, 169.05, 169.15, 169.17, 169.24, 169.3, 169.44' - Bedding plane or mechanical break (18), <10 deg, smooth to rough, planar to undulating, few are partings, tight to open 1/2", sand to fine gravel-sized limestone fragments in fracture<br>170.0-170.6, 171.0-171.2, 171.55-172.0' - Fracture zone (3), fine to coarse angular to subangular limestone fragments, 2% sand<br>170.7, 170.95, 171.2, 171.3, 171.4, 171.55' - Bedding plane or mechanical break (6), <10 deg, smooth, planar to undulating, open <1/2", sand in fractures | | **Limestone**<br>170.0-172.0' - light olive gray, (5Y 5/2), weak (R2), voids (<1/16") over 25% of surface, few cavities up to 3/8", poorly fossiliferous, secondary infill in voids over 10-20% of surface<br>**No Recovery 172.0-175.0'** | R21: 7 minutes |
| 175 | 175.0 | | | | | | |
| -134.5 | R22-NQ 5 ft 56% | 8 | >10<br>>10<br>>10<br>NR | 171.35' - Fracture, vertical, rough, planar<br>175.0-175.1, 175.2-175.4, 176.55-176.81, 177.1-177.5' - Fracture zone (4), fine to coarse angular to subangular gravel-sized limestone fragments<br>175.1, 175.2, 175.4, 175.85, 175.9, 175.55, 176.8, 177.3, 177.5' - Bedding plane (9), rough, undulating, sand/fine gravel in fractures, open up to 1"<br>176.2, 176.3' - Bedding plane (2), rough, undulating, little sand in fractures, open <1/4" | | **Limestone**<br>175.0-177.8' - Same as 170.0-172.0' except weak to medium strong rock (R2-R3)<br>**No Recovery 177.8-180.0'** | R22: 5 minutes |
| 180 | 180.0 | | | | | | |
| -139.5 | R23-NQ 5 ft 28% | 9 | >10<br>0<br>NR | 180.0-180.91' - Fracture zone, fine to coarse gravel-sized angular to subrounded gravel | | **Limestone**<br>180.0-181.4' - Same as 170.0-180.0' except from 180.9-181.4' fossiliferous with many molds and casts, voids (<1/16") over 50-60% of surface, many cavities up to 1"x1/2"<br>**No Recovery 181.4-185.0'** | R23: Runtime not recorded<br>12:00 Last rock core completed, total depth is 185.0' below ground surface |
| 185 | 185.0 | | | | | | |
| -144.5 | | | | | | Bottom of Boring at 185.0 ft bgs on 6/6/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-04 SHEET 1 OF 9 |

# SOIL BORING 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

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 bgs on 5/31/2007 START : 5/31/2007 END : 6/1/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 40.0 | 0.0 – 1.5 | 0.6 | SS-1 | 2-4-5 (9) | **Topsoil (OL)** 0.0-0.6' - dark gray to grayish black, (N2 to N3), trace fine silica sand, abundant organic material | | |
| 5 35.0 | 5.0 – 6.5 | 0.9 | SS-2 | 6-7-6 (13) | **Clayey Sand (SC)** 5.0-5.9' - moderate yellowish brown and dark yellowish brown, (10YR 5/1 and 10YR 4/2), moist, medium dense, very fine to fine grained, silica sand, 25-30% low to medium plastic fines, trace root fragments | | |
| 10 30.0 | 10.0 – 11.5 | 1.1 | SS-3 | 7-9-12 (21) | **Silty Sand (SM)** 10.0-11.05' - pale yellowish brown, (10YR 6/2), wet, medium dense, 20% nonplastic to low plastic fines, fine silica sand | | |
| 15 25.0 | 15.0 – 16.5 | 1.4 | SS-4 | 6-8-10 (18) | **Silty Sand (SM)** 15.0-16.4' - Same as 10.0-11.05' | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-04 SHEET 2 OF 9 |

# SOIL BORING 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

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 bgs on 5/31/2007 START : 5/31/2007 END : 6/1/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 20.0 | 20.0–21.5 | 1.2 | SS-5 | 11-12-12 (24) | **Silt Sand (SM)** 20.0-21.2' - Same as 15.0-16.4' | | |
| 25 / 15.0 | 25.0–26.5 | 0.9 | SS-6 | 5-4-5 (9) | **Silty Sand (SM)** 25.0-25.9' - Same as 20.0-21.2' | | |
| 30 / 10.0 | 30.0–31.5 | 1.5 | SS-7 | 2-3-2 (5) | **Silty Sand (SM)** 30.0-31.5' - Same as 25.0-25.9' | | |
| 35 / 5.0 | 35.0–36.5 | 1.4 | SS-8 | 5-8-7 (15) | **Sandy Lean Clay Or Sandy Organic Soil (CL-OL)** 35.0-35.7' - dark gray to grayish black, (N3 to N2), moist, stiff, low to medium plasticity, slow dilatancy, 30% very fine silica sand<br>**Silty Sand (SM)** 35.7-36.4' - pale yellowish brown mottled with dark yellowish brown, (10YR 6/2 mottled with 10YR 4/2), wet, medium dense, very fine to fine silica sand, 30-35% low plastic fines | | 35.0-35.7' appears organic rich |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-04 SHEET 3 OF 9 |

# SOIL BORING 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

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 bgs on 5/31/2007 START : 5/31/2007 END : 6/1/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 0.0 | 40.0 – 41.5 | 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 -5.0 | 45.0 – 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 | | 45.6-46.5' appears organic rich |
| 50 -10.0 | 50.0 – 51.5 | 1.2 | SS-11 | 30-40-45 (85) | **Clayey Sand (SC)** 45.6-46.5' - grayish black, (N2), wet, loose, very fine to fine grained silica sand, 25-30% low to medium plastic fines<br>**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 -15.0 | 55.0 – 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 HCl 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 |

# SOIL BORING 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

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 bgs on 5/31/2007 START : 5/31/2007 END : 6/1/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -20.0 | 60.0–61.0 | 0.9 | SS-13 | 25-50/5.5 (75/11.5") | **Silty Sand With Limestone (SM)** 60.0-60.9' - Same as 50.0-51.2' except 35-40% fine gravel-sized limestone fragments | | Driller's Remark: Depth to water 5.2' below ground surface |
| 65 | 65.0 | | | | | | |
| -25.0 | 65.3 | 0.1 | SS-14 | 50/3 (50/3") | **Limestone Fragments** 65.0-65.1' - dark yellowish brown, (10YR 4/2), mild HCl reaction, some black organic staining on bedding planes | | Driller's Remark: soft drilling at 66.67', Rig chatter at 67.0' harder drilling |
| 70 | 70.0 | | | | | | |
| -30.0 | 70.8 | 0.7 | SS-15 | 26-50/3 (76/9") | **Sandy Silt And Limestone Fragments (ML)** 70.0-70.7' - pale yellowish brown, (10YR 6/2), wet, hard, low plasticity, rapid dilatancy, mild HCl reaction, 40% ML and 60% limestone, 25-30% fine to coarse sand-sized; fine to coarse gravel-sized limestone fragments, carbonate materials | | |
| 75 | 75.0 | | | | | | |
| -35.0 | 76.5 | 0.8 | SS-16 | 50-37-27 (64) | **Silty Sand With Limestone (SM)** 75.0-75.75' - moderate yellowish brown, (10YR 5/4), moist, very dense, fine to coarse grained, mild HCl reaction, 35-40% low plastic fines, 15% fine gravel-sized limestone fragments, carbonate materials | | |
| | 80.0 | | | | | | |
| | 80.1 | 0.0 | SS-17 | 50/1 (50/1") | **No Recovery 80.0-80.1'** | | |
| 80 | | | | | | | |
| | | | | | Begin Rock Coring at 80.0 ft bgs<br>See the next sheet for the rock core log | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
| 338884.FL | 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 ft bgs on 5/31/2007 START : 5/31/2007 END : 6/1/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -40.0 | 80.0 | | 3 | 80.15' - Bedding plane, horizontal, smooth, open | | **Limestone Fragments** 80.0-81.35' - light olive gray, (5Y 5/2), moderate HCl reaction, very weak to weak (R1 to R2), fossiliferous (voids, casts, molds), voids up to 1/16", some cavities generally <6/16"x6/16" | Switching over to NQ coring at 80.0' |
| | | | 4 | 80.35' - Fracture, 30 deg, rough, stepped, black organic film over 15-20%, tight | | | |
| | R1-NQ 5 ft 46% | 8 | 10 | 80.6' - Fracture, 50-60 deg, rough, undulating, tight | | | |
| | | | | 81.03' - Fracture, 0-80 deg, rough, stepped, tight | | **Limestone** 81.35-82.3' - pale greenish yellow, (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' | |
| | | | | 81.35' - Bedding plane, horizontal, smooth, stepped, open | | | |
| | | | NR | 81.67, 81.8' - Bedding plane, horizontal, smooth, open | | | R1:7 minutes |
| | | | | 82.2' - Bedding plane, horizontal, smooth, open | | | |
| 85 | 85.0 | | | | | **No Recovery 82.3-85.0'** | |
| -45.0 | | | 1 | | | **Limestone** 85.0-90.0' - yellowish gray with pale greenish yellow mottling, (5Y 7/2 with 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 colored limestone with few voids); fossiliferous (casts and molds), voids and cavities up to 3/8"-3/4"x3/8" over 40-50% of surface | |
| | | | 1 | 85.9' - Fracture or mechanical break, horizontal, rough, undulating, tight | | | Core fell out upon retrieval, had to make multiple trips to get rock out of outer barrel |
| | | | | 86.6-87.75' - Fracture zone, vertical, rough, undulating, tight | | | |
| | R2-NQ 5 ft 100% | 44 | 2 | | | | |
| | | | 3 | 88.4-88.8' - Fracture zone, 0-<5 deg, rough, undulating, tight to open | | | No circulation below 80.0' |
| | | | 3 | 89.15-89.3' - Fracture zone, 0-90 deg, Undulating to stepped, tight to open | | | R2:5 minutes |
| 90 | 90.0 | | | | | | |
| -50.0 | | | 1 | 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), fine to very fine grained, mild to moderate HCl reaction, very weak (R1), fossiliferous (molds/casts) with very fine grained yellowish gray possible intraclasts in the structure, voids and cavities up to 3/16"-3/8" over 50-60% of surface | |
| | | | 0 | 90.7' - Fracture, <5 deg, rough, undulating, tight | | | |
| | R3-NQ 5 ft 100% | 90 | 0 | | | | |
| | | | 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 fine grained, strong HCl reaction, weak (R2), <2% cavities, voids up to 3/16" over 15-20% of rock surface | |
| | | | 2 | | | | R3:9 minutes |
| 95 | 95.0 | | | 94.6' - Fracture, horizontal, rough, undulating, tight | | | |
| -55.0 | | | 1 | 94.9' - Fracture, horizontal, rough, undulating, tight | | 92.0-93.4' - Same as 90.9-92.0' except pale yellowish brown to light olive brown, (10YR 6/2 to 5Y 5/6), mottled, very fine grained, mild to moderate HCl reaction, cavities and voids more common than above with some cavity infilling (strong HCl reaction), cavities and voids up to 20-25% | |
| | | | 0 | 95.2' - Bedding plane, horizontal, smooth, undulating, open | | | |
| | R4-NQ 5 ft 90% | 74 | 1 | 97.5' - Bedding plane, <5 deg, rough, undulating, open | | | |
| | | | 2 | 98.5' - Bedding plane, horizontal, smooth, undulating, open, organic material | | 93.4-95.0' - Same as 90.9-92.0' except voids up to 20-25% | |
| | | | 10 | 98.8' - Fracture, 20 deg, rough, undulating, tight | | | R4:9 minutes |
| 100 | 100.0 | | NR | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
| 338884.FL | GSC-04 | SHEET 6 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 ft bgs on 5/31/2007 START : 5/31/2007 END : 6/1/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -60.0 | R5-NQ 5 ft 88% | 37 | 10 | 99.35' - Fracture zone, 0-90 deg, rough, Undulating to stepped, open<br>100.0-100.3' - Fracture zone, 0-90 deg, smooth, open | | **Limestone**<br>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<br>**Clay (CL)**<br>98.4-98.45' - dark gray, (N3), strong HCl reaction, platy | |
| | | | 4 | 100.7-100.9' - Fracture, 70 deg, rough, undulating, tight | | | |
| | | | 4 | 101.2, 101.3' - Bedding plane (2), horizontal, smooth, undulating, open, black organic staining over 35% | | | |
| | | | 1 | 101.8-102.5' - Fracture zone, 0-90 deg, rough, Stepped to undulating, open to tight<br>102.65, 102.8, 102.98, 103.17' - Bedding plane (4), 0-<5 deg, rough, undulating, open | | | R5:6 minutes |
| | | | 10 | 104.1-104.4' - Fracture zone, 0-90 deg, open | | | |
| 105 | 105.0 | | NR | | | | |
| -65.0 | R6-NQ 5 ft 74% | 33 | 4 | 105.12' - Bedding plane, 0-<5 deg, smooth, Planar to stepped, open | | **Limestone**<br>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<br>**No Recovery 99.5-100.0'**<br>**Limestone**<br>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", chalk-like texture, becoming very soft, extremely weak (R0) at 104.0', thick, laminated from 101.2-101.3' with some black organic material<br>**No Recovery 104.4-105.0'**<br>**Limestone**<br>105.0-108.7' - yellowish gray, (5Y 8/1), very fine grained, strong HCl 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'<br>**No Recovery 108.7-110.0'**<br>**Limestone**<br>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<br>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<br>**No Recovery 114.9-115.0'** | |
| | | | 4 | 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 | | | |
| | | | 1 | 105.95' - Bedding plane, horizontal, smooth, planar, tight to open | | | |
| | | | 10 | 106.3' - Fracture, 30-40 deg, rough, stepped, tight | | | |
| | | | NR | 106.5, 106.7, 106.95' - Bedding plane (3), horizontal, smooth, undulating, tight to open<br>107.85' - Fracture, 0-90 deg, rough, stepped, tight | | | R6:6 minutes |
| 110 | 110.0 | | | | | | |
| -70.0 | R7-NQ 5 ft 98% | 78 | 0 | 108.2' - Bedding plane, <5 deg, rough, stepped, open | | | |
| | | | 0 | | | | |
| | | | 0 | | | | |
| | | | 1 | | | | |
| | | | 10 | 113.9' - Bedding plane, horizontal, rough, undulating, open | | | R7:7 minutes |
| 115 | 115.0 | | NR | 113.9-114.1' - Fracture, vertical, rough, undulating, open | | | |
| -75.0 | R8-NQ 5 ft 86% | 74 | 2 | 114.1' - Bedding plane, 0-30 deg and 30 deg, rough, undulating, open | | | |
| | | | 0 | 114.5' - Bedding plane, horizontal, rough, planar, open<br>114.6-114.9' - Fracture zone, horizontal, rough, planar, limestone fragments, open | | | |
| | | | 1 | 115.1' - Fracture zone, smooth, planar and undulating, limestone fragments | | | |
| | | | 3 | 115.25, 117.55, 118.18, 118.53, 118.55, 119.3' - Bedding plane (6), smooth, undulating to planar, open | | | R8:8 minutes |
| 120 | 120.0 | | NR | | | | |

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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 on 5/31/2007 START : 5/31/2007 END : 6/1/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -80.0 | R9-NQ 5 ft 88% | 24 | 4<br>2<br>7<br>8<br>4<br>NR | 120-120.35' - Fracture, vertical, smooth, planar<br>120.35' - Fracture, 40 deg, rough, undulating, tight<br>120.55' - Fracture, 0-60 deg, smooth, planar, open<br>120.75' - Bedding plane, horizontal, undulating, open<br>121.35' - Bedding plane, horizontal, smooth, stepped, tight<br>121.97, 122.25, 122.37, 122.7, 122.77, 122.87, 123.0, 123.15, 123.4, 123.5, 123.55, 123.63, 123.7, 123.82, 123.88, 123.9, 140.1, 140.2, 140.3, 140.45' - Bedding plane (20), horizontal, rough, undulating to stepped, open | | **Limestone**<br>115.0-119.3' - yellowish gray to very pale orange, (5Y 8/1 to 10YR 8/2), very fine grained, strong HCl reaction, very weak to weak (R1 to R2), "chalk-like" texture, zones where voids and cavities are nearly absent grades to zones/thin beds with voids up to 1/16" covering 20-30% (e.g. 116.1-116.2') cavities, <2% (more abundant near beginning of run, up to 3/8"x3/8"); fossil void to rate, becoming slightly more common at base of run<br>**No Recovery 119.3-120.0'** | R9:5 minutes |
| 125 | 125.0 | | | | | | |
| -85.0 | R10-NQ 5 ft 90% | 25 | 6<br>8<br>8<br>1<br>2<br>NR | 125.3, 125.47, 125.57, 125.67, 125.82, 125.96, 126.05, 126.12, 126.27, 126.32, 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 mechanical break (23), horizontal, rough, undulating to stepped, open<br>129.3' - Bedding plane, 10-15 deg, smooth, planar, tight | | **Limestone**<br>120.0-122.7' - Same as 115.0-119.3'<br>122.7-124.4' - Same as 120.0-122.7' except more voids/cavities up to 75-80% of surface covered with voids 1/16", cavities up to 3/8"-3/4"x3/8"-3/4", fossiliferous (molds/casts)<br>**No Recovery 124.4-125.0'**<br>**Limestone**<br>125.0-129.3' - Same as 122.7-124.4' except some thin laminations at base of interval<br>129.3-129.5' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, medium strong (R3), laminated bedding, thick, laminae incline 10-15 deg, 1 cavity 3/8"x3-7/8", voids less than 1/16" over 10-15% of surface, dense limestone<br>**No Recovery 129.5-130.0'** | R10:7 minutes |
| 130 | 130.0 | | | | | | |
| -90.0 | R11-NQ 5 ft 70% | 8 | 3<br>7<br>7<br>2<br>NR | 129.48' - Bedding plane, <5 deg, smooth, stepped, open<br>130.25, 130.58, 130.9, 131.2, 131.28, 131.5, 131.55, 131.64, 131.78, 131.97, 132.13, 132.35, 132.42, 132.47, 132.68, 132.92, 132.97, 133.05' - Bedding plane (18), horizontal, smooth, undulating to planar, open | | **Limestone**<br>130.0-133.5' - yellowish gray, (5Y 8/1), strong HCl reaction, weak to very weak (R2 to R1), voids up to 1/16" or less over 5-10% of surface, rare cavities (3/16"x3/16"), trace fossil molds/casts; thin lamination in upper 0.1-0.2' section<br>**No Recovery 133.5-135.0'** | R11:7 minutes |
| 135 | 135.0 | | | | | | |
| -95.0 | R12-NQ 5 ft 90% | 0 | 5<br>7<br>5<br>>10<br>2<br>NR | 135.1, 135.2' - Bedding plane (2), horizontal, smooth, undulating, open<br>135.3' - Bedding plane or fracture, 0-60 deg, rough, stepped to undulating, open<br>135.5-136.65' - Fracture zone, 0-90 deg, smooth, undulating, gravel<br>136.72,136.82, 136.92, 137.05, 137.27, 137.5' - Bedding plane (6), horizontal, rough, undulating, open<br>137.6' - Bedding plane or fracture, 0-50 deg, smooth, undulating, open<br>138.04, 138.25, 138.4' - Bedding plane (3), horizontal, rough, undulating, open<br>138.4-139.0' - Fracture zone, 0-90 deg, smooth to rough, undulating to stepped, open | | **Limestone**<br>135.0-139.5' - Same as 130.0-133.5' except cavities and voids 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 mottling (coating of limestone matrix) becoming extremely weak rock (R0) at 138.4' to 139.0', thick laminated from 138.0-139.5', few voids<br>**No Recovery 139.5-140.0'** | R12:7 minutes |
| 140 | 140.0 | | | | | | |

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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 on 5/31/2007 START : 5/31/2007 END : 6/1/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -100.0 | R13-NQ 5 ft 84% | 10 | 5 | 139.25' - Bedding plane, horizontal, rough, stepped to undulating, open | | **Limestone** 140.0-144.2' - variegated yellowish gray with gray laminae, (5Y 8/1 to 5Y 9/2), very fine to fine grained, strong HCl reaction, weak to very weak (R2 to R1), voids and cavities, 3-5% becoming 10-15% with depth, fossiliferous with trace echinoids in top portion, molds and casts increase with depth (5-10%), thick laminated 133.9-134.0' | |
| | | | 6 | 140.3, 140.42, 140.6, 140.75, 140.95' - Bedding plane or mechanical break (5), horizontal, smooth, planar to undulating | | | |
| | | | 6 | 141.18, 141.28, 141.33, 141.39, 141.5, 141.8' - Bedding plane or mechanical break (6), horizontal, smooth, planar to undulating | | | |
| | | | 6 | 142.0, 142.08, 142.18, 142.46, 142.75, 142.9' - Bedding plane or mechanical break (6), horizontal, smooth, planar to undulating | | | |
| | | | 2 NR | 143.05, 143.13, 143.65, 143.88, 143.95, 143.98' - Bedding plane or mechanical break (6), horizontal, rough, planar to undulating | | **No Recovery 144.2-145.0'** | R13:6 minutes |
| 145 | 145.0 | | | 144.08, 144.18' - Bedding plane or mechanical break (2), horizontal, rough, planar to undulating | | | |
| -105.0 | R14-NQ 5 ft 84% | 10 | >10 | 145.0-147.25' - Fracture zone, 0-90 deg, limestone gravel, stepped, undulating, smooth to rough, open | | **Limestone** 145.0-147.1' - light gray to medium gray, (N7 to N6), very fine grained, strong HCl reaction, medium strong (R3), fossiliferous (molds and casts) over 3-5%, voids up to 1/16" over 3-5% of surface | |
| | | | >10 | | | | |
| | | | 10 | 147.25' - Bedding plane, horizontal, rough, undulating, open | | 147.1-149.2' - yellowish gray grading to medium gray with depth, (5Y 7/2 to N5), fine grained, mild to moderate HCl reaction, thinly laminated in upper 0.5', trace fossil molds/casts, 1 cavity 3/8"x2", voids up to 1/16" over 15-20% of surface, some dissolution features (cavities) at 148.2' as discontinuous bedding plane voids | |
| | | | 7 | 147.3, 147.45, 147.52, 147.92, 148.0, 148.05, 148.24, 148.65' - Bedding plane (8), 0-<5 deg, undulating to planar, rough to smooth, some organic black coating over 70-80% of surfaces | | | |
| | | | 1 NR | 148.65-148.90' - Fracture zone | | | R14:6 minutes |
| 150 | 150.0 | | | | | | |
| -110.0 | R15-NQ 5 ft 100% | 90 | 1 | | | **No Recovery 149.2-150.0'** | |
| | | | 0 | 150.9' - Bedding plane, horizontal, rough, undulating | | **Limestone** 150.0-150.9' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine grained, moderate to mild HCl reaction, medium strong (R3), becomes thinly laminated with depth, voids up to 1/16" over 30-40% of surface with trace thin laminae of very fine limestone with few voids | |
| | | | 1 | 152.55' - Bedding plane, horizontal, rough, undulating, tight | | | |
| | | | 14 | 153.25-153.4' - Fracture zone, 0-90 deg, rough | | 150.9-151.8' - variegated yellowish gray, dusky yellow to light olive brown, (5Y 7/2, 5Y 6/4 to 5Y 5/6), coarse grained, strong HCl reaction, weak (R2), abundant possible lithoclasts (possible conglomeratic) | |
| | | | 1 | 153.5' - Bedding plane or fracture, horizontal, rough, planar, open | | | R15:6 minutes |
| 155 | 155.0 | | | 153.5-153.85' - Fracture, 80-90 deg, rough, undulating, tight | | | |
| -115.0 | R16-NQ 5 ft 98% | 76 | 0 | | | **Limestone** 151.8-153.3' - dusky yellow to yellowish gray, (5Y 6/4 to 5Y 7/2), medium grained, weak (R2) 153.3-155.0' - Same as 150.0-150.9' except thinly laminated, voids up to 1/16" over 5-10%, mild to strong HCl reaction with depth, some early fracture development/dissolution at 154.7' | |
| | | | 1 | 156.4, 157.15, 157.25, 157.33, 157.52, 157.65, 157.73, 157.96' - Bedding plane (8), 0-<5 deg, rough, undulating, open to tight | | | |
| | | | 7 | | | | |
| | | | 3 | 158.0, 158.15, 158.22' - Bedding plane (3), horizontal, smooth, undulating, open | | | R16:8 minutes |
| | | | 2 | 159.1' - Bedding plane, 0-<5 deg, rough, undulating, open | | | |
| 160 | 160.0 | | NR | 159.5' - Fracture, 50 deg, rough, stepped, tight | | | Actual Not Recovered interval from 159.9-160.0' |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: GSC-04 | SHEET 9 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 ft bgs on 5/31/2007 START : 5/31/2007 END : 6/1/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | | | **Limestone**<br>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 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 brown in color<br>157.25-158.2' - variegated yellowish gray to light olive brown to moderate 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 10-15% of surface<br>158.2-159.1' - yellowish gray, (5Y 7/2), some medium gray (n7-n8) mottling, fine grained, mild HCl reaction, weak to medium strong (R2 to R3), competent, voids up to 1/16" over 2-3%, several cavities 3/16"x3/8" over <1%, fossiliferous (<1%), casts/molds (echinoids)<br>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), fossiliferous, voids/cavities over 10-15% of surface<br>**No Recovery 159.9-160.0'**<br>Bottom of Boring at 160.0 ft bgs on 6/1/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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

WATER LEVELS : 1.2 ft bgs on 5/5/07 START : 5/4/2007 END : 5/6/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 41.3 | 0.0 | 1.2 | SS-1 | 1-2-3 (5) | **Topsoil** 0.0-0.2' - olive black, (5Y 2/1), roots, organics | | 10:59 Begin drilling |
| | 1.5 | | | | **Poorly Graded Sand With Organics (SP)** 0.2-1.2' - pale yellowish brown grading to moderate yellowish brown at 0.95', (10YR 6/2 to 10YR 5/4), moist, loose, very fine to fine silica sand, trace nonplastic fines, 15% organics decreasing with depth | | Driller's Remark: Hammer by M. Craus (manual with NWJ rod) |
| 5 | 5.0 | | | | | | |
| 36.3 | | 0.9 | SS-2 | 3-2-2 (4) | **Silty Sand (SM)** 5.0-5.9' - pale yellowish brown to light olive gray, (10YR 6/2 to 5Y 6/1), moist to wet, very loose, very fine to fine silica sand, 25% nonplastic fines, becoming low plastic at 5.7' | | |
| | 6.5 | | | | | | |
| 10 | 10.0 | | | | | | |
| 31.3 | | 0.9 | SS-3 | 8-14-18 (32) | **Silt (ML)** 10.0-10.91' - grayish orange, (10YR 7/4), wet, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 5-10% very fine sand-sized, carbonate materials | | |
| | 11.5 | | | | | | |
| 15 | 15.0 | | | | | | |
| 26.3 | 15.3 | 0.2 | SS-4 | 50/3 (50/3") | **Poor Recovery Limestone Fragments** 15.0-15.2' - grayish orange, (10YR 5/4), moderate HCl reaction, fragments up to 1/2" | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-05 SHEET 2 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

WATER LEVELS : 1.2 ft bgs on 5/5/07 START : 5/4/2007 END : 5/6/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 21.3 | 20.0 – 21.5 | 1.2 | SS-5 | 28-42-36 (78) | **Silt (ML)** 20.0-21.2' - dusky yellow to grayish orange, (5Y 6/4 to 10YR 7/4), wet, nonplastic, rapid dilatancy, moderate HCl reaction, 10-15% very fine to medium sand-sized, carbonate materials | | |
| 25 | 25.0 – 26.5 | 1.0 | SS-6 | 32-30-25 (55) | **Silty Sand (SM)** 25.0-26.0' - grayish yellow, (5Y 8/4), wet, very dense, moderate HCl reaction, fine to coarse sand-sized, 30% nonplastic fines, 10-15% fine gravel-sized limestone, carbonate materials | | |
| 16.3 | | | | | | | |
| 30 | 30.0 – 31.5 | 1.0 | SS-7 | 33-28-23 (51) | **Silty Sand (SM)** 30.0-31.0' - Same as 25.0-26.0' | | |
| 11.3 | | | | | | | |
| 35 | 35.0 – 36.4 | 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 gravel-sized limestone fragments | | Driller's Remark: 14:55 remove NWJ rod<br>Driller's Remark: Casing set to 40.0' |
| 6.3 | | | | | | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-05 SHEET 3 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

WATER LEVELS : 1.2 ft bgs on 5/5/07 START : 5/4/2007 END : 5/6/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 1.3 | 40.0<br>40.8 | 0.8 | SS-9 | 30-50/4<br>(96") | **Sandy Silt With Limestone (ML)**<br>40.0-40.85' - grayish olive mottled with olive gray, (10Y 4/3 with 5Y 3/2), wet, hard, low plasticity, rapid dilatancy, mild HCl reaction, 35-40% fine to coarse sand-sized, 20-25% of sample is fine to coarse limestone fragments, carbonate materials<br>Begin Rock Coring at 41.0 ft bgs<br>See the next sheet for the rock core log | | Driller's Remark: 15:55 insert AWJ rod to clear out hole (with bit) |
| 45<br>-3.7 | | | | | | | |
| 50<br>-8.7 | | | | | | | |
| 55<br>-13.7 | | | | | | | |
| 60 | | | | | | | |

| PROJECT NUMBER: 338884.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 ORIENTATION : Vertical

WATER LEVELS : 1.2 ft bgs on 5/5/07 START : 5/4/2007 END : 5/6/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | 41.0 | | 2 | 41.05' - Bedding plane, 10-25 deg, rough, undulating, open up to 1/2"<br>41.7' - Bedding plane or mechanical break, 25 deg, rough, undulating | | **Limestone**<br>41.0-45.6' - moderate yellowish brown, (10YR 5/4), very fine to fine grained, moderate HCl reaction, voids (up to 1/8") over <5-30% of 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 molds up to 1" from 43.3-45.6' infill of highly voided and moderately fossiliferous material of the same color, with infill increasing to more than 70% of surface at 44.5', 41.0-43.1' very weak (R1), 43.1-44.4' medium strong (R3), 44.4-45.6' weak (R2)<br>**No Recovery 45.6-46.0'**<br>**Limestone**<br>46.0-49.05' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, very weak to weak (R1 to R2), poorly competent, friable, organic laminar features (discontinuous) from 46.0-46.5', some (<5%) dissolution features up to 1/4" poorly fossiliferous, extremely weak (R0) voids up to 1/16" over <5% of surface<br>49.05-50.9' - moderate HCl reaction, very weak to weak (R1 to R2), moderate to highly fossiliferous, casts up to 1"x1/2", voids to 1/16" over 15% of surface<br>**No Recovery 50.9-51.0'**<br>51.0-54.5' - Same as 49.0-50.9' except fossils are moderate and up to 1/4", <1/16" voids over 20-30% of surface, infill of medium light gray (N6) and medium gray (N5) up to 1/8"x1/4", possibly breccia<br>54.5-55.55' - Same as 46.0-49.05' except no organics, infill clasts at 51.0-54.5', dissolution feature at 54.95' (1-1/4"x3/4")<br>**No Recovery 55.55-56.0'**<br>**Limestone**<br>56.0-58.5' - moderate yellowish brown, (10YR 5/4), fine grained, very mild HCl reaction, extremely weak (R0), voids (1/16") over 5-10% of surface with increasing voids and hardness with depth to 20% of surface, trace cavities <1/4" and weak rock (R2) below 57.3' | 5/5/07 08:07 begin coring<br>08:00 water level = 1.2' below ground surface |
| | | | >5 | | | | |
| | R1-NQ 5 ft 92% | 87 | 1 | 42.95-43.1' - Fracture zone, intersecting fractures, fragments to 1"<br>43.5' - Mechanical break | | | |
| | | | 2 | 43.6' - Bedding plane or mechanical break, 15-20 deg, rough, undulating | | | |
| 45<br>-3.7 | | | 1 | 44.5' - Bedding plane, <10 deg, rough, undulating, open up to 1/4" | | | R1:6 minutes |
| | 46.0 | | NR | 44.8' - Bedding plane or mechanical break, 15-20 deg, rough, undulating | | | |
| | | | >10 | 45.25' - Bedding plane or mechanical break, <5 deg, rough, undulating<br>46.0-46.9' - Fracture zone, multiple intersecting fractures, fragments up to 4" | | | |
| | | | 2 | 47.4, 47.6' - Bedding plane or mechanical break (2), <5 deg, rough, undulating | | | |
| | R2-NQ 5 ft 98% | 38 | >10 | 48.05' - Bedding plane or mechanical break, <5 deg, rough, undulating, open up to 1/8"<br>48.5-48.7' - Fracture zone, multiple intersecting fractures, fragments up to 4" | | | |
| | | | 0 | 48.95' - Bedding plane or mechanical break, <5 deg, rough, undulating, broken on edges of fractures open up to 1/2" | | | |
| 50<br>-8.7 | | | 0 | 49.7' - Mechanical break | | | R2:3 minutes |
| | 51.0 | | NR | | | | |
| | | | 2 | 51.15' - Bedding plane, 10 deg, rough, undulating, open up to 1/4" | | | |
| | | | 0 | 51.75' - Bedding plane, with missing pieces (could be associated with dissolutions), open 1" | | | |
| | R3-NQ 5 ft 91% | 66 | 0 | 53.5' - Mechanical break | | | |
| | | | >10 | 54.5-54.6' - Fracture zone, multiple intersecting fractures, 1" fragments | | | |
| 55<br>-13.7 | | | 1 | 54.95' - Bedding plane, 25 deg, rough, undulating, open up to 1", associated dissolution and in softer material | | | R3:3 minutes |
| | 56.0 | | NR | | | | |
| | | | 3 | 55.4' - Bedding plane, <5 deg, rough, undulating | | | |
| | | | >5 | 56.3' - Fracture, 50 deg, rough, undulating, with silt-sized fragments<br>56.5' - Bedding plane or mechanical break, <5 deg, rough, undulating, open | | | |
| | R4-NQ 5 ft 78% | 30 | >5 | 56.75' - Bedding plane, 10 deg, rough, undulating, open up to 1/8" | | | |
| | | | 4 | 57.1-57.3' - Fracture zone, intersecting fractures, up to 2" fragments | | | |
| 60<br>-18.7 | | | NR | 58.7-59.0' - Fracture zone, intersecting fractures, up to 2" fragments, associated laminar organics | | | R4:4 minutes |
| | 61.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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 ORIENTATION : Vertical

WATER LEVELS : 1.2 ft bgs on 5/5/07 START : 5/4/2007 END : 5/6/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R5-NQ 5 ft 98% | 9 | >10 | 59.15' - Bedding plane, 10 deg, rough, undulating, open up to 1/4" | | **Limestone** 58.5-59.9' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, very weak to weak (R1 to R2), voids (1/16"-1/8") over 30-40% of surface, few cavities <1/2" (one 1"x1/2"), black bedding plane laminations between 58.7-59.9' **No Recovery 59.9-61.0'** **Limestone** 61.0-65.9' - moderate olive brown to moderate yellowish brown, (5Y 4/4 to 10YR 5/4), very fine to fine grained, mild HCl reaction, very weak to weak (R1 to R2), occasional sections of extremely weak (R0), moderately competent and friable (variably), voids (1/16") over 5-10% of surface, sections with intermittent voids (1/16") over 25-30% of surface (secondary infill of 1"-2" cavities), very fine (<1/16" thick) black laminations decrease with depth **No Recovery 65.9-66.0'** **Limestone** 66.0-67.2' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, weak (R2), voids (1/16"-1/8") over 20-30% of surface, trace shallow cavities up to 1/4", trace organic inclusion (spheroid and laminar) 67.2-67.6' - moderate olive brown, (10YR 5/4), mild to moderate HCl reaction, weak to very weak (R2 to R1), voids (1/16") over 5% of surface, 10% having 2" infill with voids (1/16") over 25-30% of surface, fine darker laminations increasing with depth 67.6-68.3' - Same as 66.0-67.2' 68.3-71.0' - Same as 67.2-67.6' 71.0-75.8' - moderate yellowish brown, (10YR 5/4), fine grained, mild to moderate HCl reaction, 71.5-72.0' and 75.0-75.8' extremely weak (R0), weak to medium strong (R2-R3), moderately fossiliferous, casts up to 1/4", organic inclusions over <5% up to 1/2"x1/8", <1/16" voids over 30-40% of surface, competent **No Recovery 75.8-76.0'** | |
| | | | 3 | 59.25' - Bedding plane, 10 deg, rough, undulating, open up to 1/8", very thin infill of silt | | | |
| | | | >10 | 59.35' - Bedding plane, 10 deg, rough, undulating, open up to 1/8" | | | |
| | | | >5 | 59.65' - Bedding plane, 10 deg, rough, undulating, open up to 1/8" | | | |
| 65 -23.7 | | | 2 | 61.3-61.5' - Fracture zone, intersecting fractures, fragments to <1/16" to 2" | | | R5:4 minutes |
| | 66.0 | | NR | 61.9' - Bedding plane, <5 deg, rough, undulating, open up to 1/4" | | | |
| | R6-NQ 5 ft 100% | 57 | 0 | 62.3' - Fracture, 60 deg, rough, undulating | | | |
| | | | 1 | 62.5' - Bedding plane, <5 deg, rough, undulating, open up to 1/4" | | | |
| | | | 2 | 62.6' - Fracture, 60 deg, rough, undulating, opposite direction and possibly associated | | | |
| | | | 4 | 63.1' - Fracture, 60 deg, rough, undulating | | | |
| 70 -28.7 | | | 3 | 63.15' - Bedding plane, <5 deg, rough, undulating, open up to 1/4" | | | R6:6 minutes |
| | 71.0 | | 2 | 63.3' - Bedding plane, <5 deg, rough, undulating, open up to 1/4" | | | |
| | R7-NQ 5 ft 96% | 50 | 1 | 63.9-63.95' - Fracture zone, intersecting fractures, fragments to 1/2" | | | |
| | | | 0 | 64.5' - Mechanical break | | | |
| | | | 3 | 64.7-64.9' - Fractures, 40-85 deg, rough, undulating, intersecting high angle | | | |
| 75 -33.7 | | | 1 | 65.1' - Fracture, 80-85 deg, rough, undulating, continuation of a fracture in 64.7-64.9' | | | R7:2 minutes |
| | 76.0 | | NR | 65.7' - Bedding plane, rough to smooth, undulating, bottom has fragments to 30 deg angle, top is <5 deg angle | | | |
| | R8-NQ 5 ft 70% | 23 | >5 | 67.25' - Bedding plane, <10 deg, rough to smooth, undulating, along organic bedding plane | | | |
| | | | 3 | 68.3' - Bedding plane, <10 deg, smooth, undulating to planar | | | |
| | | | 3 | 68.5, 68.6' - Mechanical break (2) | | | |
| | | | >10 | 68.9' - Bedding plane, <10 deg, smooth, undulating, along organic bedding plane | | | |
| 80 -38.7 | | | NR | 69.0' - Bedding plane, <10 deg, smooth, undulating, along organic bedding plane | | | R8:4 minutes |
| | 81.0 | | | 69.15, 69.2' - Bedding plane (2), <10 deg, smooth, undulating, along organic bedding plane | | | |
| | | | | 69.17' - Bedding plane, >85 deg, smooth, undulating | | | |
| | | | | 70.0' - Bedding plane, <10 deg, smooth, undulating, along organic bedding plane | | | |
| | | | | 70.6, 70.62' - Bedding plane, <10 deg, smooth, undulating, along organic bedding plane | | | |
| | | | | 71.05' - Bedding plane, <5 deg, rough, undulating, associated with organic fractures, open to 1/4" | | | |
| | | | | 71.6' - Bedding plane or mechanical break, 30 deg, rough, undulating | | | |

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# 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 ORIENTATION : Vertical

WATER LEVELS : 1.2 ft bgs on 5/5/07 START : 5/4/2007 END : 5/6/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R9-NQ 5 ft 90% | 28 | 3 | 72.5' - Bedding plane, top is <5 deg, bottom is 30 deg, piece missing, open to 1" associated with softer zone at bottom | | **Limestone** 76.0-76.3' - very pale orange with medium light gray mottling, (10YR 8/2 with N5), very fine grained, moderate HCl reaction, medium strong to strong (R3 to R4), voids (1/16") over 5-10% of surface, some cavities up to 2"x1/2" some are infilled, transitions gradually above and below to 76.3-77.0' | |
| | | | >5 | 72.85, 73.4, 73.5' - Mechanical break (3) 74.01' - Bedding plane, top is <5 deg, bottom is 30 deg, piece missing, open up to 1/2" associated with softer zone at bottom | | | |
| | | | 1 | 74.15' - Fracture, 50 deg, rough, undulating, open up to 1/4" | | | |
| | | | 1 | 74.2' - Bedding plane, top is <5 deg, bottom is 30 deg, piece missing, open to 1" associated with softer zone at bottom | | **Limestone** 76.3-77.0' - grayish orange, (10YR 7/4), fine grained, mild to moderate HCl reaction, weak to medium strong (R2 to R3), voids (<1/16") over 20-30% of surface, trace cavities <1/4", trace fine (1/16") black inclusions | |
| 85 -43.7 | | | 1 | 75.0' - Bedding plane or mechanical break, <5 deg, rough, undulating | | | R9:8 minutes |
| | 86.0 | | NR | 75.4, 75.5' - Mechanical break (2) | | | |
| | R10-NQ 5 ft 40% | 53 | 1 | 76.6' - Bedding plane, <5 deg, rough, undulating, open up to 1/4" 76.6-76.9' - Fracture zone, intersecting fractures, fragments to 2" | | | Water level = 3.0' below ground surface |
| | | | 1 | 77.2' - Bedding plane, <5 deg, rough, undulating, open up to 1", associated with dissolution | | 77.0-77.7' - Same as 76.0-76.3' 77.7-78.8' - Same as 76.3-77.0' 78.8-79.5' - Same as 77.0-77.7' **No Recovery 79.5-81.0'** **Limestone** 81.0-85.1' - moderate brown, (10YR 5/4), very fine grained, strong HCl reaction, medium strong to strong (R3 to R4), voids up to 1/16" over 20-40% of surface, moderately fossiliferous, casts to 1/2", organic bedding features at 82.0', very pale orange (10YR 8/2) infill up to 4"x2" from 10-40% of surface (infilling poorly fossiliferous, trace voids to 1/16") 85.1-85.25' - dark yellowish brown, (10YR 4/2), strong HCl reaction, clay lens 85.25-85.5' - very pale orange to light gray, (10YR 5/4 to N7), fine grained, strong HCl reaction, medium strong to strong (R3 to R4), trace voids to 1/16" **No Recovery 85.5-86.0'** **Limestone** 86.0-88.0' - Same as 85.25-85.5' except 86.0-86.9' is highly fossiliferous, casts to 1/2", light olive gray (5Y 5/2) silt infill, from 86.9-86.95' moderate yellowish brown color (10YR 5/4), dissolution cavities to 2" and some infill of moderate yellowish brown (10YR 5/4) **No Recovery 88.0-91.0'** | |
| | | | NR | 77.5' - Bedding plane, <5 deg, rough, undulating, open up to 1", associated with dissolution 77.65' - Bedding plane, 30 deg, rough, undulating, open up to 1", associated with dissolution, lithologic change up to 1/2" open 77.95' - Bedding plane, <5 deg, rough, undulating, associated with soft material | | | |
| 90 -48.7 | | | | | | | R10:5 minutes |
| | 91.0 | | | | | | |
| | R11-NQ 5 ft 82% | 18 | >10 | 78.1' - Bedding plane, <5 deg, rough, undulating, open up to 1", associated with soft material | | | |
| | | | >10 | 78.5' - Bedding plane, <5 deg, rough, undulating, associated with soft material | | | |
| | | | >5 | 78.7' - Bedding plane, <5 deg, rough, undulating, open up to 1/4", associated with soft material 79.3' - Bedding plane, <5 deg, rough, undulating | | | |
| | | | 0 | 79.4-79.5' - Fracture zone, intersecting fractures, fragments up to 1" | | | |
| 95 -53.7 | | | >10 | 81.3' - Bedding plane, <5 deg, rough, undulating, <1/8" open | | | R11:5 minutes |
| | 96.0 | | NR | 81.5' - Bedding plane, rough, undulating, top <5 deg, bottom 30 deg | | | |
| | R12-NQ 5 ft 98% | 95 | 1 | 81.95' - Bedding plane, <5 deg, rough, undulating, open up to 1/2" | | | |
| | | | 0 | 82.6' - Fracture or fracture zone, 85 deg, rough, undulating, pieces missing 83.3' - Bedding plane, <5 deg, rough, undulating, open up to 1/2" | | | |
| | | | 0 | 83.5, 83.75, 84.05' - Mechanical break (3) 84.75' - Bedding plane, <5 deg, rough, undulating, mostly not open, missing fragments on small part of fracture (1/2") | | | |
| | | | >5 | 85.2' - Bedding plane, <5 deg, rough, undulating, open up to 1" | | | |
| 100 -58.7 | | | 0 | 86.92' - Bedding plane, 20 deg, rough, undulating, silt infill described in lithology, no stain, open up to 6" | | | R12:5 minutes |
| | 101.0 | | | | | | |

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# 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 ORIENTATION : Vertical

WATER LEVELS : 1.2 ft bgs on 5/5/07 START : 5/4/2007 END : 5/6/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R13-NQ 5 ft 86% | 18 | NR<br>0<br>>10<br>>10<br>>10<br>2<br>NR | 87.75' - Bedding plane, 20 deg, rough, undulating, open up to 1-1/2", no infill, associated with dissolution features<br>91.4-91.5' - Fracture zone, fragments to 1/2"x3/4" intersecting fractures<br>91.9' - Bedding plane, zone indurated with softer organic silt material<br>92.1' - Bedding plane, <5 deg, rough, undulating, open up to 1/8"<br>92.3, 92.5, 92.6' - Bedding plane (3), <5-20 deg, rough, undulating, infill (associated with infill of dissolution) described in lithology open up to 1/4"<br>92.8-93.05' - Fracture zone, fragments to 1/2"x3/4" intersecting fractures | | **Limestone**<br>91.0-92.9' - very fine grained, trace voids (1/16") over 30% of surface increasing with depth, dusky yellowish brown (10YR 2/2), friable, 5-30% fossils increasing with depth, 92.3-92.8' clay infill very pale orange (10YR 8/2)<br>92.9-95.1' - yellowish gray, (5Y 7/2), very weak to medium strong (R1 to R3), highly fossiliferous casts to 1/2", voids over 20% of surface up to 1/16", dissolution features to 3"x1"<br>**No Recovery 95.1-96.0'** | |
| 105<br>-63.7 | | | | | | | R13:2 minutes |
| 106.0 | | | | | | | |
| | R14-NQ 5 ft 99% | 95 | 0<br>0<br>0<br>0<br>0 | 93.5' - Mechanical break<br>93.95' - Bedding plane, <5 deg, rough, undulating, open up to 1/4"<br>95.0-95.01' - Fracture zone<br>96.1' - Bedding plane, <10 deg, rough, undulating, open <1/4"<br>97.8' - 85-90 deg, rough, undulating, open up to 1/8"<br>97.95' - Bedding plane, <5 deg, rough, undulating, up to 1/8" open<br>98.1-98.2' - Fracture zone, fragments to 1", intersecting fractures<br>99.45' - Bedding plane, <10 deg, rough, undulating, open 1/8" | | **Limestone**<br>96.0-100.9' - yellowish gray, (5Y 7/2), very fine grained, extremely weak to medium strong (R0 to R3), yellowish gray (5Y 8/1) to moderate yellowish brown (10YR 5/4) infill, voids up to 1/16" over 25% of surface, highly fossiliferous, casts and molds to 1/4", shallow dissolution features up to 2"x1-1/2"<br>**No Recovery 100.9-101.0'**<br>**Limestone**<br>101.0-101.9' - yellowish gray mottled with pale yellowish brown, (5Y 7/2 with 10YR 6/2), very weak to extremely weak (R1 to R0), voids up to 1/16" over 15% of surface, fossiliferous casts and molds to 1/4", becomes softer with depth | |
| 110<br>-68.7 | | | | | | | R14:3 minutes |
| 111.0 | | | | | | | |
| | R15-NQ 5 ft 100% | 78 | NR<br>0<br>2<br>1<br>2<br>2 | 102.0-102.5' - Fracture zone, associated with soft material and organic features, intersecting fractures up to 2"<br>102.5-103.25' - Bedding plane or fracture zone (10+), rough, undulating, up to 1/4" open<br>103.4-104.1' - Fracture zone, associated with soft material and organic features, intersecting fractures up to 2", fragments up to 2", highly fossiliferous with fossil molds (trace) same size as fragments<br>104.45' - Bedding plane, <5 deg, rough, undulating, up to 1/4" open<br>104.7-105.1' - Fracture zone, some bedding, some intersecting, fragments to 2"<br>105.3' - Bedding plane, <5 deg, rough, undulating, up to 1/8" open | | 101.9-105.3' - very fine to fine grained, competent, 5% trace organics, fossil molds up to 1/2", trace fossils, trace voids to 1/16", very weak (R1) at 105.1'<br>**No Recovery 105.3-106.0'**<br>**Limestone**<br>106.0-110.95' - Same as 101.0-101.9' except very weak to weak (R1 to R2), highly fossiliferous, fossil casts and molds, trace to 15% <1/16" sized infill of very pale orange (10YR 8/2) decreasing with depth, trace organic features<br>**No Recovery 110.95-111.0'**<br>**Limestone**<br>111.0-116.0' - Same as 96.0-100.9' except (5Y 8/1), yellowish gray (5Y 7/2) is mottled with yellowish gray infill, (5Y8/1), very weak (R1), infill poorly fossiliferous, trace (<5%) voids up to 1/16", infill is over 70-100% of surface at 111.0' | |
| 115<br>-73.7 | | | | | | | R15:5 minutes |
| 116.0 | | | | | | | |
| | R16-NQ 5 ft 100% | 62 | 0<br>2<br>2<br>0<br>0 | 106.65, 108.1, 108.3, 108.5' - Mechanical break (4)<br>112.4, 112.7, 113.0, 114.2, 114.4, 115.8, 115.85' - Bedding plane (7), <5 deg, rough, undulating, <1/8" open<br>113.5' - Mechanical break<br>117.4' - Bedding plane, <5 deg, rough, undulating<br>117.5' - Mechanical break<br>117.75' - Bedding plane, <5 deg, rough, undulating<br>118.5' - Bedding plane, <5 deg, rough, undulating<br>118.8' - Bedding plane, <5 deg, rough, undulating, 1/4" open | | | |
| 120<br>-78.7 | | | | | | | R16:7 minutes |
| 121.0 | | | | | | | |

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# 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 ORIENTATION : Vertical

WATER LEVELS : 1.2 ft bgs on 5/5/07 START : 5/4/2007 END : 5/6/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R17-NQ 5 ft 100% | 20 | 0 | 119.4' - Mechanical break | | 116.0-121.0' - Same as 111.0-116.0' except from 116.0-118.1' highly fossiliferous and fine grained fossil casts and molds to 1/2", medium light gray (N6) infill over <10%, voids up to 1/16" over 20% of surface and 118.1-121.0' fine grained to very fine grained, size decreasing with depth | |
| | | | 1 | 122.5' - Fracture, 45 deg, rough, undulating | | | |
| | | | 1 | 123.15' - Bedding plane, <5 deg, rough, undulating, up to 1/4" open | | | |
| | | | >10 | | | **Limestone** 121.0-126.0' - Same as 111.0-116.0' except 124.4-124.75' is mottled with pale orange (10YR 8/2) | |
| 125 -83.7 | | | 3 | 124.8-124.95' - Fracture zone, intersecting fractures, 1-1/2" fragments | | | R17:2 minutes |
| | 126.0 | | | 125.8-126.0' - Fracture zone, intersecting fractures, 1-1/2" fragments | | | |
| | R18-NQ 5 ft 100% | 85 | 1 | 126.75' - 80 deg, rough, undulating, open 1/8" to tight (missing very small fragments in part of fracture) | | 126.0-131.0' - yellowish gray, (5Y 7/2), very fine to fine grained, very weak to weak (R1 to R2), grain size increasing with depth, <10-25% voids to 1/16", voids increasing with depth, moderately fossiliferous, fossils to 1/4", fossil size increasing with depth, trace dissolution zones to 1/2", 129.1-129.8' very fine to fine grained | |
| | | | 0 | 128.0' - Bedding plane, <5 deg, rough, undulating, up to 1/4" open | | | |
| | | | 1 | 129.1-129.8' - Bedding plane or mechanical break, <5 deg, rough to smooth, planar to undulating, tight, some have <1/8" open | | | |
| 130 -88.7 | | | >10 | | | | R18:5 minutes |
| | 131.0 | | 1 | 130.3' - Bedding plane, <5-30 deg, rough to smooth, planar to undulating, (break changes in middle of fracture, smoothness and planar change with angle), <1/8" open | | | |
| | R19-NQ 5 ft 100% | 85 | 0 | 131.8' - Mechanical break | | 131.0-136.0' - Same as 126.0-131.0' except from 132.2-132.7' fine and very fine grained, trace organic content, moderate to highly fossiliferous (casts and molds), 133.35' 1/4" bedding plane of very light gray (N8) | |
| | | | 1 | 132.7' - Bedding plane, <10 deg, smooth to rough, undulating, up to 1/8" open | | | |
| | | | 0 | 133.2, 133.5, 133.6' - Mechanical break (3) | | | |
| | | | 1 | 134.05' - Bedding plane, 15-20 deg, rough, undulating, could be mechanical break due to drilling | | | |
| 135 -93.7 | | | 1 | | | | R19:8 minutes |
| | 136.0 | | | 135.8' - Bedding plane, <5 deg, smooth, undulating, rock fragments | | | |
| | R20-NQ 5 ft 98% | 44 | 0 | 136.2, 136.3, 137.4' - Mechanical break (3) | | 136.0-137.7' - Same as 131.0-136.0' except grades from moderate yellowish brown to yellowish gray (10YR 5/4 to 5Y 7/2), fine to very fine grained, extremely weak to weak (R0 to R1), very fine at 137.4', 1.2" thick moderate olive brown (5Y 4/4), trace voids to 1/16" | |
| | | | 2 | 137.7' - Bedding plane, <5 deg, rough, undulating, 1/2" open | | | |
| | | | >5 | 137.95-138.3' - Bedding plane, <5 deg, smooth to rough, planar, <1/8" open except for 138.3' with up to 1/4" open | | | |
| | | | 1 | 138.5' - Mechanical break, along bedding plane | | | |
| 140 -98.7 | | | 0 | 138.6' - Bedding plane, <5 deg, rough, undulating, 1/4" open | | | R20:10 minutes |
| | 141.0 | | | | | | |

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# 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 ORIENTATION : Vertical

WATER LEVELS : 1.2 ft bgs on 5/5/07 START : 5/4/2007 END : 5/6/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | NR | 139.3' - Bedding plane, <5 deg, rough, undulating, open | | **Limestone** | |
| | | | >10 | 140.15' - Fracture, 45 deg, rough, undulating, open | | 137.7-138.3' - moderate olive brown, (5Y 4/4), very fine grained, medium strong (R3), voids (up to 1/16") over 20% of surface, moderate fossils (casts) to 1/4"; interbedded with medium light gray (N6) with trace voids to 1/16", poorly fossiliferous | |
| | | | 5 | 141.0-141.25' - Fracture zone, intersecting fractures, fragments 1", organic stain | | | |
| | R21-NQ 5 ft 82% | 30 | >10 | 141.6, 141.8' - Bedding plane (2), 10-20 deg, rough, undulating, organic stain, up to 1/4" open associated dissolution features | | 138.3-140.9' - Same as 131.0-136.0' except grades from poorly fossiliferous to moderate to high fossils, fossils up to 1/4" grades from trace voids (<1/16") to voids (1/16") over 10% of surface, interbeds of light olive gray (5Y 5/2) up to 1/2" thick, interbed (discontinuous or could be infill) at 138.75' very light gray (N8) and infill of same material seen in interbeds of light olive gray (5Y 5/2) at 140.15' that is 2" thick | |
| | | | >10 | 141.7' - Fracture, 85 deg, rough, undulating, organic stain, open to 1/8" | | | |
| 145 -103.7 | | | 0 | 142.1' - Bedding plane, <5 deg, rough, undulating, organic stain | | | R21:11 minutes |
| | | | NR | 142.4, 142.5, 142.6' - Bedding plane (3), <5 deg, rough, undulating, up to 1/8" open | | | |
| | 146.0 | | | | | | |
| | | | 1 | 142.9' - Bedding plane, <5 deg, rough, undulating, up to 1/2" open | | **No Recovery 140.9-141.0'** | |
| | | | 1 | 143.1-143.4' - Fracture zone, intersecting fractures, fragments to 1-1/2", organic stain | | **Limestone** | |
| | | | | 144.0-144.2' - Fracture zone, intersecting fractures, pieces to 1-1/2", organic stain | | 141.0-144.2' - light gray to light olive gray, (N7 to 5Y 6/1), very fine grained, weak to medium strong (R2 to R3), voids (up to 1/16") over 10-15% of surface, fossils up to 1/4", dissolution features up to 2"x1/2", dusky yellow (5Y 6/2) infill very fine grained, voids over 25%, few 1/4"-1/2" dissolution features | |
| | R22-NQ 5 ft 96% | 62 | 1 | 144.4' - Bedding plane, <5 deg, rough, undulating, up to 1/2" | | | |
| | | | | 144.7' - Bedding plane, <5 deg, rough, undulating, organic stain | | | |
| | | | 4 | 144.9' - Bedding plane, 5 deg, rough, undulating, up to 1/4" open | | | |
| 150 -108.7 | | | >10 | 146.35' - Bedding plane, <5 deg, smooth to rough, undulating, up to 1-1/2" open | | | R22:11 minutes |
| | 151.0 | | NR | 147.1' - Fracture, 60 deg, rough, undulating | | | |
| | | | >10 | 148.5' - Bedding plane, 10 deg, rough, undulating, up to 1/2" open | | 144.2-145.1' - moderate yellowish brown with wavy light olive gray beds, (10YR 5/4 with 5Y 5/2), up to 1/2" thick and a 1-1/2" thick medium light gray (N6) bed, dusky yellow and light olive gray has 20-30% voids up to 1/16", fossils to 1/8" | |
| | | | | 149.3, 149.45' - Fractures (2), 75-80 deg, rough, undulating | | | |
| | | | >5 | 149.65' - Bedding plane, 20 deg, rough, undulating, open <1/8" | | | |
| | R23-NQ 5 ft 90% | 56 | 1 | 149.9' - Bedding plane, <5 deg, rough, undulating | | **No Recovery 145.1-146.0'** | |
| | | | | 150.25-150.4' - Fracture zone, intersecting fractures, 1" fragment | | **Limestone** | |
| | | | 2 | 150.6-150.8' - Fracture zone, intersecting fractures, 1" fragment | | 146.0-150.8' - moderate yellowish brown to yellowish gray, (10YR 5/4 to 5Y 7/2), fine to very fine grained, grain size increasing with depth, appears to have breccia clasts, yellowish gray (5Y 7/2), pale olive (10YR 6/2) and light gray (N7), moderately fossiliferous up to 1/4", at 148.9' abrupt change to light olive gray (5Y 6/1), very fine grained, strong to very strong (R4 to R5), trace voids to 20%, voids increase with depth, poorly fossiliferous with bedding features at 150.05-150.35' yellowish gray (5Y 8/1), olive gray (5Y 3/2) and pale yellowish brown (10YR 6/2) | |
| 155 -113.7 | | | 2 | 151.15-151.3' - Fracture zone, intersecting fractures up to 1" | | | R23:8 minutes |
| | 156.0 | | NR | 151.4, 151.6' - Bedding plane, <5 deg, rough, undulating, open up to 1/2" | | | |
| | | | | 151.8' - Bedding plane, <5 deg, rough, undulating, up to 1/8" open | | **No Recovery 150.8-151.0'** | 11:10 water level 3.0' |
| | | | | 151.9-152.2' - Fracture zone, fragments to 2" | | **Limestone** | |
| | | | | 152.5' - Fracture, 65-70 deg, smooth, undulating, organic stain | | 151.0-152.8' - Same as 137.7-138.3' | 11:11 grout hole, used 31 bags of grout |
| | | | | 152.6' - Bedding plane, <5 deg, rough, undulating, organic stain, <1/8" open | | | |
| | | | | 152.8' - Bedding plane, <5 deg, rough, undulating, associated with dissolution zone | | | |
| | | | | 153.3' - Fracture, 65-70 deg, smooth, undulating | | | |
| | | | | 154.4' - Fracture, 65-70 deg, smooth, undulating | | | |
| | | | | 154.8' - Fracture, 65-70 deg, smooth, undulating | | | |

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# 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 ORIENTATION : Vertical

WATER LEVELS : 1.2 ft bgs on 5/5/07 START : 5/4/2007 END : 5/6/2007 LOGGER : N. Jarzyniecki

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | | | **Limestone**<br>152.8-154.4' - yellowish gray mottled with pale olive, (5Y 7/2 with 10Y 6/2), very fine grained, organic laminations at 153.55', dissolution features to 1/2"x1/4", moderately fossiliferous, fossils to 1/4", voids (1/16") over <10% of surface<br>154.4-155.5' - Same as 137.7-138.3' except weak to strong (R2 to R4), beds up to 5" thick<br>**No Recovery 155.5-156.0'** | |
| | | | | | | Bottom of Boring at 156.0 ft bgs on 5/6/2007 | |

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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 bgs on 4/17/07 START : 4/17/2007 END : 4/19/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.5 | 0.0 – 1.5 | 1.1 | SS-1 | 1-2-2 (4) | **Poorly Graded Sand (SP)** 0.0-0.8' - very light gray to brownish gray, (N8 to 5YR 4/1), brownish gray mottling, moist, soft, very loose, fine grained, no HCl reaction, silica sand, dark mottling (organics) and 5% organics as roots and debris | | |
| | | | | | **Sandy Organic Soil (OL)** 0.8-1.1' - brownish black, (5YR 2/1), moist, no HCl reaction, organic matter and/or nonplastic silt, 20% fine silica sand, organics as roots | | Encountered water between 0.8' and 5.0', water level at 2.5' below ground surface at 14:15 |
| 5 | 5.0 | | | | | | |
| 37.5 | 6.5 | 1.2 | SS-2 | 1-3-4 (7) | **Silty Sand (SM)** 5.0-6.2' - moderate yellowish brown, yellowish gray, (10YR 5/4, 5Y 8/1), wet, loose, fine grained, nonplastic, moderate yellowish brown transitioning to yellowish gray, fine silica sand with 20-30% fines | | |
| 10 | 10.0 | | | | | | |
| 32.5 | 11.5 | 0.8 | SS-3 | 2-4-14 (18) | **Silty Sand (SM)** 10.0-10.2' - yellowish brown, (5Y 7/2), wet, medium dense, fine grained, no HCl reaction, fine silica sand with 20% plastic fines | | |
| | | | | | **Clayey Sand (SC)** 10.2-10.75' - yellowish gray, (5Y 8/1), wet, medium dense, fine to coarse grained, low to medium plasticity, moderate HCl reaction, 30% low to medium plastic fines, one coarse gravel-sized limestone fragment, organic lens from 10.55-10.6' | | Driller's Remark:11.5-15.0' heavy chattering |
| 15 | 15.0 | | | | | | |
| 27.5 | 15.1 | 0.1 | SS-4 | 50/1.5 (50/1.5") | **Silt (ML)** 15.0-15.1' - grayish yellow, (5Y 8/4), moist, nonplastic, rapid dilatancy, moderate HCl reaction, (5-10%) very fine sand-sized limestone fragments with coarse sand-sized to fine gravel-sized, carbonate materials | | Driller's Remark:15.2-16.0' heavy chattering |
| 20 | | | | | | | |

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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 bgs on 4/17/07 START : 4/17/2007 END : 4/19/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: 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, (5Y 8/4), strong HCl reaction, fragments to 3/16" in size | | |
| 25 / 17.5 | 25.0 | 1.1 | SS-6 | 28-30-45 (75) | **Silty Sand (SM)** 25.0-26.1' - grayish orange, (10YR 7/4), moist, very dense, mild to moderate HCl reaction, fine to coarse sand-sized and trace gravel-sized, 35% nonplastic fines | | |
| 30 / 12.5 | 26.5 / 30.0 | 0.9 | SS-7 | 20-13-8 (21) | **Silty Sand (SM)** 30.0-30.85' - Same as 25.0-26.1' except moderate to strong HCl reaction, grayish yellow limestone (10YR 7/4), from 30.7-30.85' and very stiff, not hard | | |
| 35 / 7.5 | 31.5 / 35.0 | 0.2 | SS-8 | 50/2.5 (50/2.5") | **Silty Sand (SM)** 35.0-35.15' - Same as 25.0-26.1' | | |
| 40 | 35.2 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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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 bgs on 4/17/07 START : 4/17/2007 END : 4/19/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.5 | 40.0 | 0.1 | SS-9 | 50/1 (50/1") | **Limestone Fragments** 40.0-40.1' - pale yellowish brown, (10YR 6/2), moderate HCl reaction, carbonate | | Driller's Remark: Heavy chatter throughout except no chatter at 41.0-41.5' |
| 45 -2.5 | 45.0 45.2 | 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, 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 | | |
| 50 -7.5 | 50.0 51.5 | 1.3 | SS-11 | 45-25-40 (65) | **Silty Sand And Limestone (SM)** 50.0-51.25' - moderate yellowish brown, (10YR 5/4), wet, very dense, fine grained, moderate HCl reaction, 20-25% low plastic fines, 35-40% of sample is coarse sand to fine gravel-sized limestone fragments | | |
| 55 -12.5 | 55.0 57.1 | 0.2 | SS-12 | 7/1-1/24 (8/25") | **Limestone And Silty Sand (SM)** 55.0-55.2' - Same as 50.0-51.25' except 60% of sample is limestone, 40% of sample is silty sand | | Driller's Remark: During SPT for SS-12, spoon fell 2.0' after 7 blows over 1 inch, possible 2' void at 55.1' |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
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| 338884.FL | GSC-06 SHEET 4 OF 11 |

# 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 bgs on 4/17/07 START : 4/17/2007 END : 4/19/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -17.5 | 60.0 – 61.4 | 1.2 | SS-13 | 42-32-50/4.5 (82/10.5) | **Silty Sand And Limestone (SM)** 60.0-61.2' - Same as 50.0-51.25' except 45-50% fine to coarse limestone fragments, 30% fine to coarse sand-sized, 20-25% low plastic fines | | Finished drilling at 17:48 on 4/17/07, setting HW casing to 61.0' below ground surface |
| | | | | | Begin Rock Coring at 61.5 ft bgs<br>See the next sheet for the rock core log | | |
| 65<br>-22.5 | | | | | | | |
| 70<br>-27.5 | | | | | | | |
| 75<br>-32.5 | | | | | | | |
| 80 | | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: GSC-06 | SHEET 5 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

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

WATER LEVELS : 2.5 ft bgs on 4/17/07 START : 4/17/2007 END : 4/19/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | 61.5 | | | | | | Resume drilling at 07:45 at 4/18/07 with rock coring Water level is 2.5' below ground surface |
| | R1-NQ 5 ft 86% | 32 | 2 | 61.7' - Mechanical break 62.0, 62.1, 62.65, 62.85, 63.15, 63.3, 63.75, 64.15, 65.4, 65.55' - Bedding plane or mechanical break (10), horizontal, smooth, undulating, tight to 1/8" open | | **Limestone** 61.5-65.8' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, extremely weak to weak (R0 to R2), rock strength increasing with depth, voids, to 3/16" over 20-30% of surface, moderately fossiliferous with casts to 1/4"-1/2", dissolution cavities to 1/2"x1" over 5-15% of surface, (dark possibly organic) material over 5-10% as of surface from 61.5-62.3' | |
| | | | 4 | | | | |
| | | | 2 | 62.35' - Mechanical break | | | |
| 65 -22.5 | | | 1 | | | | |
| | | | 1 | | | | R1:2 minutes |
| | | | NR | | | **No Recovery 65.8-66.5'** | |
| | 66.5 | | | | | | |
| | R2-NQ 5 ft 91% | 52 | 10 | 66.5-66.8' - Fracture zone | | **Limestone** 66.5-71.05' - Same as 61.5-65.8' except very weak to weak (R1 to R2), no dark/organic material, and all very weak to weak rock (R1 to R2) | Driller's Remark: Driller runs in 2nd gear at 350 psi |
| | | | 1 | 67.1, 68.4, 68.9, 69.6, 70.5' - Bedding plane or mechanical break (5), smooth, undulating, tight to 1/8" open | | | |
| | | | 3 | | | | |
| 70 -27.5 | | | 6 | 69.1, 69.2, 69.85, 69.95, 70.4' - Bedding plane or mechanical break (5), rough, undulating, tight to 1/2" open | | | |
| | | | 1 | 70.15, 72.5, 72.75, 73.0, 75.05, 75.55' - Bedding plane or mechanical break (6), horizontal, smooth, undulating, tight | | | R2:3 minutes |
| | 71.5 | | NR | 70.35' - Fracture or mechanical break, rough, undulating | | **No Recovery 71.05-71.5'** | |
| | R3-NQ 5 ft 98% | 66 | 1 | | | **Limestone** 71.5-76.4' - Same as 61.5-65.8' except no dark, possibly organic material, dissolution cavities to 1"x1/2" over 5% surface, extremely weak rock (R0) from 72.2-72.6' and 72.9-73.4' and increasing to moderately strong rock (R3) with depth | |
| | | | 4 | | | | |
| | | | 2 | 73.25, 73.6, 73.75' - Bedding plane or mechanical break (3), <10 deg, rough, undulating, tight, 1/2" open 74.0' - Mechanical break | | | |
| 75 -32.5 | | | 1 | | | | |
| | | | 1 | | | | R3:9 minutes |
| | 76.5 | | NR | | | **No Recovery 76.4-76.5'** | |
| | R4-NQ 5 ft 64% | 25 | 2 | 76.6, 77.35, 77.55, 77.8, 78.4, 78.9, 79.9' - Bedding plane (7), horizontal, smooth, undulating, tight to 1/8" open | | **Limestone** 76.5-77.35' - moderately yellowish brown to grayish orange, (10YR 5/4 to 10YR 7/4), medium grained, moderate HCl reaction, very weak to medium strong (R1 to R3), voids to 1/8" over 15-30% of rock, poorly fossiliferous with trace casts to 1/16" x3/16", trace dissolution cavities to 2"x1" | |
| | | | 10 | 77.8-78.15' - Fracture zone, fragments to 1"x2" | | | Driller's Remark: 50% loss of circulation at 78' |
| | | | 3 | 78.25' - Fracture, 80 deg, smooth, undulating, open | | | |
| 80 -37.5 | | | 1 | 79.0' - Bedding plane or mechanical break, <10 deg, rough, undulating, 1/2"-1" open 79.5' - Fracture, 80 deg, smooth, undulating, tight | | | |
| | | | NR | | | | R4:7 minute |
| | 81.5 | | | | | | |

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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

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

WATER LEVELS : 2.5 ft bgs on 4/17/07 START : 4/17/2007 END : 4/19/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R5-NQ 5 ft 76% | 28 | 3 | 81.55,82.55,83.3,84.0' - Bedding plane or mechanical break (4), horizontal, rough, undulating, 1/4" open to open | | **Limestone** 77.35-79.1' - grayish orange to pale yellowish brown, (10YR 7/4 to 10YR 6/2), fine to medium grained, strong HCl reaction, weak to medium strong (R2 to R3), voids to 1/8" over 5-20% of surface, poorly fossiliferous with trace fossil casts to 1/8"x1/8", dissolution cavities to 1"x1/2" (trace) 79.1-79.7' - Same as 76.5-77.35' | Driller's Remark: Void at 81.5-82.0 (dropped stem), 100% loss of circulation |
| | | | 10 | 81.95, 82.4, 83.15' - Bedding plane or mechanical break (3), 10-20 deg, rough, undulating, tight to 1/2" open | | | |
| | | | 4 | 82.4-83.8, 83.3-83.8' - Fracture zone (2), fragments to 1"x3" 84.1' - rough, 2 intersecting near vertical fractures, undulating | | | |
| 85 -42.5 | | | 10 | 84.7-85.3' - Fracture zone, fragments to 1-1/2"x3", fractures at 70-90 deg | | **No Recovery 79.7-81.5'** **Limestone** 81.5-85.3' - Same as 79.1-79.7' **No Recovery 85.3-86.5'** | R5:5 minutes |
| | 86.5 | | NR | | | | |
| | R6-NQ 5 ft 3% | 0 | 10 | 86.5-86.65' - only recovered rock | | **Limestone** 86.5-86.65' - Same as 79.1-79.7' **No Recovery 86.65-91.5'** | |
| | | | NR | | | | |
| 90 -47.5 | | | | | | | Driller's Remark: Core blockage caused no recovery for core run R6 R6:25 minutes |
| | 91.5 | | | | | | |
| | R7-NQ 5 ft 94% | 44 | 10 | 91.65, 92.9, 94.05, 94.5' - Bedding plane (4), horizontal, smooth, undulating to planar, tight to 1/2" open | | **Limestone** 91.5-94.1' - yellowish gray, (5Y 7/2), very fine to fine grained, strong HCl reaction, medium strong (R3), voids to 1/16" over 5-10% of surface, trace fossil casts to 3/16", trace cavities to 1-1/2"x1/16", with poorly competent infill, silty layer at 91.9-92.0' and 92.5-92.65' 94.1-96.2' - very pale orange to grayish orange, (10YR 8/2 to 10YR 7/4), fine to medium grained, strong HCl reaction, very weak to weak (R1 to R2), voids to 1/16" over 25% of surface, trace fossil casts to 1/4"x1/8", no visible cavities, silt layer (low plasticity) from 94.1-94.5' **No Recovery 96.2-96.5'** **Limestone** 96.5-101.5' - Same as 94.1-96.2' except trace cavities with light colored infill to 1"x1-1/2" | |
| | | | 10 | 91.65-92.0' - Fracture zone, fragments to 1-1/2"x2", some silt infill | | | |
| | | | 10 | 92.5-92.8' - Fracture zone, fragments to 1-1/2"x1-1/2", silt and coarse sand infill, 92.5-92.65' | | | |
| 95 -52.5 | | | 1 | 93.25, 93.3, 93.55' - Fracture zone or mechanical break (3), 70 deg, undulating to stepped, smooth to rough | | | |
| | | | 0 | 93.5' - Fracture, 80 deg, smooth, undulating, dark staining, tight | | | R7:21 minutes |
| | 96.5 | | NR | 93.75' - Fracture, as above at 93.5' except 20 deg | | | |
| | R8-NQ 5 ft 100% | 97 | 2 | 94.1-94.25' - Fracture zone 95.7' - Fracture, 40 deg, smooth, planar, silty infill, tight | | | |
| | | | 0 | 96.55, 96.6' - Bedding plane (2), 0-10 deg, smooth, undulating to stepped, dark staining (possibly organics), infill, tight | | | |
| | | | 1 | | | | |
| 100 -57.5 | | | 1 | 99.4' - Mechanical break or fracture, 30 deg, rough, undulating, tight to 1/4" open | | | |
| | | | 0 | 100.1' - Fracture, at 99.4' except very rough and undulating | | | R8:7 minutes |
| | 101.5 | | | | | | |

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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

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

WATER LEVELS : 2.5 ft bgs on 4/17/07 START : 4/17/2007 END : 4/19/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R9-NQ 5 ft 90% | 69 | 1 | 101.7' - Fracture, 80 deg, smooth, undulating, tight | | **Limestone** 101.5-106.0' - Same as 94.1-96.2' except trace cavities to 1/2" diameter with no infill and trace fossil casts to 3/4"x1/4" | |
| | | | 10 | 102.8, 103.25, 103.3, 103.55, 103.9, 104.85, 105.65, 105.75' - Fracture (8), 0-20 deg, smooth, undulating to planar, tight to 1/4" open | | | |
| | | | 3 | 103.25-103.3' - Fracture zone, fragments to 1/2"x1" | | | |
| 105 -62.5 | | | 1 | | | | |
| | | | 2 | | | | R9:7 minutes |
| 106.5 | | | NR | | | **No Recovery 106.0-106.5'** | |
| | R10-NQ 5 ft 100% | 68 | 1 | 107.1, 108.4, 108.7, 109.25, 109.65, 109.8, 110.3' - Bedding plane or mechanical break (7), horizontal, smooth, undulating, tight to 1/4" open | | **Limestone** 106.6-111.5' - Same as 101.5-106.0' except percentage of voids decreasing with depth down to 5% | |
| | | | 1 | | | | |
| | | | 3 | | | | |
| 110 -67.5 | | | 4 | | | | |
| | | | 10 | 110.45-111.25' - Fracture zone, fragments to 2"x4", most at 40 deg | | | R10:6 minutes |
| 111.5 | | | | | | | |
| | R11-NQ 5 ft 92% | 46 | >10 | 111.6-112.5' - Fracture zone, fragments to 2"x2", many horizontal bedding planes | | 111.5-116.5' - grayish orange, (10YR 7/4), fine to medium grained, strong HCl reaction, extremely weak to very weak (R0 to R1), voids to 1/16" over 5-20% of rock increasing in coverage with depth, trace fossil casts to 1/4"x1/8", wavy bedding planes from 111.5-112.6' | |
| | | | 1 | | | | |
| | | | 1 | 113.5' - Bedding plane, horizontal, smooth, undulating, tight | | | |
| 115 -72.5 | | | 10 | 114.7-114.9' - Fracture zone, fragments to 1-1/2"x2" | | | |
| | | | 2 | | | | R11:6 minutes |
| 116.5 | | | NR | 115.8' - Fracture or mechanical break, 10 deg, rough, undulating, tight to 1/4" open | | **No Recovery 116.1-116.5'** | Finish drilling on 4/18/07 at 17:00, at 116.5' |
| | R12-NQ 5 ft 84% | 46 | 10 | 116.5-116.6, 116.85-116.95, 117.45-117.65, 119.3-119.5' - Fracture zone (4), fragment to 1-1/2"x1-1/2" | | **Limestone** 116.5-120.7' - pale yellowish orange to pale yellowish brown, (10YR 8/2 to 10YR 6/2), medium to coarse grained, strong HCl reaction, extremely weak to weak (R0 to R2), voids to 3/16" over 5-25% of rock, fossil casts to 1/2" diameter over 5% surface, trace cavities filled with dark material | Resume drilling at 07:20 on 4/19/07 |
| | | | 10 | 116.6, 116.85, 116.95, 117.1, 117.3, 117.45, 117.65, 119.3, 119.5, 119.8, 120.5' - Bedding plane or mechanical break (11), all rough to smooth, undulating, open to 1/4" open, except 120.5' <10 deg | | | |
| | | | 10 | | | | |
| 120 -77.5 | | | 10 | | | | |
| | | | 1 | | | | R12:8 minutes |
| 121.5 | | | NR | | | **No Recovery 120.7-121.5'** | |

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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

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

WATER LEVELS : 2.5 ft bgs on 4/17/07 START : 4/17/2007 END : 4/19/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R13-NQ 5 ft 94% | 48 | 4 | 121.7-121.9' - Bedding plane, horizontal, smooth, planar to stepped, tight | | **Limestone** 121.5-126.2' - Same as 116.5-120.7' except voids decreasing to 5% coverage with depth, highly fossiliferous from 121.5-124.4 with casts to 1/4"-1/2" over 15% of surface, solution cavities to 1/4"-1/2" over 5-7%, interval of fine grained moderately strong (R3) rock with distinct lamination and trace voids (up to 1/16") at 121.7-121.9' | |
| | | | 4 | 122.65,122.7, 122.85, 123.0, 125.25' - Bedding plane or mechanical break (5), 0-5 deg, smooth, undulating, tight | | | |
| | | | 2 | | | | |
| 125 -82.5 | | | 10 | 124.4' - Fracture zone or mechanical break, 20 deg, smooth, undulating, tight | | | |
| | | | 10 | 124.5' - Fracture, 80 deg, smooth, planar, tight | | | R13:5 minutes |
| | 126.5 | | NR | 124.95' - Fracture, 30 deg, smooth, planar, tight | | | |
| | R14-NQ 5 ft 90% | 26 | 10 | 125.25-125.6' - Fracture zone, fragments to 3"x1" | | **No Recovery 126.2-126.5'** **Limestone** 126.5-131.0' - very pale orange, (10YR 8/2), fine to coarse grained, strong HCl reaction, extremely weak to very weak (R0 to R1), grain size becoming more coarse with depth, voids to 1/8" over 5-25% of surface, trace cavities to 1/2"x1" filled with light colored infill, poorly fossiliferous with trace casts to 1/4" | |
| | | | 4 | 125.6' - Fracture, 65 deg, smooth, planar, open<br>125.9-126.0' - Fracture zone, fragments to 1"x1-1/2" | | | |
| | | | 10 | 126.5-127.0' - Fracture zone, some dark staining, fragments to 2"x1" | | | |
| 130 -87.5 | | | 4 | 127.0, 127.3, 127.45, 128.0, 128.2, 128.35, 129.25, 129.4, 130.7, 130.8' - Bedding plane or mechanical break (10), 0-5 deg, smooth, planar to undulating, tight | | | |
| | | | 2 | 129.55, 129.95, 130.2' - Fractures, 50 deg, smooth, undulating to planar, tight to 1/4" open | | | R14:4 minutes |
| | 131.5 | | NR | 129.7' - Fracture, rough, undulating, near vertical, open | | **No Recovery 131.0-131.5'** | |
| | R15-NQ 5 ft 84% | 34 | 10 | 131.75, 131.8, 131.95, 132.0, 132.35, 132.45' - Bedding plane (6), horizontal, smooth, planar, tight | | **Limestone** 131.5-135.05' - Same as 126.5-131.0' except laminated at 134.25-134.9' | |
| | | | 2 | 131.85' - Fracture, vertical, smooth, planar | | | |
| | | | 10 | 132.55, 132.95, 134.45, 135.15, 135.35' - Bedding plane (5), horizontal, smooth, planar, tight | | | |
| 135 -92.5 | | | 5 | 133.85, 134.25' - Bedding plane or mechanical break (2), 0-10 deg, rough, undulating, 1/4" open | | | |
| | | | 1 | 134.35-134.55' - Fracture zone, fragments to 1"x2" | | 135.05-135.7' - pale yellowish brown, (10YR 6/2), coarse grained, strong HCl reaction, voids to 1/8" over 5-30% of rock (variable), trace fossil casts and molds to 1/4"x1/8", trace dark laminations | R15:10 minutes |
| | 136.5 | | NR | 134.65' - Fracture, 30 deg, smooth, planar, open | | **No Recovery 135.7-136.5'** | |
| | R16-NQ 5 ft 78% | 38 | >10 | 136.6' - Fracture or mechanical break, vertical, smooth, undulating, tight | | **Limestone** 136.5-138.4' - Same as 135.05-135.7' except 10% fossil casts and molds to 1/2" diameter, and color darkens to moderate yellowish brown with depth (10YR 5/4) | |
| | | | >10 | 136.75, 137.15, 137.55, 132.6, 138.05,' - Bedding plane (5), horizontal, rough to smooth, undulating, many open (next to fracture zone) | | | |
| | | | >10 | 137.15-137.55, 138.2-138.75, 139.65-139.8' - Fracture zone (3), fragment to 1-1/2"x1/2" | | | |
| 140 -97.5 | | | 10 | 138.2, 138.25, 138.4. 138.85, 139.25, 139.65' - Bedding plane (6), horizontal, rough to smooth, undulating, many open (next to fracture zone) | | 138.4-138.85' - Same as 121.7-121.9' except pale yellowish brown, (10YR 6/2) | |
| | | | NR | 138.4-138.7' - Fracture zone, many bedding planes horizontal | | 138.85-139.65' - Same as 136.5-138.4' | R16:7 minutes |
| | 141.5 | | | | | | |

| PROJECT NUMBER: | BORING 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

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

WATER LEVELS : 2.5 ft bgs on 4/17/07 START : 4/17/2007 END : 4/19/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | | | 2 | 140.2' - Mechanical break or bedding plane, 5 deg, rough, undulating, 1/4" open<br>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 | | **Limestone**<br>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<br>**No Recovery 140.4-141.5'** | |
| | | | 4 | | | | |
| | R17-NQ<br>5 ft<br>88% | 36 | >10 | 143.65' - Fracture zone, as 141.7' except dark stain and tight<br>143.85-144.25' - Bedding plane, horizontal, smooth, undulating, open | | | |
| 145<br>-102.5 | | | 10 | 144.4, 144.8, 144.9, 145.0, 145.8' - Bedding plane (5), horizontal, smooth | | | R17:11 minutes |
| | | | 1 | 144.4-144.9' - Fracture zone, fragments to 1"x1/2" | | | |
| | 146.5 | | NR | | | | |
| | | | 10 | 146.5-146.55' - Fracture zone, fragments to 1"x1/2"<br>146.55, 147.5, 148.6, 148.7, 149.1, 149.3, 149.35, 149.45, 149.7, 148.75, 150.5, 150.7' | | **Limestone**<br>141.5-144.25' - Same as 139.65-140.4'<br>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<br>**No Recovery 145.9-146.5'** | |
| | | | 10 | 147.7' - Bedding plane, 10 deg, smooth, undulating, 1/2" open | | | |
| | R18-NQ<br>5 ft<br>88% | 50 | 6 | | | | |
| 150<br>-107.5 | | | 4 | 150.1' - Mechanical break, (by drillers) | | **Limestone**<br>146.5-150.9' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), coarse grained, mild to strong HCl reaction, extremely 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'<br>**No Recovery 150.9-151.5'** | |
| | | | 3 | 150.7' - Fracture, vertical, rough, undulating, tight | | | R18:8 minutes |
| | 151.5 | | NR | | | | |
| | | | >10 | | | | |
| | | | >10 | | | | |
| | R19-NQ<br>5 ft<br>84% | 46 | 10 | | | | |
| 155<br>-112.5 | | | 1 | | | **Limestone**<br>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'<br>**No Recovery 155.7-156.5'** | |
| | | | 0 | | | | R19:7 minutes |
| | 156.5 | | NR | | | | |
| | | | 10 | 156.5-156.8,159.1-159.3' - Fracture zone (2), fragments to 2"x1" | | **Limestone**<br>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'<br>**No Recovery 159.4-161.5'** | |
| | | | 1 | 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<br>5 ft<br>58% | 33 | 10 | | | | |
| 160<br>-117.5 | | | NR | | | | |
| | | | | | | | R20:5 minutes |
| | 161.5 | | | | | | |

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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

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

WATER LEVELS : 2.5 ft bgs on 4/17/07 START : 4/17/2007 END : 4/19/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | R21-NQ 5 ft 80% | 19 | 10 | 161.5-161.7' - Fracture zone, dark staining, fragments to 1/2" thick, all bedding planes at horizontal | | **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), 5-15% voids <1/16", trace cavities <1/4" | |
| | | | 10 | 162.25, 163.15, 163.4, 163.55, 165.05, 165.4' - Bedding plane (6), horizontal, smooth, undulating to planar, some with dark staining, tight except next to fracture zone | | | |
| | | | 10 | 162.45' - Fracture or mechanical break, <10 deg, rough, undulating, 1/2" open | | 162.5-165.5' - Same as 144.25-145.9' except grayish orange to pale yellowish brown, (10YR 7/4 o 10YR 6/2), very fine to fine grained, moderate HCl reaction, strong (R4), 5% coverage of voids (<1/16"), increasing to 15% with depth | |
| 165 -122.5 | | | 10 | 162.6-162.85' - Fracture zone, some dark staining, parallel 45 deg fractures, tight | | | |
| | | | NR | 162.7' - Fracture, 70 deg, smooth, undulating, dark staining, tight<br>163.65' - Fracture, 70 deg, smooth, planar, dark staining, tight | | | R21:8 minutes |
| | 166.5 | | | | | **No Recovery 165.5-166.5'** | |
| | R22-NQ 5 ft 90% | 17 | >10 | 164.0-165.05' - Fracture zone, fragments to 3"x1" | | **Limestone** 166.5-168.5' - Same as 161.5-162.5' | |
| | | | >10 | 166.5-167.5, 168.2-168.5, 169.2-164.65, 170.35-170.55' - Fracture zone (4), fragments to 4"x1-1/2" | | | |
| | | | >10 | 167.65,168.65' - Fractures (2), rough, undulating, no stain or infill, tight | | 168.5-171.0' - Same as 162.5-165.5' except voids to 1/8" over 5-30% of surface (variable) and laminations throughout | |
| | | | >10 | 168.2, 168.5, 168.85, 169.2, 169.8, 170.35, 178.55' - Bedding plane (7), horizontal, rough to smooth, undulating to planar, no stain or infill, tight except next to fracture zone | | | |
| 170 -127.5 | | | 1 | 169.75, 170.3' - Fractures (2), 70 deg, smooth, undulating, little dark staining, open and tight respectively | | | R22:6 minutes |
| | 171.5 | | NR | | | **No Recovery 171.0-171.5'** | |
| | R23-NQ 5 ft 98% | 72 | 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, undulating to planar, some with dark staining, tight except by fracture zone | | **Limestone** 171.5-176.4' - grayish orange, (10YR 7/4), fine grained, mild HCl reaction, weak to medium strong (R2 to R3), voids to 3/16" over 5-20% surface (variable), trace fossil casts to 1/4"x1/2", trace cavities to 1"x1/2" | |
| | | | 3 | | | | |
| | | | >10 | 173.5-173.9, 176.35-176.4' - Fracture zone (2), fragments to 2"x2" | | | |
| 175 -132.5 | | | 0 | | | | |
| | | | 4 | | | | R23:7 minutes |
| | 176.5 | | NR | | | **No Recovery 176.4-176.5'** | |
| | R24-NQ 5 ft 93% | 36 | 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, 179.5, 179.8, 179.85, 180.25, 180.35, 180.75' - Bedding plane (15), horizontal, smooth, undulating to planar, few with dark stains, tight except on fracture zones | | **Limestone** 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 rock from 180.5-180.95' | |
| | | | 2 | | | | |
| | | | 3 | 176.95' - Fracture, vertical, smooth, undulating, tight<br>177.1' - Fracture, 80 deg, smooth, undulating, open | | | |
| 180 -137.5 | | | 10 | 177.9' - Fracture, 25 deg, rough, undulating, tight | | | |
| | | | 2 | 178.85' - Fracture, horizontal, same as 177.9' except horizontal | | | R24:8 minutes |
| | 181.5 | | NR | 179.65' - same as 177.1' except rough | | **No Recovery 181.15-181.5'** | |

| PROJECT NUMBER: | BORING 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

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

WATER LEVELS : 2.5 ft bgs on 4/17/07 START : 4/17/2007 END : 4/19/2007 LOGGER : C. Wallestad

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R25-NQ 5 ft 100% | 62 | 3 | 180.3' - Fracture, same as 179.65'<br>180.4-180.8' - Fracture zone, fragments to 2"x2" | | **Limestone**<br>181.5-185.0' - Same as 176.5-181.15' except layer of medium strong (R3) rock at 183.1-183.65' | |
| | | | 5 | 182.15' - Fracture, 20 deg, smooth, undulating, tight | | | |
| | | | 1 | 182.3, 182.35, 182.6, 182.65, 183.05, 183.15, 183.65, 184.6, 184.7, 184.8' - Bedding plane (10), horizontal, smooth, undulating to planar, some dark staining, tight except by fracture zone | | | |
| 185<br>-142.5 | | | 10 | 183.0' - Fracture, 80 deg, rough, undulating, open | | 185.0-186.5' - pale yellowish brown, (10YR 6/2), coarse grained, moderate HCl reaction, medium strong (R3), voids to 1/16" over 15-25% of surface, fossil casts to 3/4"x1/2" over 20% of surface | R25:9 minutes |
| | | | 0 | 184.6-184.85' - Fracture zone, fragments to 1-1/2"x2" | | | Total depth of boring is 186.5' |
| | 186.5 | | | 185.3, 185.4' - Fractures (2), 30 deg and 20 deg, rough, undulating | | Bottom of Boring at 186.5 ft bgs on 4/19/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-07 SHEET 1 OF 6 |

# SOIL BORING LOG

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.7 | 0.0 | 1.1 | SS-1 | 1-3-4 (7) | **Topsoil (OL)** 0-0.2' - grayish black, (N2), moist, organic matter with 20% fine silica sand | | Began at 8:37 on 4/20/07 |
| | 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 | | |
| 5 | 5.0 | | | | | | |
| 37.7 | | 1.2 | SS-2 | 2-1-1 (2) | **Silty Sand (SM)** 5.0-6.2' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), wet, very loose, no HCl reaction, fine silica sand with 30% nonplastic fines | | |
| | 6.5 | | | | | | |
| 10 | 10.0 | | | | | | |
| 32.7 | | 0.4 | SS-3 | 0-0-0 (0) | **Fat Clay (CH)** 10.0-10.35' - grayish blue, (5PB 5/2), moist, very soft, high plasticity, no dilatancy, no HCl reaction, 10% fine silica sand | | |
| | 11.5 | | | | | | |
| 15 | 15.0 | | | | | | |
| 27.7 | | 0.8 | SS-4 | 4-5-3 (8) | **Silt (ML)** 15.0-15.8' - grayish yellow, (5YR 8/4), wet, medium stiff, nonplastic, rapid dilatancy, moderate HCl reaction, 5-10% very fine sand, carbonate materials, trace organics, 1/16" thick gray layer at 15.2' | | |
| | 16.5 | | | | | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-07 SHEET 2 OF 6 |

# SOIL BORING LOG

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.7 | 20.0 – 21.5 | 1.3 | SS-5 | 3-3-3 (6) | **Silt (ML)** 20.0-21.3' - Same as 10.0-10.35' except greenish gray, (5G 6/1), medium stiff, no HCl reaction, with light olive yellow mottling (5Y 5/6) in 15-20% of silt, three concretions to 1"x1/4" between 20.0-20.5' | | |
| 25 | 25.0 | | | | | | |
| 17.7 | 26.5 | 1.3 | SS-6 | 2-2-2 (4) | **Sandy Fat Clay (CH)** 25.0-26.3' - light olive gray, (5YR 6/1), with mottling from 25.0-25.3', moist, soft, high plasticity, no dilatancy, no HCl reaction, 30% fine silica sand, one coarse gravel-sized silica sand concretion | | |
| 30 | 30.0 | | | | | | |
| 12.7 | 31.5 | 1.5 | SS-7 | 2-4-7 (11) | **Organic Soil (OH)** 30.0-31.5' - olive black, (5Y 2/1), moist, stiff, medium to high plasticity, slow dilatancy, no HCl reaction, 5-10% fine silica sand, fine silica sand lens from 30.45-30.55' | | |
| 35 | 35.0 | | | | | | |
| 7.7 | 36.5 | 1.0 | SS-8 | 3-5-3 (8) | **Organic Soil (OH)** 35.0-36.0' - olive gray, (5Y 4/1), wet, medium stiff, medium to high plasticity, slow dilatancy, no HCl reaction, 40% fine silica sand | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING LOG

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.7 | 40.0 – 41.5 | 1.1 | SS-9 | 6-6-7 (13) | **Sandy Organic Soil (OH)** 40.0-41.1' - Same as 35.0-36.0' except 30-40% fine silica sand | | |
| 45 -2.3 | 45.0 – 46.5 | 1.4 | SS-10 | 3-5-6 (11) | **Sandy Organic Soil (OH)** 45.0-46.4' - Same as 40.0-41.1' except grayish orange, (10YR 7/4), mottled, silt stringers | | |
| 50 -7.3 | 50.0 – 51.5 | 1.2 | SS-11 | 6-16-20 (36) | **Interbedded Organic Soil With Silt (OH)** 50.0-51.2' - Organic Soil (OH) is same as 30.0-31.5' except olive black (5Y 2/1), moist, hard, 10-15% fine silica sand; the Silt (ML) is same as 15.0-15.8' except hard, no to low plasticity, no organics | | |
| 55 -12.3 | 55.0 – 56.3 | 1.3 | SS-12 | 18-28-50/3 (78/9") | **Silt (ML)** 55.0-56.3' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), wet, hard, low plasticity, rapid dilatancy, moderate to strong HCl reaction, 1/4"-1" thick organic layers at 55.25' and 55.8' respectively, 5-10% fine sand | | |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-07 SHEET 4 OF 6 |

# SOIL BORING LOG

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -17.3 | 60.0 – 61.4 | 1.0 | SS-13 | 17-42-50/5 (92/11") | **Silt (ML)** 60.0-61.0' - Same as 55.0-56.3' except trace dark mottling, 1/16" thick organic soil layer at 60.1', trace fine sand-sized and gravel-sized limestone fragments | | |
| 65 -22.3 | 65.0 – 66.5 | 1.5 | SS-14 | 5-10-14 (24) | **Silt (ML)** 65.0-66.5' - olive gray with grayish orange mottling, (5Y 4/1 with 10YR 7/4), wet, very stiff, low plasticity, rapid dilatancy, moderate HCl reaction, 5-10% fine sand, trace gravel-sized limestone fragments, carbonate materials, 10% organic lamination | | |
| 70 -27.3 | 70.0 – 71.5 | 1.5 | SS-15 | 6-6-5 (11) | **Interbedded Organic Soil And Silt (OH)** 70.0-71.5' - Same as 50.0-51.2' except stiff, with irregular bedding and pockets of material | | At 13:35 water level is 1.25' below ground surface |
| 75 -32.3 | 75.0 – 76.5 | 1.1 | SS-16 | 2-4-10 (14) | **Organic Soil With Sand (OH)** 75.0-76.1' - olive gray, (5Y 3/2), wet, stiff, medium to high plasticity, slow dilatancy, no HCl reaction, 20% very fine silica sand, fine silica sand layer from 75.05-75.75' | | |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-07 SHEET 5 OF 6 |

# SOIL BORING LOG

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -37.3 | 80.0 – 81.5 | 1.0 | SS-17 | 10-28-16 (44) | **Silt (ML)** 80.0-81.0' - grayish orange, (10YR 7/4), wet, hard, low plasticity, rapid dilatancy, moderate HCl reaction, trace coarse gravel-sized limestone fragment, carbonate materials, 1/8" thick dark layer at 80.3' | | |
| 85 | 85.0 | | | | | | |
| -42.3 | 86.5 | 1.2 | SS-18 | 0-0-0 (0) | **Sandy Organic Soil (OH)** 85.0-86.2' - olive black, (5Y 2/1), wet, very soft, medium to high plasticity, slow dilatancy, no HCl reaction, 30-40% fine silica sand | | |
| 90 | 90.0 | | | | | | |
| -47.3 | 91.5 | 1.3 | SS-19 | 0-0-0 (0) | **Sandy Organic Soil (OH)** 90.0-91.3' - Same as 85.0-86.2' except 5-50% sand decreasing with depth | | |
| 95 | 95.0 | | | | | | |
| -52.3 | 95.9 | 0.6 | SS-20 | 25-50/5 (75/11") | **Silt With Limestone Fragments (ML)** 95.0-95.6' - pale yellowish brown, (10YR 6/2), wet, hard, nonplastic, rapid dilatancy, moderate HCl reaction, carbonate, 1/16"-3/16" thick silt/limestone interbeds | | |
| 100 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-07 SHEET 6 OF 6 |

# SOIL BORING LOG

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -57.3 | 100.0 100.5 | 0.4 | SS-21 | 50/6 (50/6") | **Silt (ML)** 100.0-100.4' - grayish orange, (10YR 7/4), moist, hard, low plasticity, slow to rapid dilatancy, moderate HCl reaction, carbonate material, organic soil layers 3/16" thick at 100.1' and 100.3' | | Finished drilling/sampling at 15:30 on 4/20/07 Total depth of boring 100.5' Surface collapse; filled with grout |
| | | | | | Bottom of Boring at 100.5 ft bgs on 4/20/2007 | | |
| 105 -62.3 | | | | | | | |
| 110 -67.3 | | | | | | | |
| 115 -72.3 | | | | | | | |
| 120 | | | | | | | |

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

# SOIL BORING 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

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 bgs on 4/21/07 START : 4/21/2007 END : 4/26/2007 LOGGER : C. Wallestad, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 43.1 | 0.0 – 1.5 | 1.1 | SS-1 | 1-2-3 (5) | **Poorly Graded Sand With Organics (SP)** 0.0-1.1' - brownish black to brownish gray, (5YR 2/1 to 5YR 4/1), moist, loose, fine silica sand, 20% organic material decreasing with depth | | 4/21/07 at 07:55 start SPT |
| 5 | 5.0 | | | | | | |
| 38.1 | 5.0 – 6.5 | 1.1 | SS-2 | 2-2-3 (5) | **Silty Sand (SM)** 5.0-6.1' - moderate yellowish brown to grayish orange, (10YR 5/4 to 10YR 7/4), wet, loose, fine silica sand, 20% nonplastic fines, trace organics as roots | | |
| 10 | 10.0 | | | | | | |
| 33.1 | 10.0 – 11.5 | 1.1 | SS-3 | 3-8-10 (18) | **Silt (ML)** 10.0-11.1' - grayish orange, (5YR 7/4), wet, very stiff, nonplastic, rapid dilatancy, moderate HCl reaction, 10% very fine sand-sized, all carbonate | | |
| 15 | 15.0 | | | | | | |
| 28.1 | 15.0 – 15.4 | 0.3 | SS-4 | 50/5 (50/5") | **Silt (ML)** 15.0-15.3' - Same as 10.0-11.1' except hard | | |
| 20 | | | | | | | |

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

# SOIL BORING 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

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 bgs on 4/21/07 START : 4/21/2007 END : 4/26/2007 LOGGER : C. Wallestad, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 23.1 | 20.0 – 21.5 | 0.9 | SS-5 | 5-10-15 (25) | **Silt (ML)** 20.0-20.9' - Same as 10.0-11.1' except dark yellowish orange (10YR 6/6), 1/8" thick layer at 20.5', very stiff, fine to coarse sand-sized limestone fragments at 20.0-20.3' and 20.75-20.9' | | |
| 25 / 18.1 | 25.0 – 26.5 | 0.9 | SS-6 | 10-20-23 (43) | **Sandy Silt (ML)** 25.0-25.9' - grayish orange, (10YR 7/4), wet, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 30% fine to coarse sand-sized, carbonate materials | | |
| 30 / 13.1 | 30.0 – 30.3 | 0.2 | SS-7 | 50/4 (50/4") | **Silty Sand (SM)** 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 | | |
| 35 / 8.1 | 35.0 – 35.3 | 0.3 | SS-8 | 50/4 (50/4") | **Silty Sand (SM)** 35.0-35.3' - moderate olive brown, (5Y 4/4), wet, very dense, moderate HCl reaction, fine to coarse sand-sized, 25% nonplastic fines, trace fine gravel-sized limestone, carbonate materials | | HW casing set at 35 ft below ground surface |
| 40 | 40.0 – 40.2 | 0.1 | SS-9 | 50/2 (50/2") | **Limestone Fragments** 40.0-40.05' - moderate yellowish brown, (10YR 5/4), moderate HCl reaction, coarse sand-sized fragments | | |
| | | | | | Begin Rock Coring at 40.0 ft bgs<br>See the next sheet for the rock core log | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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 ORIENTATION : Vertical

WATER LEVELS : 5.0 ft bgs on 4/21/07 START : 4/21/2007 END : 4/26/2007 LOGGER : C. Wallestad, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | RQD (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| 3.1 | 40.0 R1-NQ 1 ft 85% 41.0 | 0 | 1 | | | **Limestone** 40.0-40.85' - light olive gray, (5Y 5/2), medium to coarse grained, strong HCl reaction, weak (R2), mottled with grayish orange (10YR 7/4), voids to 1/8" over 15-25% of surface, trace cavities to 1"x1/4", trace fossils to 1/2"x1/4" | R1:2 minutes |
| | | | NR | 40.6' - Fracture, 70 deg, smooth, undulating to stepped, tight | | **No Recovery 40.85-41.0'** | |
| | R2-NQ 5 ft 54% | 0 | >10 | 41.0-41.4' - Fracture zone, fragments to 2"x1" | | **Limestone** 41.0-43.7' - light olive gray, (5Y 5/2), fine to coarse grained, weak to moderate HCl reaction, extremely weak (R0), poorly competent, trace voids to 1/16", unconsolidated sandy silt from 42.5-43.55' | |
| | | | 0 | 41.75' - Bedding plane or mechanical break, horizontal, smooth, undulating, tight | | | |
| | | | 0 | | | | |
| 45 -1.9 | | | NR | | | **No Recovery 43.7-46.0'** | R2:2 minutes |
| | 46.0 | | | | | | |
| | R3-NQ 5 ft 94% | 24 | N/A | | | **Sandy Silt (ML)** 46.0-48.25' - moderate yellowish brown, (10YR 5/4), wet, medium grained, strong HCl reaction, carbonate silt with 20-50% carbonate | |
| | | | N/A | | | | |
| | | | >10 | | | **Limestone** 48.25-50.7' - moderate yellowish brown, (10YR 5/4), medium to coarse grained, moderate HCl reaction, highly competent, voids to 1/8" over 15-45% of rock, trace fossil casts to 3/16" diameter | |
| | | | 4 | 48.95, 49.05' - Bedding plane or mechanical break (2), horizontal, smooth, planar, tight to 1/4" open | | | |
| 50 -6.9 | | | 3 | 49.0' - Fracture or mechanical break, vertical, smooth, planar, open | | | R3:3 minutes |
| | 51.0 | | NR | 49.8, 50.1' - Fractures (2), 60 deg, rough, undulating, tight | | **No Recovery 50.7-51.0'** | |
| | R4-NQ 5 ft 100% | 11 | 0 | 50.15' - Fracture, 30 deg, rough, undulating, tight | | **Limestone** 51.0-56.0' - grayish orange, (10YR 7/4), fine to coarse grained, moderate to weak HCl reaction, extremely weak to weak (R0 to R2), voids to 1/8" over 10-40% of rock, trace fossils to 1/8" diameter, extremely weak, fine grained rock at 53.5-54.2' and 55.4-55.6', voids over 10-15% of surface, 25-30% dark laminations 1/16"-3/16" thick | |
| | | | 3 | 50.4' - Fracture, 80 deg, rough, undulating, tight | | | |
| | | | 1 | 50.5' - Fracture, 50 deg, rough, undulating, tight<br>52.1, 52.5, 52.85, 53.98, 54.2, 54.75, 55.4' - Bedding plane or mechanical break (7), horizontal and 10 deg, smooth, undulating, tight | | | |
| | | | 2 | | | | R4:4 minutes |
| 55 -11.9 | | | 1 | | | | |
| | 56.0 | | | | | 56.0-56.3' - Same as 51.0-56.0' | |
| | R5-NQ 5 ft 98% | 34 | N/A | | | **Silt (ML)** 56.3-57.7' - grayish orange, (10YR 7/4), fine grained, strong HCl reaction, extremely weak (R0), grading to extremely weak (R0) limestone, thinly bedded with 1/16" thick, dark laminations (possible organics) over 25% of surface | |
| | | | 1 | 57.4, 59.15' - Bedding plane or mechanical break (2), horizontal, smooth, undulating, tight to 1/4" open | | | |
| | | | 0 | | | | |
| | | | 1 | | | **Limestone** 57.7-59.7' - Same as 51.0-56.0' | |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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 ORIENTATION : Vertical

WATER LEVELS : 5.0 ft bgs on 4/21/07 START : 4/21/2007 END : 4/26/2007 LOGGER : C. Wallestad, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -16.9 | | | N/A | | | **Silt (ML)**<br>59.7-60.3' - grayish orange, (10YR 7/4), strong HCl reaction, extremely weak (R0), grading to extremely weak (R0) limestone, thinly bedded with 1/16" thick, dark laminations (possible organics) over 25% of surface | R5:5 minutes |
| 61.0 | | | NR | | | | |
| | R6-NQ<br>5 ft<br>98% | 84 | 1 | 61.5, 65.8' - Bedding plane or mechanical break (2), 20 deg, smooth, undulating to planar | | **Limestone**<br>60.3-60.9' - Same as 51.0-56.0'<br>**No Recovery 60.9-61.0'**<br>**Limestone**<br>61.0-61.4' - pale yellowish brown, (10YR 6/2), fine to coarse grained, moderate HCl reaction, very weak to weak (R1 to R2), competent, voids to 1/8" over 5-15% of rock, trace cavities to 1.0' diameter most filled with extremely weak rock (R0), few open, trace dark laminations | |
| | | | 2 | 62.3' - Bedding plane or mechanical break, horizontal, smooth, undulating to planar | | | |
| | | | N/A | 62.5' - Bedding plane or mechanical break, 5 deg, smooth, undulating to planar | | | |
| | | | N/A | | | | |
| 65<br>-21.9 | | | 1 | | | | R6:9 minutes |
| 66.0 | | | NR | | | | |
| | R7-NQ<br>5 ft<br>100% | 57 | 2 | 66.15, 66.8' - Bedding plane or mechanical break (2), horizontal, smooth, undulating, tight to 1/4" open | | **Silt (ML)**<br>61.4-62.6' - poorly competent as 56.3-57.7' | |
| | | | 1 | | | **Limestone**<br>62.6-64.8' - pale yellowish brown, (10YR 6/2), fine to coarse grained, moderate HCl reaction, very weak to weak (R1 to R2), competent, voids to 1/8" over 5-15% of rock, trace cavities to 1.0' diameter most filled with extremely weak rock (R0), few open, trace dark laminations (possible organics) | |
| | | | 0 | | | | |
| | | | 1 | 68.85' - Fracture or mechanical break, 20 deg, rough, undulating to stepped, tight | | | |
| 70<br>-26.9 | | | 1 | 69.5, 70.4' - Bedding plane or mechanical break (2), horizontal, smooth, undulating, tight to 1/4" open | | | R7:3 minutes |
| 71.0 | | | | | | | |
| | R8-NQ<br>5 ft<br>100% | 70 | 1 | 71.1, 73.55, 73.8' - Bedding plane or mechanical break (3), horizontal, smooth, undulating to planar, 1/16" thick infill of fines infill, tight | | **Silt (ML)**<br>64.8-65.9' - poorly competent as 56.3-57.7'<br>**No Recovery 65.9-66.0'** | |
| | | | 2 | 72.05' - Fracture, 55 deg, rough, undulating, tight | | **Limestone**<br>66.0-71.0' - moderate yellowish brown, (10YR 5/4), moderate to strong HCl reaction, extremely weak to weak (R0 to R2), voids to 1/16" over 0-25% of rock, trace fossil casts, trace dark laminations, extremely weak from 66-66.6', 67.3-68.3', and 69.1-71.0'<br>71.0-72.6' - Same as 66.0-71.0' except extremely weak (R0)<br>72.6-73.5' - moderate yellowish brown, (10YR 5/4), coarse grained, moderate HCl reaction, weak to medium strong (R2 to R3), competent, voids to 3/16" over 15-30% of rock, fossil casts to 3/16"x3/8" over 5-15% of rock, trace cavities to 1/4"x1.5', trace dark material (possible organics)<br>73.5-74.4' - Same as 71.0-72.6' | |
| | | | 10 | 72.55' - Fracture, 70 deg, rough, undulating, tight<br>73.8-74.3' - Fracture zone | | | |
| | | | 10 | | | | |
| 75<br>-31.9 | | | 1 | 74.9' - Fracture, 85 deg, smooth, undulating<br>75.05' - Fracture, 60 deg, smooth, undulating<br>75.4' - Fracture, 50 deg, smooth, undulating | | | R8:6 minutes |
| 76.0 | | | | | | | |
| | R9-NQ<br>5 ft<br>96% | 77 | 0 | | | | |
| | | | 1 | 77.25, 78.1' - Bedding plane or mechanical break (2), 85 deg, smooth, planar, tight | | | |
| | | | 2 | 78.7' - Fracture, 30 deg, rough, undulating, tight | | | |
| | | | 1 | 79.25-79.85' - Fracture zone, fragments to 1" diameter | | | |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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 ORIENTATION : Vertical

WATER LEVELS : 5.0 ft bgs on 4/21/07 START : 4/21/2007 END : 4/26/2007 LOGGER : C. Wallestad, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -36.9 | | | >10 | 79.75, 79.85' - Mechanical break or fractures (2), horizontal, rough, undulating, associated with dissolution cavity, open | | **Limestone** 74.4-76.0' - moderate yellowish brown, (10YR 5/4), coarse grained, moderate HCl reaction, weak to medium strong (R2 to R3), competent, voids to 3/16" over 15-30% of rock, fossil casts to 3/16"x3/8" over 5-15% of rock, trace cavities to 1/4"x1.5", trace dark material (possible organics) | R9:8 minutes |
| | 81.0 | | NR | 80.4' - Fracture, 75 deg, rough, associated with dissolution cavity, open | | | |
| | R10-NQ 5 ft 85% | 43 | >10 | 80.4-80.8' - Fracture zone, fragments 1.5"x2" | | | |
| | | | 2 | 81.0-81.05, 81.55-81.95' - Fracture zone (2), fragments 1.5"x2" | | | |
| | | | 3 | 81.05, 81.55, 81.95' - Bedding plane or mechanical break (3), horizontal, rough, undulating, open by fracture zones | | 76.0-77.25' - Same as 74.4-76.0' except voids decreasing with depth | |
| | | | 4 | 81.45' - Fracture or mechanical break, 40 deg, rough, undulating, tight to 1/4" open | | 77.25-78.1' - Same as 56.3-57.7' except trace dark laminations (possible organics) | |
| 85 -41.9 | | | 0 | 82.1, 83.6' - Bedding plane or mechanical break (2), rough, undulating, tight to 1/4" open | | 78.1-79.6' - dark yellow orange to moderate yellowish brown, (10YR 6/6 to 10YR 5/4), fine grained, strong HCl reaction, weak to medium strong (R2 to R3), voids to 1/8" over 20-45% of rock, trace fossil casts 1/4" diameter, trace cavities to 1"x2" with competent, medium strong rock (R3) infill | R10:7 minutes |
| | 86.0 | | NR | 82.8' - Fracture or mechanical break, 30 deg, smooth, planar, tight | | | |
| | R11-NQ 5 ft 87% | 51 | 2 | 83.45' - Fracture or joint, 60 deg, undulating, as 81.5' | | | |
| | | | 10 | 84.25' - Bedding plane, <10 deg, smooth, undulating, apparently along possible organic layer, tight | | | |
| | | | 2 | 84.85' - Fracture or mechanical break, 40 deg, rough, undulating, 1/4" open | | 79.6-80.8' - grayish orange to pale yellowish brown, (10YR 7/4 to 10YR 6/2), moderate HCl reaction, medium strong (R3), competent, voids to 3/16" over 0-35% of rock, cavities to 3"x1" over 25-30% of rock, cavities partially filled with weak rock infill, trace fossil casts to 1/2"x1/4" | |
| | | | 10 | 85.0' - 20 deg | | | |
| 90 -46.9 | | | 10 | 86.2, 87.35, 88.9, 89.7' - Bedding plane or mechanical break (4), horizontal, smooth, undulating to planar, tight except for fracture zone | | | R11:8 minutes |
| | 91.0 | | NR | 86.45, 86.65' - Fractures or mechanical break (2), 50 deg, rough, undulating, tight to 1" open | | **No Recovery 80.8-81.0'** | |
| | R12-NQ 5 ft 74% | 28 | 2 | 87.2' - Fracture or mechanical break, 20 deg, smooth, undulating, open by fracture zone | | **Limestone** 81.0-81.7' - Same as 78.1-79.6' 81.7-82.1' - Same as 79.6-80.8' 82.1-83.3' - Same as 77.25-78.1' 83.3-85.25' - Same as 81.0-81.7' except trace 1/16"-3/16" thick dark laminations (possible organics) | |
| | | | 2 | 87.2-87.35, 89.7-90.35' - Fracture zone (2), 20 deg, up to 2"x3" diameter | | | |
| | | | 10 | 88.75' - Fracture, 85 deg, smooth, undulating | | | |
| | | | 10 | 89.0' - Fracture, 50 deg, smooth, undulating | | | |
| | | | NR | 91.6' - Fracture, 20 deg, smooth, planar, tight | | **No Recovery 85.25-86.0'** | |
| 95 -51.9 | | | | 91.65' - Fracture, 70 deg, smooth, undulating, tight | | **Limestone** 86.0-90.35' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), medium grained, moderate HCl reaction, very weak to medium strong (R1 to R3), competent, voids to 3/16" over 20-30% of rock, trace fossil casts to 3/16" diameter, trace light gray infill material (medium strong) | R12:11 minutes |
| | 96.0 | | | 92.55' - Fracture, 35 deg, smooth, planar, tight | | | |
| | R13-NQ 5 ft 70% | 15 | >10 | 92.65' - Fracture, 60 deg, smooth, planar, tight | | | |
| | | | 10 | 93.05' - Fracture, 60 deg, smooth, undulating, tight | | **No Recovery 90.35-91.0'** | |
| | | | 3 | 93.2' - Fracture, 80 deg, smooth, undulating, tight | | **Limestone** 91.0-93.55' - Same as 86.0-90.35' except less voids (10-25%) than at 92.0-92.5' | |
| | | | 4 | 93.55' - Fracture or mechanical break, 20 deg, rough, undulating, 1/16"-3/16" open | | | |
| 100 | | | | 93.55-94.25' - Fracture zone, fragments to 1.5"x2.5", infill in cavities | | | |
| | | | | 94.25' - Bedding plane, horizontal, smooth, planar, open | | | |
| | | | | 96.0-96.75' - Fracture zone, dark, fragments to 3"x1", stain on many faces | | | |
| | | | | 96.75' - Bedding plane, horizontal, smooth, planar, tight | | | |

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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 on 4/21/07 START : 4/21/2007 END : 4/26/2007 LOGGER : C. Wallestad, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -56.9 | | | NR | 97.1' - Fracture, 85 deg, smooth, undulating, dark, tight<br>97.15-97.25' - Bedding plane, horizontal, smooth, planar, 1" thick silt, tight | | 93.55-94.7' - grayish orange, (10YR 7/4), fine grained, strong HCl reaction, medium strong (R3), competent, voids to 1/8" over 0-15% of surface, trace cavities to 1/4" diameter, tight plastic clay infilling in some cavities<br>**No Recovery 94.7-96.0'**<br>**Limestone**<br>96.0-97.2' - very pale orange, (10YR 8/2), fine grained, moderate HCl reaction, medium strong (R3), voids to 1/16" over 0-10% of surface, dark staining on broken face<br>97.2-97.7' - very pale orange, (10YR 8/2), fine grained, strong HCl reaction, extremely weak to weak (R0 to R2), competent, voids to 1/16" over 10-20% of rock, moderately fossiliferous with casts and molds to 3/16"x3/8", trace dark inclusions<br>97.7-98.9' - dark yellow orange to moderate yellowish brown, (10YR 6/6 to 10YR 5/4), fine grained, moderate HCl reaction, medium strong (R3), competent, voids between 1/16"-1/8" over 30%, few secondary cavity infilling up to 1/2", strong HCl reaction on infilling (similar to 78.1-79.6')<br>98.9-99.5' - Same as 96.0-97.2'<br>**No Recovery 99.5-104.3'**<br>**Limestone**<br>104.3-105.7' - grayish orange, (10YR 7/4), fine grained, moderate to strong HCl reaction, medium strong (R3), medium strong (R3) at 105.4', voids up to 1/16" over 0-30% (mostly 0-5%) of surface, trace dark laminations 3/16" thick<br>105.7-106.0' - fine to medium grained, moderate to strong HCl reaction, extremely weak to very weak (R0 to R1), very weak rock at 105.75', voids up to 1/16" over 5-15% of rock, trace dark inclusions<br>106.0-109.3' - grayish orange, (10YR 7/4), medium to coarse grained, weak to strong HCl reaction, extremely weak to weak (R0 to R2), poorly competent, voids to 1/8" over 25% of surface, fossil casts to 3/4"x1/4" over 3-12% of surface, trace dark mottling<br>**No Recovery 109.3-111.0'**<br>**Limestone**<br>111.0-115.7' - Same as 106.0-109.3'<br>**No Recovery 115.7-116.0'**<br>**Limestone**<br>116.0-119.1' - Same as 106.0-109.3' | R13:9 minutes<br><br>07:55 water level = 2.5' below ground surface<br>NW casing set at 101 ft below ground surface<br>No recovery at 101.0-104.3 due to core barrel blockage<br><br>R14:10 minutes<br><br>R15:4 minutes<br><br>R16:3 minutes |
| | 101.0 | | | | | | |
| | R14-NQ 5 ft 34% | 9 | NR | 97.35' - Fracture, 75 deg, smooth, undulating, dark, tight<br>97.6-97.7' - Fracture zone, fragments to 1"x3/4"<br>98.5' - Fracture, 20 deg, rough, undulating, tight<br>98.85' - Fracture, 70 deg, smooth, undulating, dark, tight | | | |
| | | | >10 | 98.9, 99.0' - Bedding plane or mechanical break (2), horizontal, smooth, planar, tight | | | |
| 105<br>-61.9 | | | 3 | 99.15' - Fracture, 20 deg, rough, undulating, tight<br>99.3' - Fracture, 40 deg, smooth, undulating, dark, tight | | | |
| | 106.0 | | | | | | |
| | R15-NQ 5 ft 66% | 0 | >10 | 99.8' - Fracture, 75 deg, smooth, undulating, open | | | |
| | | | >10 | 104.3-104.7' - Fracture zone, dark staining on some faces, fragments to 3/4"x1.5"<br>104.7, 104.9, 105.0, 105.15' - Mechanical break (4), horizontal, smooth, undulating | | | |
| | | | >10 | 104.95' - Fracture or mechanical break, 40 deg, smooth, planar, dark, tight | | | |
| | | | 0 | 105.2' - Bedding plane, horizontal, smooth, planar, dark, open<br>105.4, 105.75' - Mechanical break (2) | | | |
| 110<br>-66.9 | | | NR | 105.7' - Bedding plane, horizontal, smooth, undulating, tight to 1/2" open<br>106.25, 107.2, 109.2' - Fractures (3), 80 deg, smooth, undulating, dark, open (missing opposite face) | | | |
| | 111.0 | | | | | | |
| | R16-NQ 5 ft 94% | 46 | 10 | 106.4-107.1, 107.5-109.0' - Fracture zone (2), fragments to 3"x2", some dark staining on faces in lower interval | | | |
| | | | 0 | 109.0' - Fracture, 20 deg, smooth, undulating, dark, missing opposite face | | | |
| | | | 10 | 111.0-111.15' - Fracture zone, fragments to 1"x1/4"<br>111.15' - Mechanical break or bedding plane, horizontal, rough, undulating, open (missing opposite face) | | | |
| | | | 3 | 111.35' - Fracture, 80 deg, rough, undulating, tight | | | |
| 115<br>-71.9 | | | >10 | 113.25-113.6' - Fracture zone, fragments up to 2" in diameter | | | |
| | 116.0 | | NR | 113.25, 113.6' - Bedding plane or mechanical break (2), smooth, undulating, open (missing opposite face) | | | |
| | R17-NQ 5 ft 100% | 90 | 10 | 113.95, 114.1' - Fractures (2), 45 deg and 35 deg, tight to 1" open | | | |
| | | | 0 | 114.6' - Bedding plane or mechanical break, smooth, undulating, tight to 1/4" open | | | |
| | | | 1 | 114.85' - Fracture, 80 deg, rough, undulating, dark, stain<br>115.35-115.7' - Fracture zone, fragments to 2"x2" | | | |
| 120 | | | 1 | 116.6' - Fractures (2), 80 deg, smooth, undulating, intersecting, tight | | | |

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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 on 4/21/07 START : 4/21/2007 END : 4/26/2007 LOGGER : C. Wallestad, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -76.9 | | | 0 | 116.75' - Bedding plane or mechanical break, <10 deg, smooth, undulating, tight | | **Limestone** | R17:5 minutes |
| | 121.0 | | | 116.9' - Fracture or mechanical break, 60 deg, smooth, undulating, tight | | 119.1-119.5' - yellowish gray, (5Y 7/2), weak HCl reaction, weak to medium strong (R2 to R3), voids to 1/8" over 0-20% of surface, trace cavities to 1.5'x1/4" with no infilling | |
| | | | 1 | 118.95' - Bedding plane or fracture, 20 deg, smooth, undulating, tight | | 119.5-121.0' - Same as 106.0-109.3' | |
| | | | 1 | 119.5' - Bedding plane, horizontal, smooth, undulating, tight | | 121.0-123.55' - Same as 116.0-121.0' except increased fossil casts with depth, voids up to 1/2"x1/4" over 5-10% of rock | |
| | R18-NQ 5 ft 99% | 99 | 0 | 121.6, 122.6, 125.5' - Bedding plane (3), horizontal, smooth, undulating, tight | | 123.55-123.85' - Same as 119.1-119.5' except fossil casts/molds to 1/2"-1/4" over 5% of rock, trace cavities filled with clay, tight, many voids infilled | |
| | | | 0 | | | | |
| 125 -81.9 | | | 1 | | | 123.85-125.95' - moderate yellowish brown, (10YR 5/4), medium to coarse grained, moderate HCl reaction, weak (R2), voids to 1/16" over 30-40% of rock, no visible fossils or cavities | R18:11 minutes |
| | 126.0 | | | | | **No Recovery 125.95-126.0'** | |
| | | | 2 | 126.3, 126.9, 127.1 127.65, 127.7, 127.95, 128.0, 128.4, 128.45, 129.65' - Bedding plane (10), horizontal, smooth, undulating to planar, mostly tight except at fracture zones | | **Limestone** | |
| | | | 10 | 127.65-127.7, 128.4-128.95' - Fracture zone or bedding plane (2), horizontal, fragments to 1/2"x1/4" | | 126.0-127.7' - Same as 123.85-123.95' except extremely weak to medium strong rock (R0 to R3), mostly weak rock, moderately fossiliferous with echinoderm molds to 1/2"x1/4" at 126.3-127.7', trace fossil molds throughout entire run | |
| | R19-NQ 5 ft 90% | 58 | 10 | | | | |
| | | | >10 | | | | |
| 130 -86.9 | | | 0 | 129.65-129.95' - Bedding plane, horizontal, smooth, undulating to planar, mostly tight except by fracture zones | | 127.7-128.0' - Same as 104.3-105.7' 128.0-130.5' - Same as 126.0-127.7' | R19:10 minutes |
| | 131.0 | | NR | | | **No Recovery 130.5-131.0'** | |
| | | | 1 | 131.05, 132.1, 132.3, 133.8, 133.95, 134.2, 134.3, 134.4, 134.65' - Bedding plane (9), horizontal, smooth to rough, undulating to planar, tight except by fracture zones and where missing opposite face | | **Limestone** 131.0-134.9' - Same as 126.0-130.5' except moderately fossiliferous from 132.6-133.8' with casts to 1/2"x1/4" over 5-10% of rock, bigger voids and coarser texture with depth, thick rock as at 104.3-105.7' and 134.0-134.8' | 07:30 water level = 3.0' below ground surface |
| | | | 10 | 132.05, 134.65' - Fractures (2), 60 deg, rough to smooth, undulating to planar | | | |
| | R20-NQ 5 ft 78% | 42 | 10 | 132.5-132.65. 133.8-133.95, 134.2-134.3, 134.65-134.8' - Fracture zone (4), fragments to 1.25"x1/2" | | | |
| | | | >10 | 134.2' - Bedding plane, horizontal, smooth to rough, undulating to planar, tight except by fracture zones where missing opposite face | | | |
| 135 -91.9 | | | NR | | | **No Recovery 134.9-136.0'** | R20:6 minutes |
| | 136.0 | | | | | | |
| | | | >10 | 136.0-136.75' - Fracture zone or bedding plane, horizontal, fragments up to 1"x2" | | **Limestone** 136.0-137.0' - pale olive, (10YR 6/2), fine to medium grained, weak HCl reaction, medium strong (R3), competent, trace voids to 1/16", trace cavities on interbeds to 1/2" thick with increased percentage of voids to 3/16" over 30-60% infill | |
| | | | 5 | 136.75, 136.95, 137.0, 137.2, 137.45. 137.55, 137.75, 138.1' - Bedding plane (8), horizontal, smooth, planar, tight | | | |
| | R21-NQ 5 ft 82% | 42 | 1 | 137.3, 138.5' - Mechanical break (2) | | | |
| 140 | | | 1 | | | | |

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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 on 4/21/07 START : 4/21/2007 END : 4/26/2007 LOGGER : C. Wallestad, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -96.9 | | | NR | 139.85' - Fracture, 70 deg, rough, undulating, tight | | **Limestone** | R21:8 minutes |
| | 141.0 | | | | | 137.0-138.1' - grayish orange, (10YR 7/4), medium to coarse grained, weak HCl reaction, weak to medium strong (R2 to R3), voids to 3/16" over 15-40% of surface, trace fossil casts | |
| | | | 10 | 141.3' - Fracture, 80 deg, smooth, undulating, tight | | 138.1-140.1' - moderate yellowish brown, (10YR 5/4), medium grained, weak HCl reaction, medium strong (R3), competent, voids to 1/8" over 20-25% surface, trace fossil casts to 1/2"x1/4" | |
| | | | >10 | 141.35' - Bedding plane or mechanical break, horizontal, smooth, undulating, machine/rock grinding, so not tight | | | |
| | R22-NQ 5 ft 84% | 8 | 10 | 141.75' - Fracture, 80 deg, rough, undulating, tight and no grind mark | | | |
| | | | >10 | 141.75-143.3' - Fracture zone, associated with cavities, some staining (dark), fragments average 1" diameter up to 2"x5" | | **No Recovery 140.1-141.0'** | |
| 145 -101.9 | | | 10 NR | 143.3' - Fracture, 70 deg, smooth, undulating, open, missing opposite face<br>143.7' - Fracture or mechanical break, rough, undulating, dark, 1/4" open | | **Limestone**<br>141.0-141.75' - Same as 138.1-140.1' | R22:11 minutes |
| | 146.0 | | | | | 141.75-145.2' - light olive gray with pale orange mottling, (5Y 6/1 with 10YR 8/2), fine grained, strong HCl reaction, medium strong (R3), (possible preferential flow path, oxidation/reduction), competent, voids to 3/16" over 10% of surface, fossil casts to 1" diameter over 5% surface, dissolution cavities to 1"x2" over 10% surface, 1/2" cavities without infilling, voids to 3/16" over 30-40% of infilling, decreased mottling with depth | |
| | | | >10 | 144.0' - Fracture, 80 deg, rough, undulating, open | | | |
| | | | 2 | 144.0-145.2' - Fracture zone, as 141.75-142.3' | | | |
| | | | | 146.0-146.7' - Fracture zone, fragments to 2" diameter | | | |
| | R23-NQ 5 ft 82% | 42 | 3 | 146.7' - 20 deg, rough, undulating, dark, open, missing opposite face | | | |
| | | | | 146.85' - Fracture, 70 deg, rough, undulating, dark, tight | | | |
| | | | 3 | 146.95' - Fracture, 30 deg, smooth, planar | | | |
| 150 -106.9 | | | 0 NR | 147.05, 148.45' - Fractures (2), 40 deg, smooth, undulating | | **No Recovery 145.2-146.0'**<br>**Limestone** | R23:6 minutes |
| | 151.0 | | | 147.8, 148.15, 148.25' - Bedding plane (3), <5 deg, rough, undulating, tight to 1/4", low angle fracture | | 146.0-149.25' - dark yellowish orange, (10YR 6/6), fine to medium grained, moderate HCl reaction, medium strong (R3), competent, voids to 1/8" over 5-20% of rock, fossil casts to 1" diameter over 0-10% surface, infilling or interbedded material 1"-4" thick at 147.5', 148.3', 148.8', and 149.15', infilling consists of light olive gray (5Y 5/6), fine grained limestone, strong HCl reaction, trace voids to 1/16", trace cavities to 3/4" diameter, dark laminations at 149.25' | Note: after fractures were measured, it was noticed that the beginning of this run is the end of R23, therefore subtract 0.9' from all depths. |
| | | | 1 | 149.35' - Bedding plane or mechanical break, <5 deg, rough, undulating, open, missing opposite face | | | |
| | | | 10 | 149.35-149.55' - Fracture zone, fragments up to 2"x1" | | | |
| | | | | 149.55' - Fracture, 40 deg, smooth, planar | | | |
| | R24-NQ 5 ft 100% | 62 | >10 | 149.68' - Fracture, <5 deg, rough, undulating, open, missing opposite face | | | |
| | | | 2 | 151.2' - Fracture, 65 deg, smooth, undulating to stepped, possible stain, tight | | | |
| 155 -111.9 | | | 4 | 152.25' - Fracture, 20 deg, smooth, undulating to stepped, open by fracture zone<br>152.45' - Fracture, 40 deg, smooth, undulating | | 149.25-150.1' - Same as 138.1-140.1' except weak to medium strong (R2 to R3), trace organics | R24:6 minutes |
| | 156.0 | | | 152.45-153.05, 153.45-154.0' - Fracture zone (2), fragments 2" diameter | | **No Recovery 150.1-151.0'** | |
| | | | 3 | 152.75' - Fracture, 20 deg, smooth, undulating to stepped, open | | **Limestone**<br>151.0-155.5' - Same as 146.0-149.25' except trace dark, wavy laminations at 154.5' | |
| | | | 2 | 153.3' - Fracture, 65 deg, smooth, planar, possible stain, tight | | 156.0-158.5' - pale yellowish brown, (10YR 6/2), fine grained, strong HCl reaction, medium strong (R3), trace voids and fossil casts to 1/4" diameter | |
| | R25-NQ 5 ft 98% | 68 | 1 | 153.45' - Fracture, 85 deg, smooth, planar, open<br>154.0' - Fracture, 75 deg, smooth, planar | | | |
| | | | | 154.05' - Mechanical break | | | |
| 160 | | | 3 | 154.6, 155.6, 155.8, 156.05' - Bedding plane (4), horizontal, smooth, undulating, tight 1/4" open | | | |

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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 on 4/21/07 START : 4/21/2007 END : 4/26/2007 LOGGER : C. Wallestad, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -116.9 | | | 10 | 156.45' - 50 deg and 80 deg, smooth, planar, open, missing opposite face | | 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 |
| | 161.0 | | NR | 156.5' - Fracture, 50 deg, smooth, undulating, tight | | | |
| | | | 1 | 156.65' - Fracture, 65 deg, smooth, planar, tight | | **No Recovery 160.9-161.0'** | |
| | | | 10 | 156.7, 159.05, 159.15,159.5, 160.35, 160.5' - Bedding plane (6), horizontal, smooth, undulating, tight, some planar | | **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' | |
| | R26-NQ 5 ft 70% | 23 | >10 | 157.15' - Fracture, 50 deg, smooth, undulating, tight | | 163.5-164.5' - pale yellowish brown, (10YR 6/2), fine to medium grained, strong HCl 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 percentage of dissolution cavities as evidence by fracture zone breakage pattern | |
| | | | >10 | 157.7' - Fractures (2), 70 deg and 5 deg, smooth, undulating, open, missing opposite face | | | |
| 165 -121.9 | | | NR | 158.95' - Fracture, 65 deg, smooth, undulating, tight 160.35-160.5' - Fracture zone, fragments up to 1"x2' | | | R26:8 minutes |
| | 166.0 | | NR | 161.85' - Fracture, 45 deg, smooth, undulating, tight | | **No Recovery 164.5-166.6'** | |
| | | | >10 | 162.15' - Fracture or mechanical break, smooth, undulating, tight to 1/4" open | | **Limestone** 166.6-168.7' - Same as 163.5-164.5' | |
| | | | >10 | 162.5' - Bedding plane, <10 deg, smooth, undulating, tight | | | |
| | 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 | | | Moderate chatter at 168.0-168.5' |
| | | | 2 | 168.7, 169.8, 169.85, 170.2, 170.35' - Bedding plane (5), horizontal and 10 deg, smooth, planar, dark, tight except next to fracture zone | | 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 1/8"-3/4", medium strong (R3), moderate HCl reaction | |
| 170 -126.9 | | | 2 | | | | R27:7 minutes |
| | 171.0 | | | | | 171.0-171.5' - Same as 168.7-171.0' | |
| | | | 5 | 171.55, 173.55' - Fractures (2), 60 deg, rough, undulating, tight | | 171.5-172.2' - light olive gray, (5Y 5/2), very fine grained, mild HCl reaction, very strong (R5), voids to 3/16" over 5% of surface, weak HCl reaction, 1" thick, fine grained section at 171.7' | |
| | | | 10 | 171.65, 171.75, 171.85, 172.3' - Bedding plane (4), horizontal, smooth, undulating, tight | | | |
| | R28-NQ 5 ft 100% | 55 | 10 | 173.55' - Bedding plane, 10 deg, smooth, undulating, tight | | 172.2-173.6' - dark yellowish orange, (10YR 6/6), fine to medium grained, mild HCl reaction, weak (R2), with light olive gray, moderate to coarse grained (80% orange, 20% gray, bimodal), 1/16" voids over 40%, trace larger voids/cavities (<3/16") | |
| | | | 10 | 173.65' - Fracture, 45 deg, rough, undulating, tight | | | |
| 175 -131.9 | | | 10 | 174.9-174.95' - Bedding plane, 10 deg, smooth, undulating, associated with lamination surfaces, tight | | | R28:7 minutes |
| | 176.0 | | | | | 173.6-176.0' - pale yellowish brown 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) dropping to weak to medium (R2 to R3) below 174.8', HCl reaction similar to 163.5-164.5' | |
| | | | 10 | 174.95-175.55' - Fracture zone, fragments to 3"x1" | | | |
| | | | 10 | 175.55' - Fracture, 30 deg, smooth, planar, tight | | | |
| | | | 10 | 175.7' - Fracture, 70 deg, smooth, planar, tight | | | |
| | R29-NQ 5 ft 100% | 45 | 10 | 175.85' - Fracture, 20 deg, smooth, planar, tight | | | |
| | | | 2 | 176.0-176.25' - Fracture zone, fragments to 1"x2" | | 176.0-181.0' - Same as 173.6-176.0' except weak to medium strong (R2 to R3) | |
| 180 | | | | | | | |

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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 on 4/21/07 START : 4/21/2007 END : 4/26/2007 LOGGER : C. Wallestad, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -136.9 | | | 10 | 176.25' - Fractures (2), 70 deg and 40 deg, smooth, planar, open, intersecting fractures, fracture zone | | | R29:10 minutes |
| | 181.0 | | | | | | |
| | R30-NQ 5 ft 84% | 8 | >10 | 176.55' - Bedding plane, horizontal, smooth, undulating, tight to 1/4" open | | **Limestone** 181.0-185.2' - pale yellowish brown to dark yellowish orange, (10YR 6/2 to 10YR 6/6), fine to very fine grained, strong HCl reaction, medium strong to very strong (R3 to R5) | |
| | | | >10 | 176.9, 177.0' - Fractures (2), horizontal, smooth, undulating, fragments to 1"x1/4" | | | |
| | | | >10 | 177.8' - Fracture, 75 deg, smooth, undulating, open by fracture zone | | | |
| | | | >10 | 177.8-178.2' - Fracture zone, fragments to 2" diameter | | | |
| | | | >10 | 178.2' - Fracture, 75 deg, smooth, undulating, dark, open | | | |
| 185 -141.9 | | | 1 NR | 178.35' - Fracture, 55 deg, smooth, planar, dark, tight; 178.45, 178.7' - Fractures (2), 55 deg, smooth, undulating, tight | | **No Recovery 185.2-186.0'** | R30:9 minutes |
| | 186.0 | | | 178.85-179.1' - Fracture zone, fragments to 1" diameter | | | |
| | R31-NQ 5 ft 68% | 0 | >10 | 179.9' - Fracture, 20 deg and 55 deg, smooth, planar, tight | | **Limestone** 186.0-189.4' - Same as 181.0-185.2' except strong to very strong (R4 to R5) | |
| | | | >10 | 180.0' - Fracture, 30 deg, smooth, planar, dark, tight | | | |
| | | | >10 | 180.75-181.0' - Fracture zone, fragments to 1"x2" | | | |
| | | | >10 | 181.0-181.45, 182.0-184.35' - Fracture zone (2), fragments to 2"x2", some staining | | | |
| | | | NR | 181.45' - Fracture, 20 deg, smooth, planar, open by fracture zone; 181.65' - 10 deg and 75 deg, smooth, undulating to planar, tight | | **No Recovery 189.4-191.0'** | Core blockage |
| 190 -146.9 | | | | 181.85, 181.9' - Fractures (2), 75 deg, smooth, planar, tight | | | R31:6 minutes |
| | 191.0 | | | | | | |
| | R32-NQ 5 ft 98% | 65 | 10 | 184.35' - Fracture, 85 deg, smooth, undulating, dark, open by fracture zone | | **Limestone** 191.0-191.4' - Same as 186.0-189.4' 191.4-195.9' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, medium strong (R3), voids to 1/8" over 10-25% of rock, fossil casts to 1/4" diameter over 5-10% of rock, trace dissolution cavities filled with lighter colored porous rock; 193.1-193.2' same as 191.0-191.4' and 181.0-189.4' | |
| | | | | 184.65' - Bedding plane, <5 deg, smooth, undulating, tight | | | |
| | | | >10 | 185.0' - Fracture, 85 deg, smooth, undulating, open by fracture zone | | | |
| | | | 3 | 186.0-189.4' - Fracture zone, fragments to 5"x2", dark staining on many faces; 191.0-191.3' - Fracture zone, fragments to 3" x 1" | | | |
| | | | 0 | 191.3' - Fracture, 40 deg, smooth, undulating, dark, some staining, open to fracture zone | | | |
| 195 -151.9 | | | 1 | 192.2' - Fracture, 60 deg, rough, undulating, tight | | | R32: Run time not recorded |
| | 196.0 | | NR | 192.5' - Fracture, 70 deg, rough, undulating, tight | | **No Recovery 195.9-196.0'** | |
| | R33-NQ 5 ft 97% | 60 | 8 | 192.5-192.8' - Fracture zone, fragments to 2" in diameter | | **Limestone** 196.0-198.9' - pale yellowish brown to grayish orange, (10YR 6/2 to 10YR 7/4), very fine grained, strong HCl reaction, strong to very strong (R4 to R5), 5-10% voids (1/16"), trace cavities from 1/4" round to 1/4"x1/2" | |
| | | | >10 | 192.8' - Bedding plane, 10 deg, rough, undulating, low angle fracture, tight; 193.15' - Bedding plane, <10 deg, smooth, planar, tight | | | |
| | | | 2 | 193.25' - Fracture, 50 deg, smooth, planar, tight | | | |
| | | | 0 | 193.75' - Fracture, 30 deg, smooth, planar, tight; 195.7' - Bedding plane, horizontal, smooth, planar, tight to 1/4" open | | | |
| 200 | | | | | | | |

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|---|---|
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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 on 4/21/07 START : 4/21/2007 END : 4/26/2007 LOGGER : C. Wallestad, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -156.9 | | | >10 | 196.45, 196.6' - Bedding plane (2), horizontal, smooth, planar to undulating, dark, some staining, tight to 1/8" open | | **Limestone** 198.9-200.85' - pale yellowish brown to grayish orange, (10YR 6/2 to 10YR 7/4), fine grained, moderate HCl reaction, strong (R4), 2" infilling of elongate cavities 1/8"-1/2" wide and up to 1" long with dark gray infilling, 10% voids (1/16"), trace cavities predominantly round up to 1/2" | R33: Run time not recorded |
| | 201.0 | | NR | | | | |
| | R34-NQ 5 ft 100% | 58 | 1 | 196.8' - Fracture, 80 deg, smooth, undulating, dark, some staining, tight to 1/16" open | | | |
| | | | 10 | 197.0' - Fracture, 50 deg, smooth, undulating, tight | | | |
| | | | >10 | 197.05' - Fracture, 10 deg, smooth, undulating, tight | | | |
| | | | 5 | 197.2' - Fracture, 75 deg, rough, undulating, open | | **No Recovery 200.85-201.0'** | |
| | | | 3 | 197.2-197.7' - Fracture zone, fragments 2-1/2"x 1", some dark staining | | **Limestone** 201.0-201.3' - pale yellowish brown, (10YR 6/2), fine grained, moderate to strong HCl reaction, medium strong (R3), competent | |
| 205 -161.9 | | | | 198.3' - Fractures (2), 65 deg and 25 deg, smooth, planar, tight, intersecting | | | |
| | 206.0 | | | 200.35' - Bedding plane, horizontal, smooth, planar to undulating, dark, some staining, tight to 1/16" open | | 201.3-206.0' - pale yellowish brown to grayish orange, (10YR 6/2 to 10YR 7/4), fine grained, strong HCl reaction, medium strong (R3), competent, voids to 3/16", trace fossil cavities, trace dark laminations to 3/16" thick, yellowish orange, porous inclusions to 1"x1/2" over 5-10% of rock from 201.3-203.5' | R34: Run time not recorded |
| | | | >10 | 200.35-200.85' - Fracture zone, fragments 1"x2" | | | |
| | | | 3 | 201.5' - Fracture, 40 deg, smooth, undulating, tight | | | |
| | R35-NQ 5 ft 98% | 48 | >10 | 202.5' - Fracture, 70 deg, smooth to rough, undulating, tight | | | |
| | | | >10 | 202.8' - Fractures (2), 60 deg, smooth, undulating, 2 parallel fractures, tight | | 206.0-207.2' - Same as 201.0-201.3' except trace laminations (3/8" thick) with high void % and one cavity 1"x1/8" | |
| | | | >10 | 202.9-203.7' - Fracture zone, fragments to 3-1/2"x1" | | | |
| 210 -166.9 | | | 3 | 203.8, 203.9' - Fractures (2), 55 deg, smooth, undulating, tight | | 207.2-210.9' - moderate yellowish brown to light olive gray, (10YR 5/4 to 5Y 5/2), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids to 3/16" over 30% of rock, trace fossil casts to 1/2"x1/4", suspected dissolution in fracture zones, secondary infilling with light olive gray, medium strong rock (R3) to 2"x1/2" in brown rock, moderate HCl reaction | R35: Run time not recorded |
| | 211.0 | | NR | 204.0, 204.5, 204.75. 205.3' - Bedding plane (4), horizontal, smooth, planar to undulating, tight to 1/4" open | | | |
| | R36-NQ 5 ft 99% | 52 | 1 | 204.15' - Fracture, 20 deg, smooth, undulating, tight to 1/4" open | | | |
| | | | 10 | 205.4' - Fracture, 80 deg, smooth, undulating, tight | | | |
| | | | >10 | 206.0-206.3' - Fracture zone, fragments to 1.5"x1" | | | |
| | | | 2 | 206.3' - Bedding plane, horizontal, smooth, planar to stepped, open to fracture zone | | **No Recovery 210.9-211.0'** | |
| 215 -171.9 | | | 2 | 207.05' - Bedding plane, horizontal, smooth, planar, tight | | **Limestone** 211.0-211.4' - Same as 207.2-210.9' 211.4-212.9' - yellowish gray to grayish orange, (5Y 7/2 to 10YR 7/4), very fine grained, very strong HCl reaction, strong (R4), no voids, trace 1/4" cavities, HCl reaction similar to 201.0-201.3' | R36: Run time not recorded |
| | 216.0 | | NR | 207.2' - Fracture, 70 deg, smooth, planar, tight | | | |
| | R37-NQ 5 ft 98% | 80 | 0 | 207.85' - Fracture, 40 deg, rough, undulating, tight | | | |
| | | | 0 | 208.35' - Fracture, vertical and 40 deg, rough, undulating, open, missing opposite face | | 212.9-215.95' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), fine grained, moderate to strong HCl reaction, medium strong to strong (R3 to R4), voids to <1/16" from 10-30%, a few to many cavities up to 1/2" | |
| | | | 1 | 208.6-208.95' - Fracture zone, fragments to 1.5"x1" | | | |
| | | | 3 | 209.0' - Bedding plane, horizontal, smooth, planar, tight | | **No Recovery 215.95-216.0'** | |
| 220 | | | | 209.5-210.0' - Fracture zone, fragments to 1.5"x1" | | | |
| | | | | 210.25' - Fracture, 30 deg, smooth, undulating, tight to 1" open | | | |
| | | | | 210.6' - Fracture, 30 deg, smooth, undulating, tight to 1/2" open | | | |

| 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 bgs on 4/21/07 START : 4/21/2007 END : 4/26/2007 LOGGER : C. Wallestad, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -176.9 | | | 2 | 211.8, 212.1, 212.25, 212.3, 212.4, 212.65' - Bedding plane (6), 25 deg, smooth, planar, tight except by fracture zone | | **Limestone** 216.0-216.5' - Same as 201.0-201.3' and 211.4-212.9', 216.5-218.6' except trace voids to 1/16" and layers 1/4"-1/8" thick with infill materials as 216.5-218.6' 216.5-218.6' - yellowish gray, (5Y 7/2), medium to coarse grained, weak to moderate HCl reaction, weak to medium strong (R2 to R3), voids to 1/8" over 20-30% of rock, fossil casts to 1/2" diameter over 5% of rock, trace inclusions of dusky yellow (5Y 7/4), low percentage of voids, infill to 4"x2" | R37: Run time not recorded |
| 221.0 | | | NR | 212.35' - Fracture, 25 deg, smooth, planar, open, missing opposite face | | | |
| | | | 5 | 212.65-213.6' - Bedding plane, 25 deg, smooth, planar, tight except by fracture zone | | | |
| | | | >10 | 213.6' - Fracture, 25 deg, smooth, planar, open, missing opposite face | | | |
| | R38-NQ 5 ft 68% | 23 | 10 | 214.0' - Fracture, 60 deg, smooth, undulating, tight | | | |
| | | | 10 | 214.6' - Fracture, 45 deg, rough, undulating, tight | | | |
| 225 -181.9 | | | NR | 215.6' - Fractures (2), 60 deg and 40 deg, smooth, undulating, intersecting fractures, tight to 1/8" open 215.75' - Fracture, 30 deg, smooth, planar, tight to 1/8" open | | 218.6-220.5' - Same as 201.0-201.3' and 211.4-212.9' except trace voids to 1/16" and layers 1/4"-1/8" thick with infill materials as 216.5-218.6' 220.5-220.9' - yellowish gray, (5Y 7/2), medium to coarse grained, weak to moderate HCl reaction, weak to medium strong (R2 to R3), voids to 1/8" over 20-30% of rock, fossil casts to 1/2" diameter over 5% of rock, trace inclusions of dusky yellow (5Y 7/4), low percentage voids, infill to 4"x2" | R38: Run time not recorded |
| 226.0 | | | | | | | |
| | | | 10 | 218.6' - Fractures or bedding plane (2), 35 deg and horizontal, smooth, planar to stepped, intersecting fractures, open, missing opposite face | | | |
| | | | 10 | 219.0, 219.3, 219.75' - Bedding plane (3), <5 deg, rough, undulating, tight to 1/4" open | | | |
| | R39-NQ 5 ft 92% | 35 | 4 | 219.9-220.0' - Fractures (3), 0,90,50 deg, smooth, planar, intersecting fractures, tight to 1" open, missing opposite face | | | |
| | | | >10 | 220.5-220.55' - Fracture zone, fragments to 1/2" diameter | | **No Recovery 220.9-221.0'** | Chattering (moderate) at 229.0' |
| 230 -186.9 | | | 10 | 221.5, 221.65, 221.9, 223.3, 223,4, 223,55, 223.65, 223.9, 224.1' - Bedding plane (9), horizontal and 5 deg, smooth, planar, tight except by fracture zone | | **Limestone** 221.0-221.6' - moderate yellowish brown, (10YR 5/4), fine grained, moderate to strong HCl reaction, strong to very strong (R4 to R5), 15-20% <1/16" voids, laminar appearance in both color and void percentage, transitions from above and below gradual | R39: Run time not recorded |
| 231.0 | | | NR | | | | |
| | | | 10 | 221.6, 223.35' - Fractures (2), 80 deg, smooth, undulating, tight 221.95' - 50 deg, smooth, undulating, tight | | | R. McComb begins logging |
| | | | 10 | 222.55-222.9' - Fracture zone, fragments to 2"x1/2", mostly 1" diameter 223.0' - Bedding plane, 5 deg, rough, undulating, tight to 1/2" open | | | |
| | R40-NQ 5 ft 92% | 30 | >10 | 223.55' - Bedding plane, horizontal and 5 deg, smooth, planar, tight except by fracture zone | | 221.6-221.75' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, strong to very strong (R4 to R5), no voids as 201-201.3' and 211.4-212.9', gradual transitions above and below | |
| | | | >10 | 223.65-223.9' - Fracture zone, fragments to 2"x1/2", mostly 1" diameter | | | |
| 235 -191.9 | | | >10 | 223.9' - Bedding plane, horizontal and 5 deg, smooth, planar, tight except by fracture zone | | 221.75-223.7' - grayish orange to yellowish orange, (10YR 7/4 to 5Y 7/2), fine grained, strong HCl reaction, very weak to weak (R1 to R2), voids to 1/16" over 5-25% of surface, many cavities up to 3/4" some of which infilled with 25% void rock, strong HCl reaction throughout | R40: Run time not recorded |
| 236.0 | | | NR | 224.1-224.15' - Fracture zone, fragments 1/2"x1/4" | | | |
| | | | >10 | 226.0-226.2, 227.65-227.8, 230.1-230.15, 230.4-230.45' - Fracture zone (4), fragments to 2"x1" | | | |
| | | | >10 | 226.7' - Mechanical break 227.25' - Mechanical break | | 223.7-224.2' - Same as 221.6-221.75' | |
| | R41-NQ 5 ft 70% | 10 | >10 | 227.6, 227.65, 227.8, 228.2, 228.45, 228.5, 228.9, 229.15, 230.3' - Bedding plane (9), horizontal, smooth, undulating to planar, tight except by fracture zones | | 224.2-224.4' - Same as 221.75-223.7' **No Recovery 224.4-226.0'** | |
| | | | >10 | 230.3' - Bedding plane, horizontal, smooth, undulating, tight except by fracture zone | | | |
| 240 | | | | | | | |

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|---|---|
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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 on 4/21/07 START : 4/21/2007 END : 4/26/2007 LOGGER : C. Wallestad, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (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, open | | **Limestone** 226.0-277.65' - 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 casts to 2"x 1" over 5-10% of rock | R41: Run time not recorded |
| | 241.0 | | | 231.4-231.7' - Fracture zone, <10 to 90 deg, rough, stepped to undulating, open | | | |
| | | | >10 | 232.8' - Fracture, <10 to horizontal deg, rough, undulating, open | | | |
| | R42-NQ 5 ft 18% | 0 | NR | 232.9-233.4' - Fracture, 80 deg, rough, undulating, open<br>233.4-234.5, 234.8-235.6' - Fracture zone (2), <10 to horizontal deg, rough, stepped to undulating, open<br>236.0-237.0, 237.0-238.0' - Fracture zone (2), horizontal to 90 deg, rough, stepped to undulating, open<br>238.0-239.5' - Fracture zone, various orientations, predominantly limestone gravel<br>241.0-241.9' - Fracture zone, various orientations, predominantly limestone gravel | | **Limestone** 227.65-229.15' - yellowish gray, (5Y 7/2), medium grained, strong HCl 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 | |
| 245 -201.9 | | | | | | **Clay With Silt (CL-ML)** 229.15-229.85' - medium plasticity, poorly competent, clay and silt with limestone fragments to 1/4", strong pungent sulfur or petroleum odor (fetid) | R42: Run time not recorded |
| | 246.0 | | | 246.0-248.4' - Fracture zone, horizontal to 90 deg, rough, stepped to undulating, open, gravel-sized to fine cobble-sized limestone fragments | | 229.85-230.6' - Same as 227.65-229.15' | |
| | | | >10 | | | **No Recovery 230.6-231.0'** | |
| | | | >10 | 247.0' - Mechanical break | | **Limestone** 231.0-235.2' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, very weak to weak (R1 to R2), voids up to 1/16" over 15-20%; <3-5% from 232.8-233.8', where limestone appears to become conglomerate ( harder fragments within matrix), cavities up to 3/4"-1-3/16"x3/8"-3/4", penetrate into core surface, becomes thickly laminated and less fragmented with depth with voids and cavities<br>235.2-235.6' - yellowish gray, (5Y 7/2), mild to moderate HCl reaction, extremely weak (R0), poorly competent, somewhat friable; crumbles to silt and sand-sized material (5-10%) | |
| | R43-NQ 5 ft 48% | 0 | >10 | | | | |
| 250 -206.9 | | | NR | | | | 4/26/07 11:35 total depth at 251.0'<br>R43: Run time not recorded |
| | 251.0 | | | | | **No Recovery 235.6-236.0'**<br>**Limestone** 236.0-239.1' - yellowish gray, (5Y 7/2), fine grained, mild HCl 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<br>239.1-239.5' - yellowish gray, (5Y 7/2), very fine grained, moderate to strong HCl reaction, strong (R4), competent, voids covering 3-10% of surface<br>**No Recovery 239.5-241.0'** | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: GSC-07A | SHEET 14 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 on 4/21/07 START : 4/21/2007 END : 4/26/2007 LOGGER : C. Wallestad, R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | | | **Limestone**<br>241.0-241.9' - yellowish gray, (5Y 7/2), mild HCl reaction, very weak (R1), competent, broken into gravel-sized fragments, voids <1% to over 30-40%, cavities up to 1" and penetrating 10% of rock<br>**No Recovery 241.9-246.0'**<br>**Limestone**<br>246.0-248.4' - yellowish gray, (5Y 7/2), fine grained, weak to moderate HCl reaction, extremely weak to weak (R0 to R2), competent, become friable at depth, voids and cavities over 20-30% of surface >10%, limestone at 248.0' becomes extremely weak, friable, trace fossil casts and molds<br>**No Recovery 248.4-251.0'**<br>Bottom of Boring at 251.0 ft bgs on 4/26/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-08 SHEET 1 OF 10 |

# SOIL BORING 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

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 : 13.8 ft bgs on 04/22/07 START : 4/21/2007 END : 4/23/2007 LOGGER : C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 43.2 | 0.0 – 1.5 | 1.2 | SS-1 | 2-2-2 (4) | **Poorly Graded Sand With Organics (SP)** 0.0-0.9' - medium light gray, (N6), moist, loose, fine silica sand, organic material, trace nonplastic fines, plant roots | | Began drilling at 16:30, 4/21/07 |
| | | | | | **Silty Sand (SM)** 0.9-1.2' - grayish brown, (5Y 3/2), moist, loose, fine silica sand, 25% nonplastic fines, organic material | | |
| 5 | 5.0 | | | | | | |
| 38.2 | 5.0 – 6.5 | 0.9 | SS-2 | 2-3-3 (6) | **Poorly Graded Sand With Silt (SP-SM)** 5.0-5.9' - grayish yellow, (5Y 8/4), wet, loose, fine silica sand, 5-10% nonplastic fines, some plant roots | | |
| 10 | 10.0 | | | | | | |
| 33.2 | 10.0 – 11.5 | 1.0 | SS-3 | 3-4-4 (8) | **Silty Sand (SM)** 10.0-11.0' - yellowish gray, (5Y 7/2), wet, loose, fine grained, fine silica sand, 25% low plastic fines | | |
| 15 | 15.0 | | | | | | |
| 28.2 | 15.0 – 16.5 | 1.0 | SS-4 | 3-2-3 (5) | **Silty Sand (SM)** 15.0-15.95' - Same as 10.0-11.0' | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-08 SHEET 2 OF 10 |

# SOIL BORING 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

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 : 13.8 ft bgs on 04/22/07 START : 4/21/2007 END : 4/23/2007 LOGGER : C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 23.2 | 20.0 – 21.5 | 1.3 | SS-5 | 2-2-3 (5) | **Silty Sand (SM)** 20.0-21.3' - Same as 15.0-15.95' | | |
| 25 | 25.0 – 26.5 | 1.0 | SS-6 | 2-2-3 (5) | **Silty Sand (SM)** 25.0-25.5' - Same as 15.0-15.95' and 20.0-21.3'<br>**Clayey Sand (SC)** 25.5-26.0' - yellowish gray, (5Y 7/2), moist, loose, fine silica sand, 30% medium plastic fines | | |
| 18.2 | | | | | | | |
| 30 | 30.0 – 31.5 | 1.4 | SS-7 | 0-0-1 (1) | **Silty Sand (SM)** 30.0-30.35' - dark yellowish orange, (10YR 6/6), wet, very loose, fine grained, silica sand, 30% nonplastic to low plastic fines, 30.35' abrupt contact in materials, 1/2" thick gray fat clay (CH) seam<br>**Clayey Sand (SC)** 30.35-31.35' - yellowish gray with medium gray mottling, (5Y 7/2 with N5), moist, very loose, fine grained, silica sand, 35% medium to high plastic fines | | Driller's Remark: Weight of hammer drove sampler through top 12 inches of sample Stop work for the day, drilled to 30.0' below ground surface, collected 30.0-35.35', stopped at 17:35<br>Drilling resumes 08:40, 4/22/07<br>Water level 13' 10" below ground surface at 08:30 |
| 13.2 | | | | | | | |
| 35 | 35.0 – 36.5 | 1.5 | SS-8 | 2-5-8 (13) | **Sandy Fat Clay (CH)** 35.0-36.5' - medium gray with yellowish gray mottling, (N5 with 5YR 7/2), moist, medium stiff, high plasticity, 35% fine silica sand increasing with depth, mottling increasing with depth at 35.7' | | Slough at top of 35.0-36.5' has silty sand with iron oxide modules up to 1/4" (most about 1/16") |
| 8.2 | | | | | | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-08 SHEET 3 OF 10 |

# SOIL BORING 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

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 : 13.8 ft bgs on 04/22/07 START : 4/21/2007 END : 4/23/2007 LOGGER : C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 3.2 | 40.0 – 41.5 | 1.2 | SS-9 | 1-2-1 (3) | **Silty Sand (SM)** 40.0-41.2' - light olive gray with medium dark gray mottling, (5Y 5/2 with N4), wet, loose, fine silica sand, 25% nonplastic fines | | |
| 45 | 45.0 | | | | | | |
| -1.8 | 45.0 – 46.5 | 1.5 | SS-10 | 3-4-3 (7) | **Fat Clay With Sand (CH)** 45.0-45.5' - light olive gray with medium dark gray mottling, (5Y 5/2 with N4), moist, medium stiff, high plasticity, no dilatancy, 20% fine silica sand | | May also be organic rich |
| | | | | | **Organic Soil With Sand (OH)** 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) | | |
| 50 | 50.0 | | | | | | |
| -6.8 | 50.0 – 51.5 | 1.5 | SS-11 | 2-2-2 (4) | **Silty Sand (SM)** 50.0-50.3' - yellowish gray, (5Y 7/2), wet, loose, fine silica sand, 25% low plastic fines | | |
| | | | | | **Organic Soil With Sand (OH)** 50.3-51.5' - Same as 45.5-46.4' | | |
| 55 | 55.0 | | | | | | |
| -11.8 | 55.0 – 56.5 | 1.5 | SS-12 | 2-3-2 (5) | **Organic Soil With Sand (OH)** 55.0-56.5' - Same as 45.5-46.4' except 30% sand | | |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-08 SHEET 4 OF 10 |

# SOIL BORING 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

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 : 13.8 ft bgs on 04/22/07 START : 4/21/2007 END : 4/23/2007 LOGGER : C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -16.8 | 60.0<br>60.9 | 0.9 | SS-13 | 25-50/5<br>(75/11") | **Silt (ML)**<br>60.0-60.9' - yellowish gray, (5Y 7/2), moist, hard, low plasticity, rapid dilatancy, moderate HCl reaction, with carbonate, 1/2" sandy organic soil (OH) seam at top of sample | | |
| 65<br>-21.8 | 65.0<br>65.1 | 0.0 | SS-14 | 50/1.5<br>(50/1.5") | **No Recovery 65.0-65.1'** | | Driller's Remark: Not sure if drilling resistance, while increasing, is indicative of rock.<br>Only minor amount of sand (probably slough material) in sampler<br>We will drill to 70.0' and try another split spoon.<br>Driller's Remark: Chatter while drilling, some rock fragments in cuttings |
| 70<br>-26.8 | 70.0<br>71.5 | 1.5 | SS-15 | 31-41-49<br>(90) | **Silt With Sand (ML)**<br>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 gravel-sized limestone fragments, carbonate | | |
| 75<br>-31.8 | 75.0<br>75.2 | 0.2 | SS-16 | 50/2<br>(50/2") | **Silt (ML)**<br>75.0-75.2' - Same as 70.0-71.5' except 20% coarse sand sized<br>Begin Rock Coring at 75.0 ft bgs<br>See the next sheet for the rock core log | | |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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 bgs on 04/22/07 START : 4/21/2007 END : 4/23/2007 LOGGER : C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD 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. Will set casing and begin rock coring<br>T. Williams becomes operator<br>Driller's Remark: Little resistance to drilling until about 77.5' |
| | | | NR | | | | |
| | R1-HQ 5 ft 30% | 7 | >10 | 77.5-78.0, 78.5-79.0, 80.2, 80.7, 80.8' - Mechanical break (5), fragments too irregular to determine fit | | **Limestone**<br>77.5-79.0' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, weak (R2), voids abundant, only 78.0-78.5' (75% of surface) | |
| | | | 2 | | | | |
| | | | NR | | | **No Recovery 79.0-80.0'** | R1: Run time not recorded |
| 80 | 80.0 | | | | | | |
| -36.8 | | | 3 | | | **Limestone**<br>80.0-81.9' - Same as 77.5-79.0 except laminated bedding below 80.4', trace organics along bedding 80.5-81.4', voids (<1/16") >5% of surface, along bedding plane 81.9-84.2' - yellowish gray, (5Y 7/2), fine grained, moderate HCl reaction, weak (R2), voids (1/16") over 75% of surface (1/16" or larger) over 5%, laminated bedding at 87.2-87.5', 88.1-88.3', and 88.9-94.1' | |
| | | | 4 | 81.0, 81.3' - Joint (2), horizontal, smooth, planar, some organic material<br>81.3-81.9' - Fracture, vertical, rough, undulating, black, staining on 75% of surface<br>81.9, 85.5, 85.9, 86.2, 86.9, 87.3, 87.5, 88.6, 90.3-90.9, 91.7, 92.1' - Mechanical break (11) | | | |
| | R2-HQ 5 ft 84% | 15 | 4 | | | | |
| | | | 0 | | | | |
| | | | 0 | | | | R2: 7 minutes |
| | | | NR | | | **No Recovery 84.2-85.0'** | |
| 85 | 85.0 | | | | | | |
| -41.8 | | | 2 | | | **Limestone**<br>85.0-90.0' - Same as 81.9-84.2' except laminated uneven bedding at 85.1-85.3', and 86.2-86.9', trace large (3/8") voids, weakly competent interval 88.6-89.4', trace organics 87.5-88.0' | |
| | | | 2 | | | | |
| | R3-HQ 5 ft 100% | 65 | 0 | | | | |
| | | | 1 | | | | |
| | | | >10 | | | | R3: 6 minutes |
| 90 | 90.0 | | | | | | |
| -46.8 | | | >10 | | | 90.0-92.3' - Same as 81.9-84.2' except from 91.0-91.8' has 75% area as very few voids, abundant voids <1/16" of surface, larger voids (3/16"x 3/4" and smaller) are present 91.4-92.2' (5% of area) | |
| | | | 1 | | | | |
| | R4-HQ 5 ft 66% | 38 | >10 | 92.5-93.0' - Fracture zone | | **Silt (ML)**<br>92.3-92.7' - light olive brown, (5Y 5/2), moderate HCl reaction, carbonate derived, limestone fragments at bottom of zone | |
| | | | 2 | 93.0, 93.15' - Mechanical break (2) | | | |
| | | | NR | | | | R4: 6 minutes |
| 95 | 95.0 | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: GSC-08 | SHEET 6 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 bgs on 04/22/07 START : 4/21/2007 END : 4/23/2007 LOGGER : C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -51.8 | R5-HQ 5 ft 68% | 47 | >10 | 95.0-95.4' - Fracture zone | | **Limestone** 92.7-93.3' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, very weak (R1), voids (1/16") over 30% of surface | |
| | | | 2 | 95.8, 96.1' - Mechanical break (2) | | **No Recovery 93.3-95.0'** | |
| | | | 3 | 96.6-97.6' - Fracture, vertical | | **Limestone** 95.0-95.4' - Same as 92.7-93.3' except trace organics | |
| | | | >10 | 97.6-98.0' - Mechanical break (3) | | 95.4-95.7' - yellowish gray, (5Y 7/2), strong HCl reaction, very weak (R1), voids (1/16") over 85% of surface | Driller's Remark: lost circulation at 98.0' |
| | | | NR | 98.0-98.3' - Fracture zone | | 95.7-96.1' - Same as 92.7-93.3' 96.1-98.4' - Same as 95.4-95.7' except very fine grained, few voids, zone from 96.5-97.4' has interfingering limestone with voids over 75% of surface, trace organics throughout; thin zones (1-1/5") of carbonate-derived lean clay at 98.1-98.3' | R5: 10 minutes |
| 100 | 100.0 | | | | | | |
| -56.8 | R6-HQ 5 ft 94% | 60 | >10 | 100.0-100.8' - Fracture zone, also organics and carbonate derived silt | | **No Recovery 98.4-100.0'** | |
| | | | 1 | 100.9-101.4' - Fracture or mechanical break, 79 deg, rough, undulating 101.4-101.9' - Fracture zone, some fragments have slight dark staining | | **Fat Clay (CH)** 100.0-100.4' - yellowish gray, (5Y 7/2), thin (3/8") layered limestone at 100.3', carbonate derived | |
| | | | 2 | 102.3, 102.8, 103.0, 103.2, 103.5' - Mechanical break (5) | | **Fat Clay (CH)** 100.4-100.6' - black, (N1), strong HCl reaction, carbonate derived | R6:5 minutes |
| | | | 4 | 103.5-103.9' - Fracture, 70 deg, tight | | **Silt (ML)** 100.6-101.0' - light olive gray, (5Y 5/2), strong HCl reaction, carbonate derived | |
| | | | 0 | | | **Limestone** 101.0-104.2' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, very weak to weak (R1 to R2), voids (1/16") over 75% of surface, large voids (up to 3/8" x 3/4") over <5%, very fossiliferous 104.2-104.7' - Same as 101.0-104.2' except light olive gray, (5Y 7/2), moderate HCl reaction | |
| 105 | 105.0 | | NR | | | | |
| -61.8 | R7-HQ 5 ft 0% | 0 | NR | | | **No Recovery 104.7-110.0'** | R7: 2 minutes |
| 110 | 110.0 | | | | | | |
| -66.8 | R8-HQ 5 ft 38% | 37 | 1 | 110.7, 111.2' - Mechanical break (2) | | **Limestone** 110.0-111.9' - yellowish gray with medium gray mottling, (5Y 7/2 with N5), very fine grained, strong HCl reaction, very weak to weak (R1 to R2), voids (1/16" or less) over 85% of surface, moderately fossiliferous (casts and molds) | Driller's Remark: rod drop 3 feet at 110.0' below ground surface |
| | | | 3 | 111.6, 111.8' - Joint (2), horizontal, tight | | **No Recovery 111.9-115.0'** | |
| | | | NR | | | | R8: 1 minute |
| 115 | 115.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-08 SHEET 7 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 bgs on 04/22/07 START : 4/21/2007 END : 4/23/2007 LOGGER : C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -71.8 | R9-HQ 5 ft 20% | 10 | 1 | 115.5' - Mechanical break | | **Sand (SW)** 115.0-115.3' - yellowish gray and olive gray, (5Y 7/2 and 5Y 3/2), fine to coarse grained, strong HCl reaction | |
| | | | NR | | | **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 | | | | | | |
| -76.8 | R10-HQ 5 ft 30% | 0 | N/A | | | **Sandy Silt (ML)** 120.0-121.5" - yellowish gray, (5Y 7/2), soft, strong HCl reaction, weakly competent limestone fragments at bottom of section, carbonate derived | Driller's Remark: 120.0-125.0' rod dropped entire interval |
| | | | N/A | | | **No Recovery 121.5-125.0'** | |
| | | | NR | | | | R10: Runtime not recorded |
| 125 | 125.0 | | | | | | |
| -81.8 | R11-HQ 5 ft 70% | 52 | >10 | 125.0-128.3, 125.8-126.2' - Fractures or mechanical break (2), no visible orientation | | **Limestone** 125.0-126.4' - Same as 110.0-111.9' except poorly competent, trace black, staining throughout core | |
| | | | >10 | 126.4, 126.6, 127.5' - Mechanical break (3) | | 126.4-128.5' - light gray, (N7), strong HCl reaction, very weak (R1), voids (1/16") over 70% of surface, cavities (up to 3/4"x1-9/16") over 5% of surface, very fossiliferous (mold and casts) | |
| | | | 1 | | | | |
| | | | 0 | | | **No Recovery 128.5-130.0'** | |
| | | | NR | | | | R11: 4 minutes |
| 130 | 130.0 | | | | | | |
| -86.8 | R12-HQ 5 ft 92% | 8 | >10 | | | **Sandy Silt (ML)** 130.0-131.3' - grayish orange to light olive gray, (10YR 7/6 to 5Y 5/2), strong HCl reaction, fine sand-sized particles about 25%, carbonate derived, abrupt transition to 131.3-132.2' | |
| | | | >10 | 131.7-132.0' - Fracture zone | | | |
| | | | >10 | 132.4-134.6' - Fracture zone, most are probable mechanical breaks | | **Limestone** 131.3-132.2' - very pale orange to light olive gray, (10YR 8/2 to 5Y 5/2), fine grained, strong HCl reaction, medium strong (R3), laminated bedding (<1/16" thick) below 131.8', transitions gradually to 132.2-134.6' | |
| | | | >10 | | | | |
| | | | >10 | | | | R12: 7 minutes |
| 135 | 135.0 | | NR | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
| 338884.FL | 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 ORIENTATION : Vertical

WATER LEVELS : 13.8 ft bgs on 04/22/07 START : 4/21/2007 END : 4/23/2007 LOGGER : C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -91.8 | R13-HQ 5 ft 82% | 47 | >10 | 135.0-136.0' - Fracture zone, fragments | | **Limestone** 132.3-134.6' - very pale orange to yellowish gray, (10YR 8/2 to 5Y 7/2), fine grained, extremely weak to very weak (R0 to R1), trace intervals of laminated bedding **No Recovery 134.6-135.0'** **Limestone** 135.0-137.9' - Same as 132.3-134.6' except zone of light olive gray (5YR 5/2) 137.9-139.1' - light olive gray, (5YR 5/2), fine grained, strong HCl reaction, weak (R2), voids (1/16") over 60% of surface, oriented along bedding planes (laminated bedding), zone of medium gray (N5) limestone, medium strong (R3) from 137.9-138.1' **No Recovery 139.1-140.0'** **Limestone** 140.0-143.0' - Same as 137.9-139.1' laminated bedding only in top foot of core 143.0-143.3' - Same as 140-143.0' except mottled medium gray (n5), with few voids **No Recovery 143.3-145.0'** | R13: 5 minutes |
| | | | 3 | 136.3, 136.6, 136.95' - Mechanical break (3) | | | |
| | | | 1 | 137.4-137.7' - Fracture zone or mechanical break | | | |
| | | | >10 | 138.2-138.5' - Fractures (5), smooth, planar, fractures along bedding planes, probably mechanical breaks | | | |
| | | | NR | | | | |
| 140 | 140.0 | | | | | | |
| -96.8 | R14-HQ 5 ft 66% | 13 | 2 | 140.4' - Mechanical break 140.6-140.9' - Fracture zone, no visible orientation | | | |
| | | | >10 | 142.2-142.3' - Fracture zone or mechanical break, rough, undulating | | | |
| | | | >10 | | | | |
| | | | NR | | | | R14: 5 minutes |
| 145 | 145.0 | | | | | | |
| -101.8 | R15-HQ 5 ft 86% | 68 | 0 | | | **Limestone** 145.0-147.8' - medium light gray to yellowish gray, (N6 to 5Y 7/2), fine grained, strong to moderate HCl reaction, strong to very strong (R4 to R5), voids over 25% of surface, one cavity (3/4"x3/4") passes through core at 145.5' 147.8-149.3' - yellowish gray, (5Y 7/2), very fine grained, strong to very strong HCl reaction, very strong (R5), laminated to thinly bedded, voids (1/16") occur in some bedding planes but not others, overall in about 20% of surface **No Recovery 149.3-150.0'** **Limestone** 150.0-150.4' - dusky yellow, (5Y 6/4), fine to medium grained, moderately HCl reaction, very weak (R1), voids (1/16") over 90% of surface 150.4-151.0' - very pale orange to yellowish brown, (10YR 8/2 to 10YR 6/2), fine grained, strong HCl reaction, very strong (R5) 151.0-152.2' - Same as 150-150.4' 152.2-153.8' - Same as 150.4-151' except with slight increase in voids (1/16") over 5-10% (mostly in browner rock) | |
| | | | >10 | 146.1-146.5' - Fracture zone 146.6' - Mechanical break | | | |
| | | | 3 | 147' - Fracture, horizontal, rough, undulating, black staining on surface 147.3' - Mechanical break | | | |
| | | | 2 | 147.6' - Fracture, horizontal, smooth, undulating, black staining on surfaces 148.3' - Mechanical break | | | |
| | | | 0 | | | | R15: 9 minutes |
| | | | NR | | | | |
| 150 | 150.0 | | | | | | |
| -106.8 | R16-HQ 5 ft 76% | 45 | 1 | 150.0-150.3' - Fracture zone | | | |
| | | | 4 | 151.1, 151.2' - Fractures (2), horizontal, rough, undulating, probable mechanical breaks but surfaces don't match | | | |
| | | | 3 | 151.3, 151.6' - Mechanical break (2) 152.1' - Fracture, horizontal, smooth, undulating, probable mechanical breaks, but surfaces don't match | | | |
| | | | 1 | 152.2-153.8' - Fracture, horizontal, smooth, undulating, black, probable mechanical breaks, but surfaces don't match | | | |
| | | | NR | | | | R16: Runtime not recorded |
| 155 | 155.0 | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: GSC-08 | SHEET 9 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 bgs on 04/22/07 START : 4/21/2007 END : 4/23/2007 LOGGER : C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -111.8 | R17-HQ 5 ft 78% | 47 | 3 | 155.1' - Fracture or mechanical break<br>155.1-155.7' - Fracture, vertical, rough, undulating, some staining on surface | | **No Recovery 153.8-155.0'**<br>**Limestone**<br>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 derived silt and fine sand on faces | | 156.1-157.3' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, weak (R2), voids (1/16") over 35% of surface | |
| | | | 2 | 156.1' - Fracture, horizontal, smooth, undulating, probable mechanical break, but faces don't match up | | 157.3-158.9' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, very weak (R1), voids (1/16") of over 85% of surface, large (3/8") voids over 5% | |
| | | | 1 | 156.8' - Mechanical break<br>156.8-157.2' - Fracture, 70 deg, rough, planar, some black staining on surface | | **No Recovery 158.9-160.0'** | R17: 9 minutes |
| | | | NR | 157.2' - Mechanical break<br>157.5' - Fracture or mechanical break, rough, undulating | | | |
| 160 | 160.0 | | | | | | |
| -116.8 | R18-HQ 5 ft 16% | 0 | >10 | 160.0-160.8' - Fracture zone | | **Limestone**<br>160.0-160.4' - Same as 157.3-158.9' | |
| | | | NR | | | 160.4-160.7' - yellowish gray, (5Y 7/2), fine grained, strong HCl reaction, very weak (R1), voids (1/16") over 80% of surface<br>**No Recovery 160.8-165.0'** | R18: 2 minutes |
| 165 | 165.0 | | | | | | |
| -121.8 | R19-HQ 5 ft 78% | 47 | 2 | 165.4-165.7' - Fracture or mechanical break, 60 deg, rough, undulating | | **Limestone**<br>165.0-168.7' - light olive gray, (5YR 5/2), fine grained, strong HCl reaction, weak (R2), trace laminated bedding 166.7-167.5', voids (1/16"-3/16") over 5% of surface 165.0-166.0' | |
| | | | 4 | 165.9' - Fracture, 30 deg, rough, undulating<br>166.1-166.5' - Fracture or mechanical break, 70 deg, rough, undulating | | | |
| | | | >10 | 166.6, 166.8' - Mechanical break (2)<br>167.3-167.8' - Fracture zone | | | |
| | | | >10 | 168.2' - Fracture, horizontal, smooth, planar, iron oxide | | | |
| | | | NR | 168.3-168.9' - Fracture zone, probable mechanical break, but faces don't match up | | 168.7-168.9' - moderate olive brown, (5Y 4/4), fine to medium grained, moderate to strong HCl reaction, very weak to weak (R1 to R2), voids (1/16") over 80% of surface.<br>**No Recovery 168.9-170.0** | R19: 8 minutes |
| 170 | 170.0 | | | | | | |
| -126.8 | R20-HQ 5 ft 94% | 52 | 2 | 170.0-175.0' - Fracture, vertical, rough, undulating, black, staining on 10% of surface<br>170.2' - Fracture, horizontal, probable mechanical break but faces don't match up | | **Limestone**<br>170.0-170.3' - Same as 168.7-168.9'<br>170.3-174.7' - light olive gray, (5YR 5/2), fine grained, strong HCl reaction, weak (R2) | |
| | | | >10 | 171.4-171.9' - Mechanical break | | | |
| | | | 4 | 171.9-172.9' - Fracture, vertical, rough, undulating<br>172.2' - Mechanical break | | | |
| | | | 4 | 172.2-172.6' - Fractures or mechanical break (2), rough, undulating<br>172.6' - Mechanical break | | | |
| | | | 1 | 173' - Fracture, horizontal, smooth, planar, slight black staining on surfaces | | | R20: 9 minutes |
| 175 | 175.0 | | NR | | | **No Recovery 174.7-175.0'** | |

| PROJECT NUMBER: 338884.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 bgs on 04/22/07 START : 4/21/2007 END : 4/23/2007 LOGGER : C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -131.8 | R21-HQ 5 ft 100% | 55 | 2<br>2<br>1<br>>10<br>>10 | 173.4-173.9' - Fractures or mechanical break (2), horizontal and 50 deg, rough, undulating<br>173.9, 174.3' - Fractures (2), horizontal, smooth, undulating, some dark staining on surface<br>175.6' - Fracture, horizontal, smooth, planar, dark staining on surfaces<br>176.4' - Fracture, horizontal, smooth, planar, coating of carbonate derived silt<br>177' - Fracture or mechanical break, horizontal, rough, undulating<br>177.0-177.3' - Fracture or mechanical break, 70 deg, rough, undulating<br>178.3' - Fracture, horizontal, smooth, undulating, coating of carbonate derived silt | | **Limestone**<br>175.0-180.0' - Same as 170.3-174.7' except laminated bedding from 175.9-176.5' and 179.3-180.0' | R21: 9 minutes |
| 180 | 180.0 | | | | | | |
| -136.8 | R22-HQ 5 ft 100% | 57 | 2<br>>10<br>2<br>3<br>2 | 178.5-179.5' - Fracture zone<br>179.6, 179.7' - Mechanical break (2)<br>180.3' - Fracture, horizontal, rough, undulating, dark staining<br>180.9' - Mechanical break<br>182.0-182.4' - Fracture or mechanical break, vertical, rough, undulating<br>182.5' - Fracture, horizontal, smooth, undulating, coating of carbonate derived silt, trace of dark staining<br>183.7, 183.9, 184.0' - Fracture or mechanical break (3), 45 deg, rough, undulating<br>184' - Fracture or mechanical break, 45 deg, rough, undulating | | 180.0-181.8' - dusky yellow, (5Y 6/4), moderate HCl reaction, weak (R2), voids over 75% of surface. Below 180.6', limestone appears to interfinger (possible infilling) and then laminated bedding as in 175.0-180.0'<br>181.8-185.0' - Same as 175-180.0' except zone from 182.5-183.5' with voids (3/8"x3/4") <5% of surface | Plugging borehole on 4/24/07<br>R22: 6 minutes |
| 185 | 185.0 | | | | | | |
| -141.8 | | | | 184.4' - Fracture, horizontal, smooth, undulating, dark staining on 70% of surface<br>184.4-184.7' - Fracture or mechanical break, vertical, rough, undulating | | Bottom of Boring at 185.0 ft bgs on 4/23/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-08A SHEET 1 OF 8 |

# SOIL BORING 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

DRILLING METHOD AND EQUIPMENT : CME 75 S/N 252437, mud rotary, auto hammer, NW rods, 4-7/8" tri-cone bit ORIENTATION : Vertical

WATER LEVELS : 4.9 ft bgs on 6/17/07 START : 6/14/2007 END : 6/16/2007 LOGGER : J. Schaeffer, D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 43.1 | | | | | | | Blind drill to 25.0' to begin split spoon sampling<br><br>Boring GSC-08A is 5.0' offset from GSC-08 toward E-6 (southeast) |
| 5<br>38.1 | | | | | | | Cuttings from 5.0-10.0' appear to be fine sands |
| 10<br>33.1 | | | | | | | Cuttings from 10.0-15.0' appear to be sand and clayey sands |
| 15<br>28.1 | | | | | | | Drilling mud is Quick Gel bentonite |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-08A SHEET 2 OF 8 |

# SOIL BORING 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

DRILLING METHOD AND EQUIPMENT : CME 75 S/N 252437, mud rotary, auto hammer, NW rods, 4-7/8" tri-cone bit ORIENTATION : Vertical

WATER LEVELS : 4.9 ft bgs on 6/17/07 START : 6/14/2007 END : 6/16/2007 LOGGER : J. Schaeffer, D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 23.1 | | | | | | | |
| 25 | 25.0 | | | | | | |
| 18.1 | 26.5 | 1.1 | SS-1 | 2-2-2 (4) | **Silty Sand (SM)** 25.0-26.1' - light brownish gray, (5YR 6/1), wet, very loose, nonplastic, no HCl reaction, very fine to fine grained sand, 25% fines, silica sand | | |
| 30 | 30.0 | | | | | | |
| 13.1 | 31.5 | 1.1 | SS-2 | 5-5-6 (11) | **Silty Sand (SM)** 30.0-31.1' - Same as 25.0-26.1' except medium dense | | |
| 35 | 35.0 | | | | | | |
| 8.1 | 36.5 | 1.5 | SS-3 | 2-3-5 (8) | **Fat Clay With Sand (CH)** 35.0-36.5' - brownish gray and olive gray, (5YR 4/1 and 5Y 4/1), mottled, moist, no HCl reaction, medium stiff, high plasticity, 20% very fine to fine silica sand | | |
| 40 | | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: GSC-08A | SHEET 3 OF 8 |
|---|---|---|

# SOIL BORING 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

DRILLING METHOD AND EQUIPMENT : CME 75 S/N 252437, mud rotary, auto hammer, NW rods, 4-7/8" tri-cone bit ORIENTATION : Vertical

WATER LEVELS : 4.9 ft bgs on 6/17/07 START : 6/14/2007 END : 6/16/2007 LOGGER : J. Schaeffer, D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 3.1 | 40.0 – 41.5 | 1.5 | SS-4 | 3-5-2 (7) | **Fat Clay With Sand (CH)** 40.0-40.8' - pale yellowish brown, (10YR 6/2), mottled, moist, no HCl reaction, medium stiff, 15-25% fine sand, 10-15% coarse rounded sand, medium plasticity, no dilatancy | | Finish drilling for the day 6/14/07, at 18:00<br>Resume drilling 07:45 on 6/15/07; advance HW casing from 15' to 40' |
| | | | | | **Fat Clay With Sand (CH)** 40.8-41.0' - Same as 35.0-36.5' | | |
| | | | | | **Fat Clay (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), mottled, wet, loose, very fine to fine grained, no HCl reaction, 25% nonplastic fines | | |
| 45 -1.9 | 45.0 – 46.5 | 1.5 | SS-5 | 0-2-4 (6) | **Clayey Sand (SC)** 45.0-45.5' - pale yellowish brown, (10YR 6/2), wet, very loose, no HCl reaction, mottled and streaked with medium dark gray (N4), very fine to fine grained sand, 35-40% high plastic fines | | |
| | | | | | **Silty Sand (SM)** 45.5-46.1' - pale yellowish brown, (10YR 6/3), wet, very loose, very fine to fine sand, 20-25% low plastic 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 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 black (N2), moist, medium stiff, very high plasticity, no dilatancy, appears to be pyrite grains to sand-sized | | |
| 50 -6.9 | 50.0 – 51.5 | 1.4 | SS-6 | 6-5-7 (12) | **Clayey Sand (SC)** 50.0-51.4' - similar to 40.5-45.5' and 46.1-46.6', moderate yellowish brown with gray streaking, (10YR 5/4), wet, medium dense, very fine to fine grained, no HCl reaction, very fine to fine grained sand, 30-35% high plastic fines, 1/4" thick organic soil/peat (OH/PT) lens at 50.0', same as 46.1-46.5' | | |
| 55 -11.9 | 55.0 – 56.5 | 1.5 | SS-7 | 0-1-1 (2) | **Silty Sand With Organic Soil/ Peat Lenses (SM)** 55.0-56.5' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), mottled, wet, very loose, no HCl reaction, very fine to fine 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' | | Driller's Remark: 25% circulation loss starting at 55.0' |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-08A SHEET 4 OF 8 |

# SOIL BORING 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

DRILLING METHOD AND EQUIPMENT : CME 75 S/N 252437, mud rotary, auto hammer, NW rods, 4-7/8" tri-cone bit ORIENTATION : Vertical

WATER LEVELS : 4.9 ft bgs on 6/17/07 START : 6/14/2007 END : 6/16/2007 LOGGER : J. Schaeffer, D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -16.9 | 60.0 – 61.5 | 1.5 | SS-8 | 4-4-5 (9) | **Silty To Clayey Sand (SM-SC)** 60.0-61.5' - Same as 55.0-56.5' except no HCl reaction, interbedded peat/organic soil (PT/OH), interbedded in lenses 1/16"-2" thick, mostly irregular, slickenside appearance in organic soil/peat, sample is 60% organic soil/peat and 40% silty to clayey sand | | |
| | | | | | | | Driller's Remark: Harder at 64.0' |
| 65 | 65.0 | | | | | | Driller's Remark: Circulation loss continues at 25% |
| -21.9 | 66.5 | 1.3 | SS-9 | 7-4-9 (13) | **Silt (ML)** 65.0-65.2' - yellowish gray, (5Y 8/1), moist, medium stiff, nonplastic, rapid dilatancy, moderate HCl reaction, carbonate material, organic soil/peat lenses at top and bottom, 1/4" thick, laminated, same as above | | Driller's Remark: Material from 64.0-70.0' drills hard and soft in layers<br>Will switch to rock coring after 70.0' sample |
| | | | | | **Poorly Graded Sand With Silt To Silty Sand (SP-SM)** 65.2-66.25' - pale yellowish brown, (10YR 6/2), wet, medium dense, no HCl reaction, fine sand, 10-15% nonplastic fines | | |
| | | | | | **Silt (ML)** 66.25-66.3' - Same as 65.0-65.2' | | |
| 70 | 70.0 | | | | | | |
| -26.9 | 70.8 | 0.8 | SS-10 | 39-50/4 (89/10") | **Silty Sand (SM)** 70.0-70.8' - pale yellowish brown, (10YR 6/2), wet, very dense, mild to moderate HCl reaction, fine to coarse sand, 35% nonplastic fines, trace fine gravel-sized limestone, carbonate materials | | |
| | | | | | Begin Rock Coring at 72.0 ft bgs<br>See the next sheet for the rock core log | | |
| 75 | | | | | | | |
| -31.9 | | | | | | | |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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)

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 on 6/17/07 START : 6/14/2007 END : 6/16/2007 LOGGER : J. Schaeffer, D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | RQD (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| | 72.0 | | N/A | | | **Poorly Graded Sand With Silt (SP-SM)**<br>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 | |
| | | | 4 | 73.2, 73.5, 74.0' - Fractures (3), rough, undulating, horizontal<br>73.3' - Fractures (2), 50 deg, rough, undulating, between two horizontal fractures | | | |
| | R1-HQ 5 ft 100% | 15 | 1 | 74.4' - Fracture, 75 deg, rough, undulating | | **Organic Soil (OL)**<br>72.7-72.8' - olive black, (5Y 2/1), medium stiff, medium plasticity, mild HCl reaction | Box break at 74.5', just below or at near-vertical fracture |
| 75<br>-31.9 | | | >10 | 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 | | **Limestone**<br>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)<br>77.0-81.2' - light olive gray, (5Y 5/2), fine grained, mild to moderate HCl reaction, weak (R2), with trace 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), gray cavity infill at 80.4' with strong HCl reaction | R1:6 minutes |
| | | | 3 | 76.9-77.0' - Fractures or mechanical break | | | |
| | 77.0 | | | | | | |
| | | | 1 | 77.15' - Fracture, smooth, planar, horizontal | | | |
| | | | 1 | 78.4' - Fracture, 20 deg, rough, undulating, at zone of increased voids and cavities from 78.3-78.5' | | | Driller's Remark: Drilling soft intermittently at about 78' |
| | R2-HQ 5 ft 84% | 83 | 0 | | | | |
| 80<br>-36.9 | | | 1 | 80.6' - Fracture, 20 deg, rough, some crumble, open, gray infill at cavity included in fracture | | | R2:5 minutes |
| | | | NR | | | | |
| | 82.0 | | | | | | |
| | | | 2 | 82.1, 82.8, 83.3, 83.9, 84.3, 86.1, 86.6' - Fractures (7), open to tight, mostly horizontal fractures, substantial voids, gray infill at fracture, possible drilling mud, possibly healed | | **No Recovery 81.2-82.0'**<br>**Limestone**<br>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 | |
| | | | 2 | | | | |
| | R3-HQ 5 ft 96% | 67 | 1 | 83.9-84.5' - softer, bounded by fractures, infill of clay to silt | | | |
| 85<br>-41.9 | | | 1 | 85.3' - Fracture, 45 deg, rough, undulating, healed or mechanical break | | | |
| | | | 1 | | | | R3:4 minutes |
| | 87.0 | | NR | | | | |
| | | | 3 | 87.1' - Fracture, open, horizontal fracture to small fragments with two 1" fragments | | **No Recovery 86.8-87.0'**<br>**Limestone**<br>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<br>87.3-88.25' - pale yellowish brown, (10YR 6/2), fine grained, mild to moderate HCl reaction, weak (R2), <3% voids, several fossil cavities up to 1/2", less friable than above | |
| | | | 1 | 87.5' - Fracture, 45 deg, roughly stepped, also a discontinuity, overlying and underlying rock are different, though fracture mostly in underlying rock | | | |
| | R4-HQ 5 ft 80% | 58 | 2 | 87.8' - Fracture, open, horizontal, roughly stepped, several small 1/2" fragments | | | |
| 90<br>-46.9 | | | 1 | 88.6' - similar to fracture at 87.8', but in different material with additional voids and cavities | | | |
| | | | NR | 89.9, 90.0' - Mechanical break (2), 0-20 deg<br>90.9' - Fracture, 50 deg, rough, undulating, at end of core | | | R4:5 minutes |
| | 92.0 | | | | | | |

| PROJECT NUMBER: | BORING 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 ORIENTATION : Vertical

WATER LEVELS : 4.9 ft bgs on 6/17/07 START : 6/14/2007 END : 6/16/2007 LOGGER : J. Schaeffer, D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R5-HQ 5 ft 54% | 13 | <10 | 92.0-92.4' - Fracture zone, angular 1/4"-1" of over and underlying material | | **Limestone** 88.25-91.0' - Same as 87.0-87.3' except with 20% voids and increased elongate fossils, transition from overlying paler-colored material, material has several filled voids, thin (up to 1/4" thick) layers of silt-sized material at 89.5' with moderate HCl reaction, organics at 90.8' | Driller's Remark: May have lost circulation at 91' |
| | | | | 92.5' - Fracture, rough, undulating, horizontal, end of rock fragments | | | |
| | | | 3 | 92.6' - Fracture, 70 deg, rough, undulating, joins with horizontal fracture at 92.5' | | | |
| | | | 2 | 93.0' - rough, planar, discontinuity, horizontal, open, faces do not match | | | |
| 95 -51.9 | | | | 93.15' - Fracture, 45 deg, planar, healed, <1/16" relief | | **No Recovery 91.0-92.0'** | |
| | | | NR | 93.9, 94.0' - Fracture (2), rough, undulating, horizontal, more open at 93.9', healed at 94.0' | | **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 blocks co-mingled | R5:5 minutes |
| | | | | 94.4, 94.5' - Fracture (2), 0-30 deg, rough, stepped, open, fragments | | | Driller's Remark: No circulation while drilling 92-97' |
| 97.0 | | | | | | | |
| | R6-HQ 5 ft 100% | 73 | 1 | 97.6' - discontinuity between overlying unconsolidated material and underlying rock, some rock fragments above | | 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 at 70 degree angle | |
| | | | 1 | 98.3' - Fracture, 40 deg, rough, undulating, healed | | 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, very weak rock (R1) in the last 2" of interval, fractures at 94.5' and 94.6' in very weak rock | |
| | | | 1 | | | | |
| 100 -56.9 | | | 2 | 99.8, 100.2' - Fractures (2), 10 deg, rough, undulating, transition from overlying limestone with voids to yellow limestone at 99.8', then to weaker limestone, both have silt-sized infill | | 94.6-94.7' - unconsolidated pale yellowish brown and black organics | R6:5 minutes |
| | | | 2 | 100.7' - Fracture, 70 deg, rough, undulating | | **No Recovery 94.7-97.0'** | |
| 102.0 | | | | 101.3' - Mechanical break, or fracture, healed | | **Limestone** 97.0-97.6' - dark yellowish gray grading to pale greenish yellow with depth, (10YR 4/2 to 10YR 8/2), fine grained, strong HCl reaction, angular blocks of color | Core loss interpreted to be at beginning of core run based on drill time |
| | R7-HQ 5 ft 88% | 60 | NR | 101.7' - Fracture, 40 deg, rough, undulating, fragments | | | |
| | | | <10 | 102.6-103.4' - fragments, unconsolidated | | | |
| | | | <10 | 103.4-103.8' - Fracture zone | | 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 | |
| 105 -61.9 | | | 0 | 104.3, 107.35' - Fractures (2), horizontal, infill, upper fracture is open, lower is tight and similar in color, calcareous infill, silt-sized | | | |
| | | | 0 | 104.5' - horizontal discontinuity 105.2' - 10 deg, healed or mechanical break | | 99.8-100.7' - pale greenish yellow, (10Y 8/2), strong HCl reaction, medium strong to very weak (R3 to R1), <5% voids on core surface, friable | |
| | | | 0 | | | | R7:4 minutes |
| 107.0 | | | | | | 100.7-102.0' - Same as 97.6-99.8' except with fragments at the last 0.2' of interval | |
| | R8-HQ 5 ft 100% | 90 | 2 | | | **No Recovery 102.0-102.6'** | |
| | | | 1 | 108.1' - Fracture, tight, horizontal or mechanical break | | **Silt (ML)** 102.6-103.6' - light olive gray, (5Y 5/2), very soft, fine grained, moderate HCl reaction, carbonate derived | |
| | | | 0 | | | | |
| 110 -66.9 | | | 2 | 110.1' - Fracture, 10 deg, mechanical, healed | | 103.6-104.0' - Same as 102.6-103.6' except with a 1" thick fragment of limestone (yellowish gray (5Y 7/2), very weak [R1], 10% coverage of 1/16" voids) | |
| | | | 1 | 110.9, 111.0' - Fractures (2), horizontal, very similar to fractures and zone at 107.3', calcareous infill, open | | | R8:4 minutes |
| 112.0 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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 on 6/17/07 START : 6/14/2007 END : 6/16/2007 LOGGER : J. Schaeffer, D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | 1 | 112.15' - Fracture, 10 deg, open, unconsolidated sediments beneath | | **Limestone**<br>104.0-107.0' - pale greenish yellow, (10Y 8/2), fine grained, strong HCl reaction, weak (R2), 20% voids, fossils 1/4"-1" size<br>**Limestone**<br>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<br>**Limestone**<br>112.0-112.15' - Same as 107.0-112.0' | |
| 115<br>-71.9 | R9-HQ<br>5 ft<br>6%<br>117.0 | 0 | NR | | | **Silt (ML)**<br>112.15-112.3' - pale greenish yellow, (10Y 8/2), fine grained, strong HCl reaction, carbonate derived<br>**No Recovery 112.3-123.5'** | Driller's Remark: 3.5' of void at 113.5-117'<br>R9:1 minute |
| 120<br>-76.9 | R10-HQ<br>5 ft<br>0%<br>122.0 | 0 | NR | | | | Driller's Remark: Rods lowered without drilling to 120' (about 3 feet)<br>R10:1 minute<br>Driller's Remark: Felt like drilling sediment at 120-122'; drilling fluid was coffee color |
| 125<br>-81.9 | R11-HQ<br>5 ft<br>58%<br>127.0 | 0 | NR<br>N/A<br>N/A<br>N/A | 123.5' - interpret no recovery before due to R10, drill rates, and competent material at 126.0' | | **Elastic Silt (MH)**<br>123.5-126.0' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), wet, soft to medium stiff, low plasticity, no to slow dilatancy, strong HCl reaction, trace organics (1/16" fragments and one 1" chunk) | Driller's Remark: Rods pushed 122.0-123.0', definitely sediments, not a void; then troubles getting core barrel to set |
| 130<br>-86.9 | R12-HQ<br>5 ft<br>96%<br>132.0 | 45 | 4<br>NR<br>5<br>>10<br>0<br>1<br>3 | 126.0, 126.15, 126.2' - Fractures (3), smooth, planar, horizontal, numerous other planes every 1/16"<br>126.3' - Fractures, above horizontal fractures and with partial vertical fractures<br>126.4' - no recovery<br>127.1' - Fracture, overlying large fragment to horizontal fracture, with debris<br>127.1-128.6' - Fracture, vertical, open to tight, gray discolorations along fracture faces, other vertical and horizontal fractures starting from main fracture, but most are short and tight<br>128.6-128.9' - fragment, terminated below by a 60 deg rough and undulating fracture at 129.0'<br>130.1' - Fracture, rough, undulating, horizontal, open | | **Limestone**<br>126.0-126.4' - light olive gray, (5Y 5/2), fine to very fine grained, strong (R4), horizontal laminations and fractures, no voids<br>**No Recovery 126.4-127.0'**<br>**Limestone**<br>127.0-131.8' - yellowish gray to grayish orange, (5Y 7/2 to 10YR 7/4), fine grained, strong HCl reaction, weak (R2), 3% coverage of voids (1/16"), several fossils (casts/molds [elongate (1/4"-1/2")]), shallow (1/4") cavities though very intact looking, at 131.4-131.8' increased voids and cavities, infilled elongate cavities with hard gray limestone | R11:3 minutes<br>Last foot had slow and fast sections (likely 6" of void)<br>R12:4 minutes |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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 on 6/17/07 START : 6/14/2007 END : 6/16/2007 LOGGER : J. Schaeffer, D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 135<br>-91.9 | R13-HQ<br>5 ft<br>76%<br>137.0 | 22 | NR<br>3<br>>10<br>5<br>4<br>NR | 131.5' - Fracture, 70 deg, with several 1-2" fragments mostly elongate, all roughly stepped to undulating, possible multiple vertical fractures<br>132.3-132.4' - Fractures, horizontal, smooth, planar, Fragments bounded by smooth, planar fractures, flat 1/4" triangles<br>133.4-133.95' - Fracture, 40 deg, rough, stepped, leading into fragments with angular block with vertical and horizontal fractures, transition between limestone within fragments<br>133.95, 134.05, 134.4, 134.6, 134.9' - Fractures (5), horizontal to 10 deg fractures along visible horizontal laminations/planes, roughly to smoothly planar<br>135.1' - Fracture, 70 deg, rough, undulating<br>135.25, 135.2, 135.5' - Fractures (3), 20 deg, rough, undulating, tight, open<br>135.65' - Fracture, sealed fracture plane with light gray silt-sized infill 1/4" thick | | **No Recovery 131.8-132.0'**<br>**Limestone**<br>132.0-132.1' - Same as 127.0-131.8' except pale greenish yellow, (10Y 8/2)<br>132.1-132.55' - Same as 126.0-126.4 except moderate to strong HCl reaction, strong (R4), horizontal bedding planes with breaks and fragments broken along horizontal planes<br>132.55-133.75' - Same as 132.0-132.1' except strong HCl reaction, weak to very weak (R2 to R1), weakening and becoming friable with depth<br>133.75-135.8' - Same as 132.1-132.55' except weak to medium strong (R2 to R3), banding/layering with grayer and greener bands<br>**No Recovery 135.8-137.0'**<br>Bottom of Boring at 137.0 ft bgs on 6/16/2007 | R13:5 minutes<br>Total depth of boring 137.0'<br>Hole open to 97.0' after removing casing<br>Water level at 4.9' below ground surface at 08:50 on 6/17/07 |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-09 SHEET 1 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 LEVELS : 2.0 ft bgs on 04/05/07 START : 4/5/2007 END : 4/7/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 41.3 | 0.0 | 1.2 | SS-1 | 1-2-3 (5) | **Topsoil** 0.0-0.2' - grayish black, (N2), moist, soft, organics, 15-20% fine silica sand | | |
| | 1.5 | | | | **Poorly Graded Sand With Organics (SP)** 0.2-1.2' - medium gray to medium dark gray, (N5 to N4), moist, loose, fine silica sand, trace nonplastic fines, 10-15% fine organics, increasing to 20% at 0.9' | | Water level at 2.0' |
| 5 | 5.0 | | | | | | |
| 36.3 | 6.5 | 1.1 | SS-2 | 1-2-2 (4) | **Silty Sand (SM)** 5.0-6.1' - light olive brown to moderate olive brown, (5Y 5/6 to 5Y 4/1), wet, very loose, very fine silica sand, 15-20% nonplastic fines, trace organics | | Driller's Remark: Light chattering at 8.0' |
| 10 | 10.0 | | | | | | |
| 31.3 | 11.3 | 0.8 | SS-3 | 10-22-50/3 (72/9") | **Silt (ML)** 10.0-10.75' - grayish yellow to moderate yellow, (5Y 8/4 to 5Y 7/6), wet, hard, nonplastic, rapid dilatancy, moderate HCl reaction, carbonate material, 3/8" thick lens of clayey sand (SC) at top of sample, bluish gray, fine silica sand, medium plastic fines | | Driller's Remark: Very slow rate of penetration (27 minutes) |
| 15 | 15.0 | | | | | | |
| 26.3 | 15.8 | 0.8 | SS-4 | 42-50/3 (92/9") | **Silt (ML)** 15.0-15.8' - Same as 10.0-10.75' except grayish yellow, (5Y 8/4), mild HCl reaction | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-09 SHEET 2 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 LEVELS : 2.0 ft bgs on 04/05/07 START : 4/5/2007 END : 4/7/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 21.3 | 20.0–21.0 | 1.0 | SS-5 | 32-50 (82") | **Silt (ML)** 20.0-21.0' - Same as 15.0-15.8' except 5-10% very fine to fine sand | | |
| 25 | 25.0 | | | | | | |
| 16.3 | 26.3 | 1.2 | SS-6 | 45-47-50/4 (97/10") | **Silt (ML)** 25.0-26.2' - Same as 20.0-21.0' except very fine to medium sand-sized material increasing to 15% with depth | | Driller's Remark: Hard drilling at 29.0' |
| 30 | 30.0 | | | | | | |
| 11.3 | 30.3 | 0.2 | SS-7 | 50/4 (50/4") | **Silt And Limestone Fragments (ML)** 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 material on some surfaces | | |
| 35 | 35.0 | | | | | | |
| 6.3 | 36.5 | 1.4 | SS-8 | 42-27-40 (67) | **Sandy Silt (ML)** 35.0-36.4' - light olive gray, (5Y 5/2), wet, hard, nonplastic, rapid dilatancy, mild HCl reaction, 30-35% fine to coarse sand-sized limestone fragments, trace fine gravel-sized limestone fragments, carbonate material | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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 LEVELS : 2.0 ft bgs on 04/05/07 START : 4/5/2007 END : 4/7/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 1.3 | 40.0 – 41.5 | 1.5 | SS-9 | 1-2-4 (6) | **Silty Sand (SM)** 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 sand-sized limestone fragments, 30% low plastic fines, 5% fine gravel-sized limestone fragments, carbonate materials | | Driller's Remark: Lost circulation at 40.0' |
| 45 -3.7 | 44.7 | 0.3 | SS-10 | 50/4 (50/4") | **Limestone Fragments And Silt** 45.0-45.3' - yellowish gray, (5Y 7/2), mild HCl reaction, carbonate material, 80% fine to coarse gravel-sized limestone fragments; 20% Silt (ML): wet, nonplastic, rapid dilatancy<br>Begin Rock Coring at 45.0 ft bgs<br>See the next sheet for the rock core log | | Split spoon sample SS-10 actually advanced 45.0-45.35' |
| 50 -8.7 | | | | | | | |
| 55 -13.7 | | | | | | | |
| 60 | | | | | | | |

| 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

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 END : 4/7/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -3.7 | 45.0 | | | | | **No Recovery 45.0-49.0'** | Began rock coring at 45.0' |
| | R1-HQ 5 ft 20% | 0 | NR | | | | |
| | | | >10 | 49.0-50.0' - Fracture zone, various orientations<br>49.5' - 0-60 deg, smooth, planar, open | | **Limestone**<br>49.0-49.5' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, extremely weak (R0), friable, voids over 50-60% of surface<br>49.5-50.0' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 8/2), very fine grained, mild to moderate HCl reaction, very weak (R1), presence of micro fractures inclined 60-70 deg, voids over less than 1% of surface, 3/4"-1-3/16" size cavities over less than 9% of the surface<br>50.0-51.75' - yellowish gray, (5Y 7/2), very fine grained, moderate HCl reaction, very weak to weak (R1 to R2), voids over 1-3% of surface, 3/4"-3/16" cavities over up to 10% of the surface, trace fossil cast and molds, trace cavity infilling<br>**No Recovery 51.75-54.6'**<br>**Limestone**<br>54.6-55.0' - Same as 50.0-51.75' except yellowish gray, (5Y 7/2), voids over less than 3% of the surface, few cavities<br>**Limestone**<br>55.0-56.3' - dusky yellow to light olive gray, (5Y 6/4 to 5Y 6/1), fine grained, mild HCl reaction, very weak (R1), voids over 15-30% of surface, cavities are 3/4"-1-3/16" long and 1/8"-3/16" wide, fossiliferous (molds/casts)<br>**No Recovery 56.3-60.0'**<br>**Limestone**<br>60.0-60.4' - light olive brown, (5Y 5/6), fine grained, mild HCl reaction, extremely weak (R0), voids over 25% of the surface, fossiliferous (possible shark tooth), molds and casts<br>**No Recovery 60.4-64.0'** | R1:4 minutes |
| 50 | 50.0 | | | | | | |
| -8.7 | | | 0 | 50.0' - Fracture, 60 deg, rough, undulating | | | Driller's Remark: Last 1.0' is harder than above; no circulation |
| | | | 2 | 51.05' - Fracture, 60 deg, rough, stepped, tight | | | |
| | R2-HQ 5 ft 43% | 35 | NR | 51.75' - Fracture, horizontal, rough, undulating, open | | | Driller's Remark: Very soft from 52.0-55.0' |
| | | | 2 | | | | R2:7 minutes |
| 55 | 55.0 | | | 54.6' - Fracture, <5 deg, rough, undulating, open | | | |
| -13.7 | | | >1 | 54.8' - Fracture, 80 deg, rough, stepped | | | |
| | R3-HQ 5 ft 26% | 14 | NR | 56.8' - Fracture, 60 deg, rough, stepped to undulating, open | | | R3:7 minutes |
| 60 | 60.0 | | | | | | |
| -18.7 | | | >10 | | | | |
| | R4-HQ 5 ft 30% | 20 | NR | | | | Driller's Remark: Very soft from 61.0-64.0' |
| | | | 1 | 64.0' - Fracture, 0-50 deg, rough, stepped | | | R4:7 minutes |
| 65 | 65.0 | | | | | | |

| 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)

ELEVATION : 41.3 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 : 2.0 ft bgs on 04/05/07 START : 4/5/2007 END : 4/7/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -23.7 | | | N/A | | | **Limestone**<br>64.0-65.0' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine 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, fossiliferous (molds/casts) | |
| | | | N/A | | | | |
| | R5-HQ<br>5 ft<br>100% | 16 | N/A | | | | Driller's Remark: Hard spot at 67.0' |
| | | | N/A | | | **Carbonate Sand (SP)**<br>65.0-69.2' - moderately yellowish brown to pale yellowish brown, (10YR 5/4 to 10YR 6/2), wet, loose, fine to very fine grained, moderate HCl reaction | |
| | | | >1 | 69.2' - Fracture, 40 deg, smooth, stepped to undulating, black coating over 5% of the joint surface | | | R5:4 minutes |
| 70<br>-28.7 | 70.0 | | | | | **Limestone**<br>69.2-70.0' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/4), fine grained, mild HCl reaction, very weak (R1), voids up to 1/16" over 15-20% of the surface, 1/16-1/8" size voids becoming more abundant with depth, slightly fossiliferous (molds and casts)<br>70.0-71.55' - Same as 69.2-70.0' except mottled<br>**No Recovery 71.55-74.75'** | |
| | | | 0 | | | | |
| | | | >3 | 71.1' - Fracture, 0-60 deg, rough, stepped, open | | | |
| | R6-HQ<br>5 ft<br>36% | 22 | NR | 71.35' - Fracture, horizontal, rough, stepped, open<br>71.4' - Fracture, horizontal, smooth, stepped, open | | | Driller's Remark: No return of circulation continues ever since 45.0'<br>R6:9 minutes |
| 75<br>-33.7 | 75.0 | | >1 | 74.75' - Fracture, 50 deg, rough, undulating, open | | **Limestone**<br>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" | |
| | | | NR | | | | |
| | R7-HQ<br>5 ft<br>44% | 36 | | | | **No Recovery 75.0-77.8'** | Driller's Remark: Recovery from bottom (77.8-80.0') |
| | | | 1 | | | **Limestone**<br>77.8-79.0' - yellowish gray, (5Y 7/2), mottled, very fine grained, mild HCl 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 1" cavities with secondary infill of limestone with voids (1/16") over 40% of surface | |
| | | | 2 | 78.8' - Fracture, 30 deg, smooth, undulating, black stain over 5% of surface<br>79.0' - Fracture, <5 deg, smooth, undulating, tight | | | R7:8 minutes |
| 80<br>-38.7 | 80.0 | | | | | | |
| | | | 3 | 79.35' - Fracture, <5-30 deg, rough, stepped to undulating, open | | | |
| | | | 1 | 80.4' - Fracture, <5 deg and 50 deg, rough, undulating, open<br>80.8' - Fracture, <5 deg, smooth, undulating, open | | 79.0-80.0' - yellowish gray, (5Y 7/2), very fine grained, moderate HCl reaction, weak (R2), voids up to 1/16" over 3% of surface, interspaced with cavities with 2% infill of very weak lamination with voids over 50-60%, trace fossil (mold/cast) | |
| | R8-HQ<br>5 ft<br>68% | 38 | 4 | 81.0' - Fracture, 0-70 deg, rough, stepped, open<br>81.1' - Fracture, 40 deg, rough, undulating, open | | | |
| | | | NR | 82.05' - Fracture, <5-50 deg, rough, stepped to undulating, open<br>82.3' - Fracture, 40 deg, rough, stepped, open | | | R8:Runtime not recorded |
| 85 | 85.0 | | | | | | |

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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

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 END : 4/7/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -43.7 | R9-HQ 5 ft 0% | 0 | NR | 82.5' - Fracture, 40 deg, rough, stepped, open<br>82.6' - Fracture, <5-70 deg, rough, stepped, open | | **Limestone**<br>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)<br>**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<br>Lost circulation at 87.0'<br>R9:5 minutes |
| 90 | 90.0 | | | | | | Driller's Remark: Pulled core barrel but no recovery, tagged the bottom of borehole at 90.0', suspect 85.0-90.0' is sand<br>90.0-90.5' firm drilling<br>90.5-93.0' very soft<br>93.0-94.0' some what harder<br>94.0-95.0 very soft |
| -48.7 | R10-HQ 5 ft 20% | 0 | 0<br>NR<br>0<br>NR | 90' - limestone fragments of 6" core | | **Limestone Fragments**<br>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)<br>**No Recovery 90.5-93.0'**<br>**Limestone**<br>93.0-93.5' - yellowish gray, (5Y 7/2), very fine grained, mild HCl reaction, weak (R2), voids over up to 5-10% of surface, carbonate black coating on 5% of the surface, cavities<br>**No Recovery 93.5-95.0'** | R10: No run time recorded |
| 95 | 95.0 | | | | | | |
| -53.7 | R11-HQ 5 ft 52% | 36 | 0<br>NR<br>1<br>1 | 98.5' - Fracture, 60 deg, rough, stepped, tight, inclined<br>99.0' - Fracture, horizontal, rough, undulating, tight | | **Limestone**<br>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<br>**No Recovery 95.8-98.2'**<br>**Limestone**<br>98.2-100.0' - yellowish gray, (5Y 7/2), fine to very fine grained, mild HCl reaction, weak (R2), up to 1/16" voids over 15-20% of surface, few cavities up to 9/16"x3/4"on the surface, mottled, interspaced with very fine grained limestone with fewer voids, fossiliferous (molds and casts) | Driller's Remark: HW casing continue to drop, advancing HW to 95.0'<br>SPT from 95.0-96.5 to determine the lithology, recorded 0.8' limestone gravel; will switch back to HW coring (17, 50/3', 67/9")<br>R11:8 minutes |
| 100 | 100.0 | | | | | | |
| -58.7 | R12-HQ 5 ft 58% | 20 | >10<br>4<br>>10<br>NR | 100.0-100.3' - Fracture zone, <5 deg and 60 deg, rough, undulating, open<br>100.75-101.0' - Fracture zone, <5 deg, rough, undulating, open<br>101.3-101.55' - Fracture zone, <5-60 deg, rough, stepped, open<br>101.9' - Fracture, horizontal, smooth, planar, clay infilling<br>102.05' - Fracture, <5 deg, rough, undulating, open<br>102.5-102.9' - Fracture zone, 0-90 deg, rough, stepped, open | | 100.0-101.4' - moderate olive brown, (5Y 4/4), fine grained, mild HCl 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 (molds/casts) | R12:11 minutes |
| 105 | 105.0 | | | | | | |

| 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

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 END : 4/7/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -63.7 | | | 10 | 105.0-106.0' - Fracture zone, 0 to inclined 60-70 deg, rough, undulating, open | | **Limestone** 101.4-101.9' - pale greenish yellow to yellowish gray, (10Y 8/2 to 5Y 7/2), very fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3) | |
| | | | 10 | 106.45' - Fracture, <5 deg, rough, undulating, open | | | |
| | R13-HQ 5 ft 48% | 23 | >10 | 106.45-107.4' - Fracture zone, rough, stepped, various orientations, open | | **Clay With Limestone (CL)** 101.9-102.2' - black to very dark gray, (N1 to N3), wet, soft, black carbonate coated gravel-sized fragments | |
| | | | NR | | | **Limestone** 102.2-102.9' - Same as 100.0-101.4' except yellowish gray to grayish yellow, (5Y 7/2 to 5Y 8/4), cavity infilling up to 1-3/16"-3/4", fossil molds and casts | R13:7 minutes |
| 110 | 110.0 | | | | | | |
| -68.7 | | | 4 | 110.2' - Fracture, 70 deg, rough, stepped, open | | **No Recovery 102.9-105.0'** | |
| | | | >10 | 110.5' - Fracture, 0-90 deg, rough, stepped, open<br>110.6' - Fracture, 70 deg, rough, stepped | | **Limestone** 105.0-107.4' - yellowish gray, (5Y 7/2), fine to very fine grained, mild to moderate HCl reaction, weak to medium strong (R2 to R3), fossil molds and casts, voids up to 1/16" over 30-40% of surface, few cavities up to 3/16"x3/16" exist on the rock surface | |
| | R14-HQ 5 ft 49% | 23 | 1 | 110.8' - Fracture, <5 deg, rough, stepped, joins with fracture at 110.6' | | | |
| | | | NR | 111.3- 111.9' - Fracture zone, various orientations<br>112.45' - Fracture zone, 0-90 deg, rough, stepped, open | | **No Recovery 107.4-110.0'** | R14:4 minutes |
| 115 | 115.0 | | | | | **Limestone** 110.0-112.45' - Same as 105.0-107.4' | |
| -73.7 | | | 3 | 115.2' - Fracture, 0-60 deg, rough, undulating to stepped, open | | **No Recovery 112.45-115.0'** | |
| | | | | 115.4' - Fracture, 40 deg, rough, undulating, tight<br>115.85' - Fracture, 50 deg, rough, undulating, open | | **Limestone** 115.0-116.0' - yellowish gray, (5Y 7/2), fine grained, mild HCl reaction, very weak (R1), friable, voids up to 1/16" over 25-30% of surface, 3/4"-1-3/16" cavities rarely exist on surface, rare fossiliferous (casts/molds) | |
| | R15-HQ 5 ft 20% | 7 | NR | | | **No Recovery 116.0-125.0'** | |
| | | | | | | | R15:4 minutes |
| 120 | 120.0 | | | | | | |
| -78.7 | | | | | | | |
| | R16-HQ 5 ft 0% | 0 | NR | | | | Driller's Remark: Retrieved a handful of material consisting of loose sand, carbonate material, moderate to high HCl reaction, silty to sandy, light gray |
| | | | | | | | R16:3 minutes |
| 125 | 125.0 | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: GSC-09 | SHEET 8 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

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 END : 4/7/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -83.7 | R17-HQ 5 ft 34% | 0 | >10 | 125.0-126.0' - Fracture (>10), <5 deg and horizontal, rough, undulating to stepped, inclined (40-50 deg), open | | **Carbonate Sand With Silt (SP-SM)** 125.0-125.5' - pale olive to yellowish gray, (10Y 6/2 to 5Y 7/2), wet, loose, fine grained, rapid dilatancy, moderate HCl reaction, trace limestone fragments | Stop drilling 04/06/2007 Resume on 04/07/07; water level 6.0' below ground surface |
| | | | >10 | 126.0-127.0' - Fracture (>10) | | | |
| | | | 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 surface, cavities up to 3/16"x3/16" | R17:3 minutes |
| 130 | 130.0 | | | | | | |
| -88.7 | R18-HQ 5 ft 20% | 0 | >10 | 130.0-131.0' - Fracture (>10), vertical and horizontal, rough, stepped to undulating, open | | **No Recovery 126.7-130.0'** **Limestone** 130.0-131.0' - pale yellowish brown 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" | |
| | | | NR | | | **No Recovery 131.0-135.0'** | R18:7 minutes |
| 135 | 135.0 | | | | | | |
| -93.7 | R19-HQ 5 ft 64% | 35 | 3 | 135.4' - Fracture, 30 deg, smooth, undulating, open | | **Limestone** 135.0-136.75' - yellowish gray, (5Y 7/2), very fine grained, moderate to strong HCl 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 | |
| | | | >10 | 135.6' - Fracture, 0-90 deg, smooth, stepped, open 2"-3" | | | |
| | | | NR | 135.95' - Fracture, rough, planar to stepped, open | | **No Recovery 136.75-138.6'** | |
| | | | >1 | 138.6' - Fracture, horizontal, smooth, planar, open, tan to black stain over 100% of surface (20% black, 1/16" thick) | | **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 | R19:10 minutes |
| | | | 2 | 139.05' - Fracture, <5 deg, rough, stepped to undulating, open | | | |
| 140 | 140.0 | | | | | | |
| -98.7 | R20-HQ 5 ft 78% | 29 | 10 | 139.15' - 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 10% of surface, trace fossil casts and molds | |
| | | | NR | 140.2' - Fracture, horizontal, smooth, planar, open | | | |
| | | | >10 | 140.5' - Fracture, horizontal, smooth, undulating, open | | 139.15-140.0' - Same as 138.6-139.05' except mottled with brownish limestone | |
| | | | 3 | 141.5-141.9' - Fracture zone, 0-90 deg, rough, undulating to stepped, various orientations | | | |
| | | | 3 | 141.9-142.3' - Fracture, vertical, rough, undulating, tight | | | |
| | | | 2 | 142.3' - Fracture, <5 deg, rough, stepped, open | | | R20:11 minutes |
| 145 | 145.0 | | | | | | |

| PROJECT NUMBER: | BORING 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

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 END : 4/7/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -103.7 | R21-HQ 5 ft 94% | 60 | 2 | 142.9' - Fracture, horizontal, rough, stepped, open<br>143.2' - Fracture, horizontal, smooth, planar, open | | **Limestone**<br>140.0-140.5' - light olive gray, (5Y 5/2), very fine grained, moderate HCl reaction, weak (R2), voids up to 1/16" over 1% of surface (concentrated along break), 1-3/16"x3/8" cavity, some infilling in cavity<br>**No Recovery 140.5-141.5'**<br>**Limestone**<br>141.5-144.1' - light olive gray, (5Y 5/2), very fine grained, mild HCl reaction, very weak to weak (R1 to R2), friable from 141.5-142.5', cavities up to 1/8"-3/16" over 40-50% of surface, 3/8"x3/16" cavities over 1-3% of surface, cavities and voids mostly present in 142.3-143.2', laminated with very fine grained limestone, less than 1% voids from 143.6-143.8'<br>144.1-144.5' - light olive gray, (5Y 5/2), very fine grained, mild to moderate HCl reaction, weak (R2), voids up to 3/16" over less than 1% surface, two 3/16"x3/16" cavities, trace fossil casts and molds<br>**No Recovery 144.5-146.1'**<br>**Limestone**<br>146.1-147.1' - light olive gray with yellowish gray mottling, (5Y 5/2 with 5Y 7/2), fine grained, mild to moderate HCl reaction, weak (R2), voids over 5-15% of the surface, several 3/16"x3/16" cavities, trace fossil molds and casts<br>147.0-146.1' - Same as 144.1-144.5'<br>147.1-147.4' - light olive gray with yellowish gray mottling, (5Y 5/2 with 5Y 7/2), fine grained, mild HCl reaction, very weak (R1), thinly cemented, 1-3/16"-1-9/16"x1/8" cavities, occasional clay bedding parallel to bedding plane, voids up to 1/16" over 1-3% of the surface<br>147.4-147.6' - dark yellowish brown, (10YR 4/2), fine grained, mild HCl reaction, extremely weak (R0), small voids over 40-50% of surface, friable with depth<br>147.6-149.7' - pale yellowish brown, (10YR 6/2), fine grained, mild to moderate HCl reaction, weak (R2), voids over 5-10% of surface, cavities (3/16"x3/8") over 1-2% of the surface, trace fossil molds and casts, cavities<br>**No Recovery 149.7-150.0'** | R21:7 minutes<br>R22:7 minutes |
| | | | 3 | 143.3' - Fracture, 15 deg, smooth, planar, open | | | |
| | | | 4 | 143.9' - Fracture, <5 deg, rough, undulating, open<br>144.1' - Fracture, <5 deg, rough, undulating, open | | | |
| | | | 0 | 144.25' - Fracture, 60 deg, rough, stepped, tight | | | |
| | | | 1 | 145.5' - Fracture, 20 deg, rough, undulating, tight | | | |
| 150 | 150.0 | | NR | 145.65' - Fracture, 60 deg, rough, stepped, tight | | | |
| -108.7 | R22-HQ 5 ft 100% | 72 | 2 | 145.45' - Fracture, 10 deg, rough, planar, open | | | |
| | | | 3 | 146.5' - Fractures, horizontal, rough, undulating, open<br>146.85' - Fracture, 10 deg, smooth, undulating, tight | | | |
| | | | 2 | 147.0' - Fracture, vertical, rough, undulating, tight | | | |
| | | | 2 | 147.1' - Fracture, horizontal, rough, planar, open<br>147.4' - Fracture, 15 deg, smooth, planar, open, silt/clay lens (<1/16" thick) | | | |
| | | | 1 | 147.55' - Fracture, 10 deg, rough, stepped, <1/16" thick silty clay lenses | | | |
| 155 | 155.0 | | | 149.6' - Fracture, 0-50 deg, rough, stepped | | | |
| -113.7 | | | | 150.45' - Fracture, <5 deg, rough, undulating, open<br>150.75' - Fracture, horizontal, rough, planar, open<br>151.35' - Fracture, <5 deg, rough, stepped, open<br>151.7' - Fracture, horizontal, smooth, planar, open<br>151.85' - Fracture, horizontal, rough, stepped, open<br>152.6' - Fracture, <5 deg, rough, undulating, open<br>153.0' - Fracture, smooth, planar, 1/16" silty clay liner covers 100% of surface<br>153.3' - Fracture, <5 deg, rough, undulating, open<br>153.55' - Fracture, rough, undulating, open<br>154.15' - Fracture, horizontal, smooth, planar, tight | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: GSC-09 | SHEET 10 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

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 END : 4/7/2007 LOGGER : R. McComb

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | | | **Limestone**<br>150.0-154.15' - moderate yellowish brown, (10YR 5/4), fine grained, mild to moderate HCl reaction, weak to 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 material from 152.0153.0'<br>154.15-155.0' - very light gray to white, (N8 to N9), very fine grained, strong HCl reaction, very weak to 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)<br>Bottom of Boring at 155.0 ft bgs on 4/7/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-10 SHEET 1 OF 10 |

# SOIL BORING 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.3 | 0.0 – 1.5 | 1.3 | SS-1 | 1-2-2 (4) | **Topsoil Grading To Poorly Graded Sand With Organics (SP)** 0.0-1.3' - grayish black, (N2), moist, very loose, fine grained, silica sand, 50% organics decreasing with depth, trace nonplastic fines | | 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 | | | | | | |
| 37.3 | 5.0 – 6.5 | 0.9 | SS-2 | 3-3-3 (6) | **Silty Sand (SM)** 5.0-5.9' - light brown, (5Y 5/6), moist, loose, fine silica sand, 15-20% nonplastic fines, trace organics | | |
| 10 | 10.0 | | | | | | |
| 32.3 | 10.0 – 11.5 | 0.7 | SS-3 | 0-0-1 (1) | **Silty Sand (SM)** 10.0-10.7' - pale orange, (10YR 8/2), wet, loose, fine to medium grained, strong HCl reaction, 20% low plastic fines, fossiliferous, carbonate material | | Weight of hammer enough to drive of SS-3 first 12" |
| 15 | 15.0 | | | | | | |
| 27.3 | 15.0 – 15.8 | 0.8 | SS-4 | 40-50/3 (90/9") | **Silt (ML)** 15.0-15.8' - grayish orange, (10YR 7/4), moist, hard, nonplastic, rapid dilatancy, mild HCl reaction, 5-10% very fine sand-sized, carbonate materials | | Driller's Remark: Feels like hard material |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-10 SHEET 2 OF 10 |

# SOIL BORING 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.3 | 20.0 – 21.5 | 1.4 | SS-5 | 28-45-43 (88) | **Silt (ML)** 20.0-21.4' - Same as 15.0-15.9' | | |
| 25 / 17.3 | 25.0 – 26.5 | 1.5 | SS-6 | 35-44-33 (77) | **Silt (ML)** 25.0-26.5' - Same as 15.0-15.9' | | |
| 30 | 30.0 | | | | | | Driller's Remark: Water loss at 28.0' |
| 12.3 | 30.0 – 31.5 | 1.3 | SS-7 | 17-32-32 (64) | **Sandy Silt (ML)** 30.0-31.3' - Same as 15.0-15.9' except grayish orange, 20-25% fine to coarse sand-sized, trace fine gravel-sized limestone, carbonate materials | | |
| 35 | 35.0 | | | | | | Driller's Remark: Hard drilling at 32.5' |
| 7.3 | 35.0 – 36.5 | 1.2 | SS-8 | 31-26-24 (50) | **Silt With Sand (ML)** 35.0-36.2' - yellowish gray, (5Y 7/2), moist, hard, nonplastic, rapid dilatancy, mild HCl reaction, very fine to fine sand-sized, 10% fine to coarse sand-sized, carbonate | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-10 SHEET 3 OF 10 |

# SOIL BORING 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

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

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.3 | 40.0 – 41.5 | 1.5 | SS-9 | 10-17-27 (44) | **Sandy Silt (ML)** 40.0-41.5' - Same as 35.0-36.2' except 30-35% fine to coarse sand-sized and trace organics | | |
| 45 -2.7 | 45.0 – 46.5 | 1.1 | SS-10 | 23-52-50 (102) | **Silty Sand (SM)** 45.0-46.1' - Same as 40.0-41.5' | | Driller's Remark: Will set casing to 45.0' below ground surface |
| | | | | | | | Driller's Remark: Hard drilling at 47.0', sample was slough in sand-sized limestone fragments |
| 50 -7.7 | 50.0 – 50.2 | 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 | | |
| 55 -12.7 | | | | | | | |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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

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

WATER LEVELS : 1.61 ft bgs on 6/14/07 START : 4/19/2007 END : 4/22/2007 LOGGER : A. Erickson

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -7.7 | 50.0 R1-NQ 1 ft 40% 51.0 | 0 | 2<br>NR | 50.2' - Fracture, 80 deg, smooth, undulating, second face of fracture has been fragmented into at least two subangular to subrounded elongate fragments, trace coatings/infill on all fragments | | **Limestone**<br>50.0-50.4' - light olive gray, (5Y 5/2), fine grained, mild to moderate HCl reaction, medium strong (R3), voids (1/16") over 10-40% of surface, thin elongate fossil molds mostly 1/4" and up to 1/2", moderately fossiliferous<br>**No Recovery 50.4-56.0'** | R1:3 minutes |
| | R2-NQ 5 ft 0% | 0 | NR | | | | |
| 55<br>-12.7 | | | | | | | R2:8 minutes |
| | 56.0 R3-NQ 5 ft 7% | 7 | 0<br>NR | | | **Limestone**<br>56.0-56.3' - dusky yellow, (5Y 6/4), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids (1/16") over 25% of surface, 1/8" thin elongate fossil molds some larger 1/4"-1/2" cavities and fossil molds<br>**No Recovery 56.3-61.0'** | Core stuck in HW casing |
| 60<br>-17.7 | | | | | | | R3: Run time not recorded |
| | 61.0 R4-NQ 5 ft 70% | 13 | >10<br>>10<br>1<br>0<br>NR | 61.35' - Fracture, horizontal, rough, undulating, tight to healed<br>61.5-61.7' - Fractures, horizontal, multiple fractures with fine bedding planes and organic laminations, nearly crush, very open<br>62.0, 62.2, 62.35' - Fractures (3), horizontal, smooth, planar, open<br>62.7-63.8' - Fracture, angular black sediment<br>63.8' - Fracture, 10 deg, rough, undulating | | **Limestone**<br>61.0-62.45' - moderate yellowish brown, (10YR 5/4), fine grained, mild to moderate HCl reaction, very weak to weak (R1 to R2), numerous 1/16"-3/16" voids, thick black horizontal bedding plane laminations, elongate 1/4" long fossil molds and casts throughout, moderately fossiliferous<br>**Silty Sand (SM)**<br>62.45-63.8' - moderate yellowish brown, (10YR 5/4), nonplastic, mild to moderate HCl reaction, 60% fine sand, 30% fines, 10% limestone fragments, non-cohesive, massive, easily friable and ground to fine sand, calcareous | |
| 65<br>-22.7 | | | | | | | R4:7 minutes |
| | 66.0 R5-NQ 5 ft 90% | 10 | 1<br>0<br>0<br>0 | 66.6' - Fracture, horizontal, rough, planar, followed by non to weak sediment/rock<br>66.6-70.5' - Fractures, 0-20 deg, occasionally more of a fracture zone, silt-sized fragments | | **Limestone**<br>63.8-64.5' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, medium strong (R3), voids (1/16") over 20-25% of surface, trace larger up to 3/16" voids and fossil molds, trace organic black beds<br>**No Recovery 64.5-66.0'** | |
| 70 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
| 338884.FL | 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

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

WATER LEVELS : 1.61 ft bgs on 6/14/07 START : 4/19/2007 END : 4/22/2007 LOGGER : A. Erickson

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -27.7 | | | 0 | | | **Limestone** | R5:6 minutes |
| | 71.0 | | NR | | | 66.0-66.6' - moderate yellowish brown, (10YR 5/4), fine grained, 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 (R3), trace organics, strong HCl reaction where extremely weak rock (R0) at the top, moderate HCl reaction where medium strong (R3) at the bottom | |
| | | | 0 | 71.0-72.9' - Fractures, several horizontal breaks | | | |
| | | | 1 | | | | |
| | R6-NQ 5 ft 78% | 18 | 2 | 72.9' - Fracture, horizontal, rough, undulating<br>73.5, 73.6' - Fractures (2), horizontal, smooth to rough, planar, open | | | |
| | | | 1 | 74.1' - Fracture, horizontal, smooth, planar, open | | 66.6-70.5' - dark yellowish orange, (10YR 6/6), fine grained, strong HCl reaction, very weak (R1), fine voids over 0-3% of surface, friable | |
| 75<br>-32.7 | | | NR | | | **No Recovery 70.5-71.0'** | End of core at 74.9', matches/mates with next core at 76.0' |
| | 76.0 | | | | | **Limestone** | R6:6 minutes |
| | | | 0 | | | 71.0-72.9' - dark yellowish orange to grayish orange, (10YR 6/6 to 10YR 7/4), fine grained, strong HCl reaction, extremely weak to very weak (R0 to R1), friable | |
| | | | 3 | 77.05' - Fracture, 10 deg, rough, undulating<br>77.2' - Fracture, horizontal, rough, planar, healed | | 72.9-74.1' - Same as 71.0-72.9' except very weak (R1) | |
| | R7-NQ 5 ft 96% | 60 | >10 | 77.65, 77.9' - Fractures (2), horizontal, smooth, planar, tight to open<br>78.0-78.8' - Fractures, horizontal, multiple breaks | | 74.1-74.9' - moderate yellowish brown, (10YR 5/4), fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), voids (1/16"-1/8") over 25-30% of surface, trace organics, 1/16" fossils/molds, highly fossiliferous | |
| | | | 2 | 79.05' - Mechanical break, 10 deg, rough, undulating | | | |
| 80<br>-37.7 | | | 1 | 79.5' - Fracture, horizontal, rough, stepped, open, missing portion of fracture | | | R7:7 minutes |
| | 81.0 | | NR | 80.05' - Fracture, 10 deg, rough, planar, tight | | **No Recovery 74.9-76.0'** | |
| | | | 2 | 81.25' - Fracture, 10 deg, rough, planar, healed | | **Limestone** | Core essentially alternates between the two rock types in 81.0-81.75' and 81.75-84.2' |
| | | | 2 | 81.75' - Fracture, 10 deg, rough, planar, open<br>82.35' - Fracture, horizontal, rough, planar, open with 1/4" infill on each face (coating is same as lithology described for 81.0-81.75') | | 76.0-77.05' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, medium strong (R3), voids (1/16"-1/8") over 25% at top reducing to 0% voids with depth (transition sharpest at 76.6') | |
| | R8-NQ 5 ft 100% | 67 | 0 | | | 77.05-79.55' - moderate yellowish brown, (10YR 5/4), fine grained, moderate to strong HCl reaction, very weak to extremely weak (R1 to R0), 0% to trace voids, friable | |
| | | | 3 | 83.75' - Fracture, horizontal, rough, undulating, tight<br>84.2-84.4' - Fractures, horizontal, rough, undulating, filled with material as described for 81.0-81.75' | | | |
| 85<br>-42.7 | | | >10 | 84.75' - Fracture, 10 deg, rough, planar, tight to open with fine coating of infill similar to 82.35' | | 79.55-80.8' - moderate yellowish brown, (10YR 5/4), moderate to strong HCl reaction, medium strong to very weak (R3 to R1), voids (1/16"-3/8") over 30% of surface from 76.0'-77.05', decrease in voids (1/16") to 3% of surface | R8:15 minutes |
| | 86.0 | | | | | **No Recovery 80.8-81.0'** | |
| | | | 5 | 85.2' - Fracture, horizontal, rough, stepped, very open, with fragments | | **Limestone** | |
| | | | 8 | 85.3' - Fracture, horizontal, smooth, planar<br>85.3-86.0' - Fractures, several horizontal and vertical, angular (1/2"-3") fragments | | 81.0-81.75' - moderate yellowish brown to pale yellowish brown, (10YR 5/4 to 10YR 6/2), fine grained, strong HCl reaction, very weak (R1) | |
| | R9-NQ 5 ft 78% | 13 | >10 | 86.1' - Fracture, 10 deg, smooth, stepped, tight to open, subangular to subrounded fragments | | | |
| | | | >10 | 86.25, 86.35, 86.4, 86.5' - Fractures (4), horizontal, rough, planar to undulating, tight | | | |
| 90 | | | | | | | |

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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

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

WATER LEVELS : 1.61 ft bgs on 6/14/07 START : 4/19/2007 END : 4/22/2007 LOGGER : A. Erickson

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: 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 | | **Limestone** | R9:9 minutes |
| | 91.0 | | | 87.3, 87.4, 87.55' - Fractures (3), horizontal, smooth, rounded rock fragments | | 81.75-84.2' - moderate yellowish brown, (10YR 5/4), fine grained, moderate to strong HCl reaction, strong (R4), voids (<1/16") over 5-15% of surface, except for 1" interval at 83.4' with 25% voids on surface | |
| | | | 5 | 87.9, 88.25, 88.35, 88.6, 88.8, 89.2, 89.4' - Fractures (7), horizontal, significant fragmentation in places | | | |
| | | | 3 | 89.45-89.9' - Fracture zone, 30 deg | | | |
| | R10-NQ 5 ft 88% | 38 | 5 | 91.0-91.4' - Fracture zone, several large subangular fragments with weathered appearance, very open | | 84.2-84.4' - Same as 81.0-81.75' except extremely weak (R0) | |
| | | | | 91.7' - Fracture, 20 deg, rough, planar, tight | | 84.4-85.3' - Same as 81.75-84.2' except weak (R2), voids over 3% of surface, this material more of a transition between the two types from 81.0-84.2' | |
| | | | 1 | 92.5' - Fracture, horizontal, rough, undulating, fragmentation | | | |
| 95 -52.7 | | | 0 | 92.6' - Fracture, 60 deg, rough, undulating, tight | | 85.3-86.0' - Same as 81.0-81.75' except strong HCl reaction, very weak (R1) | R10:8 minutes |
| | | | NR | 92.8' - Fracture, 60 deg, rough, planar, tight | | | |
| | 96.0 | | | 93.3' - Fracture, 45 deg, rough, planar, tight | | | |
| | | | 0 | 93.7' - Fracture, horizontal, rough, planar, very open, material beneath is discontinuous and somewhat fragmented | | 86.0-86.5' - moderately yellowish brown, (10YR 5/4), fine grained, moderate to strong HCl reaction, weak (R2), fine organic inclusions, no voids | |
| | | | 0 | 93.9' - Fracture, horizontal, rough, stepped, very open with fragmentation, subangular | | | |
| | R11-NQ 5 ft 94% | 78 | 1 | 95.0' - Fracture, horizontal, rough, stepped, with missing fragments | | 86.5-87.1' - Same as 86.0-86.5' except fine (<1/16") voids over 30% of surface (up to 40% at 86.6'), few larger 1/4" cavities/fossil molds | |
| | | | 4 | 98.75' - Fracture, horizontal, rough, stepped, tight | | 87.1-88.9' - Same as 86.0-86.5' except very weak to weak (R1 to R2), voids vary over 10-30% of surface | |
| 100 -57.7 | | | 0 | 99.05, 99.15' - Fractures (2), horizontal, rough, undulating, very open with weathered appearance in zone of increased voids/cavities | | 88.9-89.9' - Same as 86.0-86.5' except weak to medium strong (R2 to R3), 10% voids (<1/16"), few larger (1/4") cavities/fossil molds | R11:7 minutes |
| | 101.0 | | NR | 99.75' - Fracture, horizontal, rough, undulating, tight | | **No Recovery 89.9-91.0'** | |
| | | | 6 | 99.95' - Fracture, horizontal, smooth, planar, very open with apparent change of rock type abruptly at fracture | | **Limestone** | |
| | | | 5 | 100.0-103.5' - 3 to 4 large 1-1/2" fragments, primarily horizontal breaks along lignite lamination | | 91.0-91.4' - dark yellowish orange, (10YR 6/6), fine grained, moderate to strong HCl reaction, very weak (R1), fine voids over 10% of surface, 1/4" rounded gray inclusions | |
| | R12-NQ 5 ft 74% | 47 | 1 | 100.55' - Fracture, horizontal, planar, black bedding plane/lamination, tight | | 91.4-95.4' - moderate yellowish brown, (10YR 5/4), moderate to strong HCl reaction, weak to medium strong (R2 to R3), no voids | Driller's Remark: 20% water loss at 103.0' |
| | | | 5 | 101.8' - Fracture, horizontal, rough, stepped, open to fragments beneath | | | |
| 105 -62.7 | | | NR | 101.8-102.0' - subangular rock crush 1" in size | | 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 fossiliferous | R12:7 minutes |
| | 106.0 | | | 102.15' - Fracture, 70 deg, rough, undulating, open to overlying fragments and terminating at 101.8' horizontal fracture and at 102.3' | | | |
| | | | 2 | 102.7, 102.75' - Fractures, horizontal, smooth, stepped, tight | | **No Recovery 95.4-96.0'** | |
| | | | 0 | 103.0' - Fracture or mechanical break, 30 deg, rough, undulating, tight | | **Limestone** | |
| | R13-NQ 5 ft 76% | 48 | >10 | 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, medium strong (R3), voids (1/16") over 3-10% of surface, few cavities/molds up to 1/2", but most are 1/4" | |
| | | | 2 | 104.1-104.7' - Fracture zone, contains a large 3" fragment but some subangular vertical and horizontal fragments | | | |
| 110 | | | | | | | |

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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

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

WATER LEVELS : 1.61 ft bgs on 6/14/07 START : 4/19/2007 END : 4/22/2007 LOGGER : A. Erickson

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -67.7 | | | NR | 106.35, 106.55' - Fractures (2), 10 deg, rough, undulating, open, fine calcareous infill/coating | | 98.75-99.95' - Same as 96.0-98.75' except weak (R2), voids from 15-40% of surface, increased voids and cavities at 98.75-99.2', with fractures | R13:5 minutes |
| | 111.0 | | | | | **Limestone** | |
| | R14-NQ 5 ft 100% | 80 | 0 | 108.25, 108.6' - Fractures (2), 20 deg, rough, stepped, very open, with dissolved appearance | | 99.95-100.7' - Same as 96.0-98.75' except weak to medium strong (R2 to R3), voids decrease with depth from 5% to 0% of surface where black laminations (<1/16" thick each) become darker brown/gray banded organics | |
| | | | 2 | 108.6-109.1' - Fracture zone, subangular, primarily 1/2"-3/4" with a few larger fragments | | | |
| | | | 4 | 109.1' - Fracture, horizontal, rough, stepped, terminates fracture zone<br>112.45' - Fracture, 45 deg, rough, stepped, nearly healed | | | |
| | | | 2 | 112.8' - Fracture, horizontal, rough, stepped, open | | **No Recovery 100.7-101.0'** | |
| 115<br>-72.7 | | | 8 | 113.5' - Fracture, 30 deg, rough, stepped, open<br>113.7, 114.0' - Fractures (2), horizontal, rough, planar, open to tight | | **Limestone**<br>101.0-101.8' - dark yellowish brown, (10YR 4/2), fine grained, moderate to strong HCl reaction, strong (R4), voids over 3% of surface, few 1/4" elongated fossil casts, banded black organics (lignite) in upper portion turning to minor with depth | R14:6 minutes |
| | 116.0 | | | | | | |
| | R15-NQ 5 ft 72% | 13 | 2 | 113.85' - Fracture, vertical, rough, undulating, tight, bounded by overlying and underlying horizontal fractures | | 101.8-104.7' - moderate yellowish brown, (10YR 5/4), fine grained, moderate to strong HCl reaction, strong (R4), voids (1/16") over 25% of surface, thin elongated 1/4"-1/2" fossil molds, few larger cavities up to 3/4", small casts (1/4"), fossiliferous | |
| | | | 4 | 114.2' - Fracture, 10 deg, smooth, undulating, very open | | | |
| | | | >10 | 114.95-115.1' - Fractures, rough, stepped, subangular rock fragments bounded by horizontal fractures<br>115.3, 115.5' - Fractures (2), 20-30 deg, rough, undulating, tight to open | | | |
| | | | 3 | 116.85, 116.95, 117.05, 117.1' - Fractures (4), 0-10 deg, rough to smooth, planar to undulating, along bedding planes | | | |
| 120<br>-77.7 | | | NR | 117.35' - Fracture, horizontal, rough, stepped, open | | **No Recovery 104.7-106.0'**<br>**Limestone**<br>106.0-109.8' - moderate yellowish brown, (10YR 5/4), fine grained, moderate to strong HCl reaction, strong (R4), some short, weaker fracture zones, voids (1/16") over 25% of surface, many round to oval 1/4" fossil molds, increased size and frequency of cavities (up to 1/2") at 108.25-109.1' | R15:7 minutes |
| | 121.0 | | | | | | |
| | R16-NQ 5 ft 70% | 32 | >10 | 117.6' - Fracture, horizontal, rough, stepped<br>118.3' - Fracture, horizontal, rough, stepped, terminates the fragments | | | Driller's Remark: 100% water loss at 120.0' |
| | | | 4 | 118.45-119.1' - Fracture zone, rock fragments, grayer subangular rock fragments from 1/2"-1" | | | Quite possible no recovery is from fracture zone of 118.0' (which would shift down to 119.6') |
| | | | 0 | 119.75' - Fracture, vertical, rough, undulating, from overlying rock fragments to end core at 119.6' some fragmentation/splitting | | | |
| | | | 2 | 121.0-121.9' - Fractures (12), horizontal, every 1/2"-1", all tight to open with rounding | | **No Recovery 109.8-111.0'**<br>**Limestone**<br>111.0-116.0' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids (1/16") over 25-40% of surface, 1/4"-1" areas of lighter-colored infill with strong HCl reaction; infill is clayey in texture often not at fractures | |
| 125<br>-82.7 | | | NR | 122.05, 122.2, 122.25, 122.3' - Fractures (4), horizontal, smooth, undulating, open to tight<br>124.05' - Fracture or mechanical break, 20 deg, rough, undulating, healed | | | R16:5 minutes |
| | 126.0 | | | | | | |
| | R17-NQ 5 ft 78% | 53 | 8 | 124.3' - Fracture, horizontal, rough, undulating, tight | | | |
| | | | >10 | 126.6' - Fracture, horizontal, smooth, stepped, open to fragments/fracture zone below | | 116.0-118.0' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, weak (R2), voids (1/16") voids over 5% of surface, fine bedding planes particularly from 116.65-117.1', except at 117.6-118.0' where rock is friable and extremely weak (R0) | |
| | | | 7 | 126.6-127.5' - Fracture zone, subangular and angular fragments 1/2"-2", browner at top, grayer at bottom | | | |
| | | | 0 | 127.5' - Fracture, horizontal, rough, stepped, fracture terminates fracture zone, gray fragments above, brown limestone beneath, abrupt transition at fracture | | | |
| 130 | | | | | | | |

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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

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

WATER LEVELS : 1.61 ft bgs on 6/14/07 START : 4/19/2007 END : 4/22/2007 LOGGER : A. Erickson

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (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 (1/4"-1/2") fragments | | 118.0-119.6' - light olive gray, (5Y 3/2), fine grained, moderate to strong HCl reaction, medium strong (R3), voids (1/16") over 5-10% of surface | R17:6 minutes |
| | 131.0 | | | | | **No Recovery 119.6-121.0'** | |
| | R18-NQ 5 ft 86% | 57 | 1 | 128.75' - Fracture, horizontal, rough, planar, tight | | **Limestone** 121.0-124.5' - yellowish gray, (5Y 8/1), very fine grained, strong HCl reaction, weak (R2), voids (1/16") over 5% of surface, trace fossil imprints (mostly on fracture faces), after 122.05' inclusion of gray very fine to fine grained particles beginning as very fine particles transition to fine to medium grained and yellowish gray (5Y 7/2) after 122.5', less friable | |
| | | | 4 | 131.8' - Fracture, horizontal, rough, planar, tight | | | |
| | | | | 132.7' - Fracture, horizontal, smooth, planar, open | | | |
| | | | 7 | 132.7-133.5' - Fractures, smooth, planar, rock fragments (fragments broken in horizontal plane, then broken again) | | | |
| | | | 1 | | | | |
| 135 -92.7 | | | 5 | 134.8' - Fracture, horizontal, smooth, planar, open | | | R18:8 minutes |
| | 136.0 | | NR | 135.1' - Fracture, horizontal, smooth, planar, smooth to planar lower face, open | | **No Recovery 124.5-126.0'** | |
| | R19-NQ 5 ft 22% | 7 | >10 | 135.2, 135.25, 135.3' - Fractures (3), horizontal, smooth, planar | | **Limestone** 126.0-127.5' - moderate yellowish brown to dark yellowish orange, (10YR 5/4 to 10YR 6/6), moderate 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 | |
| | | | 0 | 135.1-135.3' - Fracture zone, horizontal, planar | | | |
| | | | | 136.0-136.6' - Fractures, horizontal, smooth, planar, angular fragments | | | |
| | | | | 136.6' - Fracture, horizontal, smooth, planar, terminates fragments | | | |
| | | | NR | 136.8' - Fracture, horizontal, rough, planar, open to tight | | | |
| 140 -97.7 | | | | | | 127.5-129.9' - moderate yellowish brown, (10YR 5/4), moderate HCl reaction, medium strong (R3), voids (1/16"-3/8") over 15% of surface, many 1/8"-1/4" cavities | R19:4 minutes |
| | 141.0 | | | | | **No Recovery 129.9-131.0'** | |
| | R20-NQ 5 ft 60% | 25 | >10 | 141.0-141.9' - Fracture zone, with angular rock fragments | | **Limestone** 131.0-132.7' - moderate yellowish brown, (10YR 5/4), moderate HCl reaction, medium strong (R3), voids (1/16"), many 1/4" cavities (elongate and round up to 3/4") | |
| | | | | 141.2' - Fracture, 10 deg, rough, stepped, open to fragmented | | | |
| | | | >10 | 141.4' - Fracture, 10 deg, rough to smooth, stepped to undulating, open to fragmented | | | |
| | | | 3 | 141.7, 141.9' - Fracture (2), 20 deg, rough, stepped, open with cavities/fragmentations | | 132.7-135.3' - moderate yellowish brown to dusky yellow, (10YR 5/4 to 5Y 6/4), moderate to strong HCl reaction, medium strong (R3), voids over 3% of surface with occasional zones of 15% coverage, no to few cavities except at zones with more voids, HCl reaction is strongest in zones with few voids | |
| | | | | 142.15' - Fracture, 20 deg, rough, stepped, very open | | | |
| | | | | 142.6' - Fracture, 10 deg, rough, stepped, open to fragmented | | | |
| 145 -102.7 | | | NR | 142.8, 143.05' - Fractures (2), 10 deg, rough, stepped, open | | | R20:10 minutes |
| | 146.0 | | | 142.6-142.8' - 1/2"-3/4" angular fragments | | **No Recovery 135.3-136.0'** | |
| | R21-NQ 5 ft 72% | 48 | 4 | 143.1' - Fracture, vertical, rough, stepped, 1" long | | **Limestone** 136.0-137.1' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, medium strong (R3), voids over 0-5% of surface with occasional band of increased voids (and small cavities), generally no cavities, harder where no voids, weaker where voids are present | |
| | | | 2 | 143.15' - Fracture, horizontal, rough, stepped, discontinuity, smooth on upper side, rough to planar on low side | | | |
| | | | | 143.8' - Fracture, horizontal, rough, planar to undulating, open | | | |
| | | | 1 | 146.6, 146.7, 146.8, 146.9' - Fractures (4), horizontal, rough, planar, open, concurrent with increasing voids (described in lithology) | | | |
| | | | >10 | 147.35' - Fracture, 0-60 deg, rough, undulating, tight, with infill | | **No Recovery 137.1-141.0'** | |
| 150 | | | | | | | |

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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

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

WATER LEVELS : 1.61 ft bgs on 6/14/07 START : 4/19/2007 END : 4/22/2007 LOGGER : A. Erickson

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -107.7 | | | NR | 147.65' - Fracture, horizontal, smooth, rounded on upper grayer surface, sharp, smooth to planar, 0 deg on bottom | | **Limestone**<br>141.0-144.0' - light olive gray transitioning to pale yellowish brown to grayish orange, (5Y 5/2 to 10YR 6/2 to 10YR 7/4), fine to very fine grained, moderate HCl reaction, strong (R4), 141.0-143.15' voids over 5% of surface, several 1/4" long and some larger cavities, 143.15-144.0' no voids, no cavities, more brown in color with turbid-looking laminations, black organic inclusions and laminations (milky/blurred laminations)<br>**No Recovery 144.0-146.0'**<br>**Limestone**<br>146.0-147.65' - light olive gray, (5Y 5/2), fine to very fine grained, moderate HCl reaction, medium strong to strong (R3 to R4), voids (1/16") over 0-3% of surface but 1" bands of 10% with 1/4" elongate fossil molds<br>**Limestone**<br>147.65-149.6' - dark yellowish orange, (10YR 6/6), moderate HCl reaction, medium strong (R3), voids (1/16") over 30% of surface at top to voids (1/16"-3/8") increasing gradually by end of core to 50% of surface, very few larger cavities, though few elongated very thin up to 1/2" long, some organic inclusions and secondary recrystallization<br>**No Recovery 149.6-151.0'**<br>**Limestone**<br>151.0-152.6' - moderate yellowish brown to light olive gray, (10YR 5/4 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<br>152.6-155.2' - moderate yellowish brown, (10YR 5/4), fine grained, mild 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'<br>**No Recovery 155.2-156.0'**<br>**Limestone**<br>156.0-157.65' - moderate yellowish brown, (10YR 5/4), fine grained, 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' | R21:6 minutes<br><br>R22:8 minutes<br><br>R23:8 minutes<br><br>Total depth of boring is 161.0' |
| | 151.0 | | | 148.75' - Fracture, 30 deg, smooth, planar, tight to healed | | | |
| | | | 0 | 149.25' - Fracture, horizontal, rough, planar, tight to open | | | |
| | | | 0 | 149.95-149.6' - Fracture zone, subangular fragments | | | |
| | R22-NQ 5 ft 84% | 58 | 7 | 153.0' - Fracture, horizontal, rough, planar, zone of increased voids with some bedding planes and laminar features | | | |
| | | | 1 | 153.25, 153.3' - Fractures (2), horizontal, rough, undulating, open with some very minor fragmentation | | | |
| 155<br>-112.7 | | | 0 | 153.5' - Bedding plane, horizontal, rough to smooth, planar, open 1/8" | | | |
| | 156.0 | | NR | 153.7, 153.8, 153.9' - Bedding plane (3), horizontal, rough, planar, open, bedding planes ridged and 1/8"-1/4" thick, no bedding planes after last fracture | | | |
| | | | 1 | 154.8' - Fracture, horizontal, rough, undulating, open | | | |
| | | | 2 | 156.85' - Fracture, horizontal, rough, planar, open | | | |
| | R23-NQ 5 ft 76% | 53 | 4 | 157.25' - Fracture, horizontal, smooth, planar, tight | | | |
| | | | 3 | 157.8' - Fracture, 70 deg, rough, planar, completely healed, closed, but broken open by load testing, surface is nearly 100% dark gray | | | |
| 160<br>-117.7 | | | NR | 158.65, 158.75, 158.85' - Fractures (3), horizontal, smooth, planar, tight to open, weathered | | | |
| | 161.0 | | | 159.1' - Fracture, horizontal, rough to smooth, stepped to planar, open<br>159.4, 159.5' - Fractures, 10 deg, rough, undulating, tight, weathered | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: 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

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

WATER LEVELS : 1.61 ft bgs on 6/14/07 START : 4/19/2007 END : 4/22/2007 LOGGER : A. Erickson

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | | | **Limestone**<br>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<br>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<br>**No Recovery 159.8-161.0'**<br>Bottom of Boring at 161.0 ft bgs on 4/22/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-11 SHEET 1 OF 10 |

# 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 bgs on 2/11/07 START : 2/7/2007 END : 2/12/2007 LOGGER : T. Stewart, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.9 | | | | | | | Begin drilling at 15:00<br>24" split spoon |
| | 3.5 | | | | | | |
| | | 0.8 | SS-1 | 1-2-1 (3) | **Silty Sand (SM)**<br>3.5-4.25' - grayish orange, (10YR 7/4), wet, very loose, 20% nonplastic fines, fine gravel fragment, non-calcareous, very fine grained to cemented silt, silica sand | | |
| 5 37.9 | 5.0 | | | | | | |
| | 8.5 | | | | | | |
| | | 1.1 | SS-2 | 1-1-3 (4) | **Poorly Graded Sand With Organics (SP)**<br>8.5-9.6' - dusky yellowish brown, (10YR 2/2), wet, very loose, 15-20% fine organics, fine silica sand | | |
| 10 32.9 | 10.0 | | | | | | |
| | 13.5 | | | | | | |
| | | 1.1 | SS-3 | 5-6-8 (14) | **Silty Sand (SM)**<br>13.5-14.6' - pale yellowish brown, (10YR 6/2), wet, medium dense, 20-25% nonplastic fines, trace very fine sand-sized black particles, fine silica sand | | SS-3 taken at 15:12 |
| 15 27.9 | 15.0 | | | | | | |
| | 18.5 | | | | | | |
| | | 1.5 | SS-4 | 7-10-9 (19) | | | SS-4 taken at 15:11 |
| 20 | 20.0 | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: GSC-11 | SHEET 2 OF 10 |
|---|---|---|

# 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 bgs on 2/11/07 START : 2/7/2007 END : 2/12/2007 LOGGER : T. Stewart, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 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 | | | | | | |
| | 25.0 | 1.5 | SS-5 | 5-5-5 (10) | **Silty Sand (SM)** 23.5-25.0' - pale yellowish brown, (10YR 6/2), wet, loose, 20-25% nonplastic fines, trace very fine sand-sized black particles, fine silica sand | | SS-5 taken at 15:25 |
| 25 17.9 | | | | | | | |
| | 28.5 | | | | | | |
| | 30.0 | 1.5 | SS-6 | 6-5-3 (8) | **Silty Sand (SM)** 28.5-30.0' - Same as 23.5-25.0' except trace black laminae | | SS-6 taken at 15:43 |
| 30 12.9 | | | | | | | |
| | 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 |
| 35 7.9 | | | | | | | |
| | 38.5 | | | | | | |
| | 40.0 | 1.5 | SS-8 | 4-5-3 (8) | **Silty Sand (SM)** 38.5-40.0' - Same as 33.5-35.0' except loose | | SS-8 taken at 15:54 |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-11 SHEET 3 OF 10 |

# 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 bgs on 2/11/07 START : 2/7/2007 END : 2/12/2007 LOGGER : T. Stewart, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.9 | | | | | | | |
| | 43.5 | | | | | | |
| | | 1.0 | SS-9 | 6-6-8 (14) | **Clayey Sand (SC)** 43.5-44.5' - light bluish gray to light gray mottled with yellowish gray, (5B 7/1 to N7 with 5Y 8/1), wet, medium dense, 35-40% high plastic fines, trace fine black particles, very fine to fine silica sand | | SS-9 taken at 16:01 |
| 45 -2.1 | 45.0 | | | | | | |
| | 48.5 | | | | | | |
| | | 1.3 | SS-10 | 2-2-3 (5) | **Silty Sand (SM)** 48.5-49.0' - pale yellowish brown, (10YR 6/2), wet, very loose, 30% low plastic fines, very fine to fine silica sand | | SS-10 taken at 16:09 |
| 50 -7.1 | 50.0 | | | | **Clayey Sand (SC)** 49.0-49.75' - dark gray, (N3), wet, loose, 30-35% medium plastic fines, very fine to fine silica sand | | |
| | 53.5 | | | | | | Driller's Remark: 16:15 - 52.5' light rig chatter of drag bit |
| | | 1.3 | SS-11 | 8-13-11 (24) | **Silty Gravel With Sand (GM)** 53.5-54.8' - medium dark gray, (N4), wet, medium dense, no HCl reaction, fine to coarse angular gravel, appears to be calcite cemented, fine silica sands, 10-15% nonplastic fines, 20% very fine to fine silica sand | | S-11 taken at 16:19 |
| 55 -12.1 | 55.0 | | | | | | Driller's Remark: 16:27 switch to 3-7/8" tricone roller bit to continue drilling |
| | 58.5 | | | | | | |
| | | 1.5 | SS-12 | 3-2-3 (5) | | | SS-12 taken at 16:35 |
| 60 | 60.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-11 SHEET 4 OF 10 |

# 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 bgs on 2/11/07 START : 2/7/2007 END : 2/12/2007 LOGGER : T. Stewart, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -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) lenses 9/16" thick (black [N1] high plasticity, slow dilatancy), very fine to fine silica sands | | |
| | 63.5 | | | | | | |
| | | 1.3 | SS-13 | 2-2-2 (4) | **Interbedded Silty Sand And Organic Soil (SM-OH)** 63.5-64.8' - Same as 58.5-60' except 80% silty sand and 20% organics | | |
| 65 | 65.0 | | | | | | |
| -22.1 | | | | | | | End drilling for 2/07/07 at 17:12 at 65.0' below ground surface |
| | 68.5 | | | | | | Start drilling on 2/8/07 at 08:30 |
| | | 1.5 | SS-14 | 8-18-35 (53) | **Organic Soil (OH)** 68.5-69.0' - brownish black, (5YR 2/1), wet, stiff, medium plasticity, slow dilatancy, laminated in sharp contact with silt below | | Driller's Remark: slightly firmer, but no chatter |
| 70 | 70.0 | | | | | | |
| -27.1 | | | | | **Silt (ML)** 69.0-70.0' - grayish orange, (10YR 7/4), wet, hard, nonplastic to low plasticity, moderate HCl reaction, laminated over entire interval with black organic beds (up to 1/16" thick), carbonate | | |
| | 73.5 | | | | | | |
| | | 1.5 | SS-15 | 28-26-42 (68) | **Silt (ML)** 73.5-75.0' - Same as 69.0-70.0' except yellowish gray, (5Y 7/2), wet, hard, low plasticity, rapid dilatancy, mild HCl reaction, 5-10% thinly bedded (3/16"-1-3/16"), black (N1) organic layers, trace fine black (N1) organic particles in silt, carbonate | | SS-15 taken at 08:55 |
| 75 | 75.0 | | | | | | |
| -32.1 | | | | | | | |
| | 78.5 | | | | | | |
| | 79.3 | 0.8 | SS-16 | 24-50/3 (74/9") | | | SS-16 taken at 09:13 |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-11 SHEET 5 OF 10 |

# 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 bgs on 2/11/07 START : 2/7/2007 END : 2/12/2007 LOGGER : T. Stewart, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -37.1 | | | | | **Silty Sand With Limestone (SM)**<br>78.5-79.3' - yellowish gray, (5Y 7/2), wet, very dense, mild HCl reaction, fine to coarse sand-sized, 25% low plastic fines, 25% fine to coarse gravel-sized limestone fragments, 5% organics, carbonate | | |
| | 83.5<br>83.7 | 0.0 | SS-17 | 50/2<br>(50/2") | **Limestone Fragments**<br>83.5-83.7' - moderate yellowish brown, (10YR 5/4), mild to moderate HCl reaction, two 1/4" thick limestone fragments recovered | | SS-17 taken at 09:33<br>Driller's Remark: Advised driller to begin coring, will use HQ coring assembly<br>09:44 begin setting casing using 'devils head' bit for 4" casing<br>Resume drilling at 16:40 |
| 85<br>-42.1 | 85.0 | | | | **No Recovery 85.0-90.0'** | | |
| | | 0.0 | R1-HQ | | | | R1: No run time recorded |
| 90<br>-47.1 | 90.0<br>90.2 | 0.2 | SS-18 | 50/2<br>(50/2") | **Limestone Fragments**<br>90.0-90.2' - yellowish gray to moderate yellow, (5Y 7/2 to 5Y 7/6), mild HCl reaction<br>Begin Rock Coring at 90.0 ft bgs<br>See the next sheet for the rock core log | | SS-18 taken at 16:45 |
| 95<br>-52.1 | | | | | | | |
| 100 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
| 338884.FL | GSC-11 | SHEET 6 OF 11 |

# 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 ORIENTATION : Vertical

WATER LEVELS : 1.7 ft bgs on 2/11/07 START : 2/7/2007 END : 2/12/2007 LOGGER : T. Stewart, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -47.1 | 90.0 | | >10 | | | **Limestone And Limestone Fragments**<br>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 HCl reaction on pulverized fragments<br>**No Recovery 91.0-95.0'** | Start drilling R2-HQ with core barrel at 18:00<br><br>Driller will flush hole, then attempt to core again, the next core run will be R2-HQ<br><br>The order of samples is as follows: SS-17, R1-HQ, SS-18, R2-HQ<br>Driller's Remark: Very little, if any circulation loss<br>R2:3 minutes<br>18:15, last run of 2/8/07 |
| | R2-HQ<br>5 ft<br>20% | 0 | NR | | | | |
| 95 | 95.0 | | | | | | |
| -52.1 | | | >10 | | | **Limestone**<br>95.0-95.7' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), 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<br>**No Recovery 95.7-99.0'** | Start coring with NQ assembly at 15:50 on 2/9/07<br>Driller's Remark: Hard drilling over 95.0-96.0' interval<br>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<br>R3:15 minutes |
| | R3-NQ<br>4 ft<br>18% | 0 | NR | | | | |
| | 99.0 | | | | | | |
| | | | >10 | | | **Limestone**<br>99.0-100.0' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), moderate HCl 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<br>**No Recovery 100.0-104.0'** | Start coring R4-NQ at 09:05 on 2/10/07<br><br>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<br>Driller's Remark: Switch of drill bit to NQ wireline bit<br>Driller's Remark: It was discovered that a conventional NQ drill bit had been in use for the previous runs<br>R4:10 minutes |
| 100<br>-57.1 | | | | | | | |
| | R4-NQ<br>5 ft<br>20% | 0 | NR | | | | |
| | 104.0 | | | | | | |
| | | | 1 | 104.5' - Fracture or bedding plane, horizontal, rough, undulating, tight | | 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 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<br>**No Recovery 105.5-108.3'** | |
| 105<br>-62.1 | | | 1 | 104.85, 105.0' - Mechanical break (2) | | | |
| | R5-NQ<br>5 ft<br>40% | 28 | NR | 105.5' - Fracture, 30 deg, rough, undulating, dissolution cavities on the surface | | | Driller's Remark: Soft zone at 107.0' for 1.0-1.5'<br><br>R5:11 minutes |
| | 109.0 | | 3 | 108.3' - Fracture, 20 deg, rough, undulating, open, assumed not a mechanical break | | | |
| | | | 1 | 108.45' - Fracture, horizontal, rough, undulating | | | |
| 110 | | | | 108.5' - Fracture, 20 deg, rough, undulating | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: GSC-11 | SHEET 7 OF 11 |
|---|---|---|

# 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 ORIENTATION : Vertical

WATER LEVELS : 1.7 ft bgs on 2/11/07 START : 2/7/2007 END : 2/12/2007 LOGGER : T. Stewart, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -67.1 | R6-NQ 5 ft 82% | 56 | >10 | 109.15' - Fracture, horizontal, smooth, undulating, open 1/2" | | **Limestone** 109.0-113.1' - Same as 104.0-109.0' except many dissolution cavities 1/8"x3/8", 15% voids <1/16" over surface, light olive color (5Y 5/2) transitions to dusky yellow gray (5Y 6/4) mottled with light olive gray (5Y 5/2) | |
| | | | >10 | 110.0-110.3' - Fracture zone, vertical and horizontal, tight<br>110.55' - Fracture, <5 deg, rough, undulating, tight | | | Driller's Remark: Loose drilling at 111.0' |
| | | | 1 | 111.0-111.4' - Fracture zone, rock fragments<br>111.9' - Fracture, 20 deg, black stain, tight | | | |
| | | | NR | 112.85' - Fracture, 10 deg, smooth, undulating, no infill, black staining | | **No Recovery 113.1-114.0'** | R6:4 minutes |
| | 114.0 | | | | | | |
| 115 -72.1 | R7-NQ 5 ft 100% | 30 | 3 | 114.5' - Mechanical break, horizontal, smooth, undulating, tight | | **Limestone** 114.0-119.0' - mottled pale yellowish orange and light olive gray, (10YR 8/6 and 5Y 5/2), fine to medium grained, moderate HCl reaction, weak to medium strong (R2 to R3), strongly cemented, 40-50% voids up to 1/16" over rock surface, poorly fossiliferous (casts), <1% fine to medium grained black particles | |
| | | | >10 | 114.6' - Fracture, <5 deg, smooth, undulating, black staining, open 1/2" | | | |
| | | | 3 | 114.8' - Fracture, 40 deg, rough, undulating, no staining, open, top of fractured zone at 114.8-115.7' | | | |
| | | | 4 | 116.0' - Mechanical break, horizontal, rough, undulating, tight<br>116.2' - Fracture, vertical, rough, undulating, black staining, open | | | |
| | | | 1 | 116.55' - Fracture, <5 deg, rough, undulating, stains over 1/4" | | | R7:6 minutes |
| | 119.0 | | | | | | |
| 120 -77.1 | R8-NQ 5 ft 48% | 20 | 1 | 116.8' - Mechanical break, horizontal, smooth, planar, open 1/8"<br>117.0, 117.25, 117.45' - Mechanical break (3)<br>117.85' - Fracture, 70 deg, rough, undulating | | 119.0-121.4' - mottled pale yellowish orange and medium gray and light olive gray, (10YR 8/6 and N5 and 5Y 5/2), fine to medium grained, weak to medium strong (R2 to R3), strong HCl reaction on light colored areas, moderate HCl reaction on darker colored areas, strongly competent, 20-30% voids 1/16"x1/16", 5-10% dissolution cavities 1/8"x1/16", poorly to moderately fossiliferous, casts, 1" section at top is moderate olive brown (5Y 4/4) and moderately to highly fossiliferous (casts)<br>**No Recovery 121.4-124.0'** | |
| | | | >10 | 118.1' - Fracture, horizontal, smooth, undulating, open<br>118.2' - Fracture, <5 deg, rough, undulating, open 3/8" | | | Driller's Remark: 121.0-122.5' soft |
| | | | NR | 118.6-118.7' - Fracture zone or mechanical break<br>119.1' - Mechanical break, along bedding plane from drilling<br>119.5, 119.6' - Fracture (2), horizontal, rough, undulating, open<br>119.9' - Fracture, horizontal, rough, planar, open | | | Driller's Remark: Slightly harder drilling at 122.5'<br>R8:6 minutes<br>Driller's Remark: 123.5' slipped down<br>Started R9-NQ at 14:27 |
| | 124.0 | | | | | | |
| 125 -82.1 | R9-NQ 5 ft 48% | 31 | >10 | 120.05-121.0' - Fracture zone, rough, undulating, open<br>124.0-124.6' - Fracture zone | | **Limestone** 124.0-124.6' - yellowish gray, (5Y 7/2), medium grained, strong HCl reaction, very weak (R1), weakly to moderately competent, voids (<1/16") over 75% of surface, 40% fine to medium grained black (N1) particles<br>124.6-126.4' - light olive brown and moderate olive brown, (5Y 5/6 and 5Y 4/4), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), moderately to highly fossiliferous (many casts, trace molds), white crystal as partial infill in cavities (with mild to moderate HCl reaction)<br>**No Recovery 126.4-129.0'** | |
| | | | 1 | 124.6' - Mechanical break, horizontal<br>125.1' - Fracture, <5 deg, rough, undulating, open | | | Driller's Remark: Soft at 124.0-127.0' |
| | | | 3 | 126.15' - Bedding plane, rough, stepped, open 1/4" | | | |
| | | | NR | 126.25' - Fracture, horizontal, rough, undulating, open 1/4"<br>126.4' - Fracture, horizontal, rough, undulating, open | | | R9:3 minutes |
| | 129.0 | | | | | | |
| 130 | | | >10 | 129.0-130.8' - Fracture zone | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
| 338884.FL | GSC-11 | SHEET 8 OF 11 |

# 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 ORIENTATION : Vertical

WATER LEVELS : 1.7 ft bgs on 2/11/07 START : 2/7/2007 END : 2/12/2007 LOGGER : T. Stewart, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -87.1 | | | >10 | | | **Limestone**<br>129.0-132.7' - Same as 124.6-126.4' | Consistent medium drilling |
| | R10-NQ<br>5 ft<br>74% | 26 | 0 | 130.8' - Fracture, horizontal, rough, undulating, tight<br>131.0' - Fracture, 60 deg, rough, undulating, tight | | | |
| | | | 0 | 131.65' - Fracture, 40 deg, rough, undulating, tight | | | R10:4 minutes |
| | | | NR | 132.3' - Fracture, <5 deg, rough, undulating, open, fractured from 132.3-132.7' | | **No Recovery 132.72-134.0'** | |
| | 134.0 | | | | | | |
| | | | 1 | 134.1' - Fracture, <5 deg, rough, undulating, open 1-1/2" | | **Limestone**<br>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' | |
| 135<br>-92.1 | | | >10 | 135.0' - Fracture, horizontal, rough, undulating, open | | | |
| | R11-NQ<br>5 ft<br>66% | 30 | >10 | 135.0-135.4' - Mechanical break<br>136.15' - Fracture, <5 deg, rough, undulating, top of fractured zone 136.15-136.8', mechanical breaks to 1-1/2" fragments | | | |
| | | | 0 | 136.8' - Mechanical break, horizontal<br>136.9' - Mechanical break | | **No Recovery 137.3-139.0'** | Driller's Remark: Soft at 137.0-138.0' |
| | | | NR | 137.05' - Fracture, vertical, slickensided, stepped<br>137.3' - Fracture, <5 deg, rough, undulating, open | | | R11:4 minutes |
| | 139.0 | | | | | | |
| | | | >10 | 139.25' - Bedding plane, horizontal, rough, planar, open 1/8", top of fractured zone of more friable material, 139.25-139.9' mechanical breaks | | **Limestone**<br>139.0-139.9' - dusky yellow to light olive gray, (5Y 6/4 to 5Y 5/2), fine grained, mild to moderate HCl reaction, medium strong (R3), trace bedding, voids <1/16" over 10-15% surface on stronger intervals, up to 45% on more friable intervals, 10-15% black possible organics | |
| 140<br>-97.1 | | | 1 | | | | Driller's Remark: Very soft from 141.5-143.5' |
| | R12-NQ<br>5 ft<br>30% | 0 | NR | 139.25, 139.9' - Mechanical break (2)<br>140.1' - Fracture, 50 deg, smooth, undulating<br>140.3' - Fracture, <5 deg, rough, undulating | | 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 (R2 to R3), bioturbated, moderately to highly fossiliferous (mostly casts, many molds) up to 1-3/8" | R12:3 minutes |
| | 144.0 | | | | | | |
| | | | 3 | 144.4' - Fracture, 10 deg, rough, undulating, open | | **No Recovery 140.5-144.0'**<br>**Limestone**<br>144.0-146.2' - Same as 139.9-140.5' except less mottling, highly bioturbated, trace very fine to fine organic particles in bioturbated zones | Start R13-NQ at 16:09, ended at 16:14 |
| 145<br>-102.1 | | | >10 | 144.6, 144.9' - Fracture (2), <5 deg, rough, undulating, open<br>145.2, 145.4' - Fracture (2), horizontal, rough, undulating, open 1/4" | | | Driller's Remark: 146.5-147.5' were alternating soft to medium drilling |
| | R13-NQ<br>5 ft<br>86% | 40 | 4 | 145.6' - Fracture, <5 deg, grayish brown (5YR 3/2) stain, tight, 1/8"<br>145.75-146.2' - Fracture zone, limestone gravel up to 1"x1/2" | | 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 5/2), bioturbated zone at 147.2' (1/2" thick) with voids <1/16" | |
| | | | 2 | 146.2' - Mechanical break, tight | | | Driller's Remark: Hard at 147.5' |
| | | | 2 | 146.4' - Bedding plane, horizontal, smooth, undulating, organic infill, tight | | | R13:5 minutes |
| | | | NR | 146.65, 146.8' - Mechanical break (2) | | **No Recovery 148.3-149.0'** | |
| | 149.0 | | | | | | |
| | | | >10 | 147.1, 147.35' - Fracture (2), horizontal, smooth, planar, open 1/2" | | **Limestone**<br>149.0-149.5' - Same as 146.2-148.3' | |
| 150 | | | | | | | |

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|---|---|
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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 ORIENTATION : Vertical

WATER LEVELS : 1.7 ft bgs on 2/11/07 START : 2/7/2007 END : 2/12/2007 LOGGER : T. Stewart, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | RQD (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -107.1 | R14-NQ 5 ft 86% | 37 | 3 | 148.3' - Fracture, horizontal, rough, undulating, open | | **Limestone** 149.5-151.9' - light olive brown to light olive gray, (5Y 5/6 to 5Y 5/2), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), poorly fossiliferous (casts), trace voids up to 1/8" | Measured depth of water at 1.7' below ground surface on 2/11/07 at 08:30 |
| | | | 5 | 149.0-149.35' - Fracture zone, limestone gravel-sized fragments to 3/4"x1" 149.35' - Fracture, horizontal, rough, undulating, open | | | |
| | | | 0 | 149.5' - Fracture, horizontal, rough, undulating, open 3/16" 149.75' - Fracture, horizontal, rough, undulating, tight | | 151.9-153.3' - Same as 146.2-148.3' | |
| | | | 1 | | | | R14:7 minutes |
| | | | NR | 149.9' - Fracture, horizontal, rough, undulating, open, top of fracture zone | | **No Recovery 153.3-154.0'** | |
| | 154.0 | | | | | | |
| 155 -112.1 | R15-NQ 5 ft 76% | 18 | 1 | 149.9-150.2' - Fracture zone, rock fragments to 1"x 1" 150.2' - Fracture, horizontal, rough, undulating, tight to open 1/8" | | **Limestone** 154.0-157.2' - moderate yellow to dusky yellow, (5Y 7/6 to 5Y 6/4), fine to medium grained, strong HCl reaction, weak to medium strong (R2 to R3), ripple laminated in light olive gray (5Y 5/2), alternating parallel intervals of bioturbation, voids up to 1/16" over 5-10% of surface | |
| | | | 1 | 150.3, 150.35, 150.72, 151.0, 151.25, 151.6, 151.75, 151.9' - Fractures (8), horizontal, rough, undulating, tight | | | |
| | | | 1 | 153.3' - Fracture, horizontal, rough, undulating | | | |
| | | | 2 | 154.5' - Fracture, horizontal, rough, planar, tight 154.6-155.1' - Fracture zone | | 157.2-157.8' - olive gray, (5Y 3/2), medium grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids <1/16" on 50-70% of surface, trace dusky yellow (5Y 6/4) discoloration | |
| | | | NR | 155.5' - Fracture, 80 deg, slickensided, stepped, brown staining, tight 156.85, 157.0, 157.6' - Fractures (3), horizontal, rough, undulating, open | | | R15:5 minutes |
| | 159.0 | | | | | | |
| 160 -117.1 | R16-NQ 5 ft 92% | 56 | 2 | 159.4, 159.5' - Fractures (2), rough, undulating, open 1/8" | | **No Recovery 157.8-159.0'** **Limestone** 159.0-162.5' - dusky yellow to moderate olive brown, (5Y 6/4 to 5Y 4/4), fine to medium grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), voids (<1/16") over 30-40% of surface, dissolution cavities up to 3/8"x3/4" on 5% of surface, white mineral infill, some cavities | |
| | | | 1 | | | | |
| | | | 7 | 160.9, 161.0, 161.1' - Bedding plane (3), <5 deg, rough, undulating, tight 161.2, 161.3' - Fracture or mechanical break (2), horizontal, rough, undulating, tight | | | |
| | | | 5 | 161.5, 161.6, 161.7, 162.0, 162.1, 162.2' - Bedding plane (4), horizontal, rough, planar, tight | | | |
| | | | 0 | 162.6' - Bedding plane, horizontal, rough, undulating | | 162.5-163.6' - very pale orange and mottled medium light gray, (10YR 8/2 and N6), strong HCl reaction, weak to medium strong (R2 to R3), highly fossiliferous (very small <1/16" molds/casts) | R16: No run time recorded |
| | 164.0 | | NR | 162.7, 163.0' - Mechanical break (2) 163.45' - Fracture, horizontal, rough, undulating, tight, open 1/8" | | | |
| 165 -122.1 | R17-HQ 2 ft 0% | 0 | NR | | | **No Recovery 163.6-164.0'** **No Recovery 164.0-166.0'** | Driller's Remark: Driller switch to HQ core assembly and used a 2.0' stake on core run R17:1 minute |
| | 166.0 | | | | | | |
| | R18-HQ 5 ft 70% | 16 | 2 | 166.65' - Bedding plane, horizontal, rough, undulating, open | | **Limestone** 166.0-166.9' - moderate olive brown and light olive gray, (5Y 4/4 and 5Y 6/1), fine grained, strong HCl reaction, strong (R4), 30-40% medium grained medium gray (N5) particles, poorly fossiliferous (few casts), laminations at 166.0' | |
| | | | >10 | 166.9' - Bedding plane, horizontal, smooth, planar, open | | | |
| | | | >10 | 166.9-171.0' - Mechanical break, horizontal, smooth, planar, highly competent limestone intervals, related to drilling | | | |
| | | | >10 | | | | |
| 170 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-11 SHEET 10 OF 11 |

# 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 ORIENTATION : Vertical

WATER LEVELS : 1.7 ft bgs on 2/11/07 START : 2/7/2007 END : 2/12/2007 LOGGER : T. Stewart, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES – DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -127.1 | | | NR | | | **Limestone**<br>166.9-169.5' - moderate olive brown, (5Y 4/4), medium to coarse grained, strong HCl reaction, weak (R2), 5-10% powder white mineral infill in voids and cavities, 166.9-167.2' and 167.6-168.0' is olive gray (5Y 6/1), fine matrix, microlaminated<br>**No Recovery 169.5-171.0'**<br>**Limestone**<br>171.0-171.9' - yellowish gray, (5Y 7/2), medium to coarse grained, strong HCl reaction, weak to medium strong (R2 to R3), 10-20% dissolution cavities up to 9/16"x3/8", up to 35% medium gray (N5) coarse-sized grains, poorly fossiliferous (trace casts), sharp contact<br>171.9-176.0' - yellowish gray, (5Y 7/2), fine to medium grained, moderate HCl reaction, weak to medium strong (R2 to R3), very poorly fossiliferous (trace casts), fine bedding laminations (1/16"x3/16") visible on fresh broken face<br>176.0-180.8' - Same as 171.9-176.0' except rippled laminations are visible over 179.0-180.5' | R18: No run time recorded |
| | 171.0 | | | | | | |
| | R19-HQ 5 ft 100% | 56 | 1 | 171.7' - Mechanical break, horizontal, undulating, 1/4" x 5/16" relief, fossil molds exposed on surface | | | |
| | | | 3 | 172.2' - Fracture, horizontal, smooth, undulating | | | |
| | | | 2 | 172.4' - Fracture or mechanical break, <5 deg | | | |
| | | | 2 | 172.5, 172.9, 173.6' - Bedding plane (3), horizontal, rough, undulating, open 3/16" | | | |
| 175<br>-132.1 | | | 2 | 174.1' - Mechanical break or fracture, 70 deg, rough, undulating<br>175.1' - Mechanical break, horizontal, rough, undulating, irregular | | | R19:8 minutes |
| | 176.0 | | | | | | |
| | R20-HQ 5 ft 96% | 32 | 2 | 175.3' - Mechanical break, horizontal, rough, undulating | | | |
| | | | 4 | 175.4' - Bedding plane, horizontal, rough, undulating, open 1/8"x3/16"<br>176.4-176.6' - Fracture, horizontal, rough, clay/gravel interbed, clay infill | | | |
| | | | 1 | 177.0, 177.1' - Fractures (2), horizontal, rough, undulating, clay infill | | | |
| | | | 7 | 177.8' - Fracture or mechanical break, 70 deg, rough, undulating, closely spaced fracture<br>178.6' - Fracture, 45 deg, rough, undulating | | | |
| 180<br>-137.1 | | | 5 | 179.0' - Mechanical break, horizontal, rough, undulating | | | R20: No run time recorded |
| | 181.0 | | NR | 179.2, 179.3, 179.35' - Bedding plane (3), horizontal, rough, planar to undulating | | **No Recovery 180.8-181.0'**<br>**Limestone**<br>181.0-185.0' - Same as 171.9-176.0' | |
| | R21-HQ 5 ft 90% | 48 | 4 | 179.6' - Mechanical break, 10-15 deg, clean, tight | | | |
| | | | 3 | 179.7, 179.85' - Fracture (2), horizontal, rough, planar, dark brown staining<br>180.0' - Mechanical break, 0-5 deg, undulating, clean | | | |
| | | | 0 | 180.1, 180.3' - Bedding plane (2), horizontal, rough, brown staining | | | |
| | | | 6 | 180.6, 180.7' - Fractures (2), horizontal, rough, undulating, slight staining, no infill<br>181.2' - Fracture, fragmented limestone | | | |
| 185<br>-142.1 | | | 5 | 181.5, 181.6, 181.7' - Fracture (3), fragmented limestone, horizontal planar breaks | | | R21: No run time recorded |
| | 186.0 | | NR | 182.0' - Bedding plane, horizontal, rough, planar, slight brown staining on fracture<br>182.5' - Fracture, rough, horizontal partings, cavity-rich limestone breaks (fragmented)<br>182.7' - Fracture, rough, irregular break<br>184.0' - Bedding plane, horizontal, smooth<br>184.05, 184.45, 184.50, 184.6' - Bedding plane (4), horizontal, smooth<br>184.95, 185.0, 185.05, 185.1' - Bedding plane (4), horizontal, smooth, fine spaced (3/8"x7/8") | | **Limestone**<br>185.3-185.5' - dark brown, fossiliferous surface, voids on >60% of surface, molds and casts<br>**No Recovery 185.5-186.0'**<br>Bottom of Boring at 186.0 ft bgs on 2/12/2007 | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: GSC-11 SHEET 11 OF 11 |
|---|---|

# 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 ORIENTATION : Vertical

WATER LEVELS : 1.7 ft bgs on 2/11/07 START : 2/7/2007 END : 2/12/2007 LOGGER : T. Stewart, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 185.3' - discontinuity with much more void/fossil-rich limestone, dark brown/yellow color<br>185.5' - end of run | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | GSC-12 SHEET 1 OF 10 |

# SOIL BORING 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

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 START : 5/16/2007 END : 5/19/2007 LOGGER : C. Wallested

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 41.0 | 0.0 – 1.5 | 1.2 | SS-1 | 1-3-3 (6) | **Topsoil** 0.0-0.2' **Poorly Graded Sand (SP)** 0.2-1.15' - grayish orange to moderate yellowish brown, (10YR 7/4 to 10YR 5/4), moist, loose, 5% nonplastic fines, trace organics, fine silica sand | | Driller's Remark: Material at 5.0-5.65' started at 3.0' below ground surface |
| 5 | 5.0 – 6.5 | 0.7 | SS-2 | 3-3-3 (6) | **Clayey Sand (SC)** 5.0-5.65' - light olive gray, (5Y 6/1), moist, loose, very fine to fine silica sand, 40-45% high plastic fines, trace fine gravel (possible concretion) | | |
| 36.0 | | | | | | | |
| 10 | 10.0 – 11.5 | 0.4 | SS-3 | 3-13-6 (19) | **Silty Limestone Gravel With Sand (GM)** 10.0-10.4' - yellowish gray, (5Y 8/4), wet, medium dense, strong HCl reaction, fine to coarse gravel-sized limestone, composed of mostly (<75%) fossil cast and molds (possible shell hash coquina), 35-40% fine to coarse sand sized (similar to limestone), 15% nonplastic to low plastic fines, carbonate material | | Driller's Remark: Lost circulation at 10.0' below ground surface Driller mixed thick mud, regain circulation |
| 31.0 | | | | | | | |
| 15 | 15.0 – 15.9 | 0.8 | SS-4 | 32-50/4.5 (82/10.5") | **Silty Limestone Gravel With Sand (GM)** 15.0-15.8' - Same as 10.0-10.4' except moderately fossiliferous with 3/4"x3/16" size casts over 10-15% of the rock surface, light olive brown (5Y 5/6) staining on some face | | Driller's Remark: Light chattering at 15.8' below ground surface |
| 26.0 | | | | | | | |
| 20 | | | | | | | |

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

# SOIL BORING 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

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 START : 5/16/2007 END : 5/19/2007 LOGGER : C. Wallested

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 21.0 | 20.0–21.5 | 1.2 | SS-5 | 8-12-12 (24) | **Silty Sand (SM)** 20.0-21.15' - yellowish gray, (5Y 8/1), wet, medium dense, very fine to fine silica sand, trace fine carbonate sand, 20% nonplastic fines, moderate HCl reaction in carbonate material, 1" thick bed of sandy fat clay at bottom of sample | | |
| 25 / 16.0 | 25.0–26.5 | 1.5 | SS-6 | 5-4-19 (23) | **Sandy Silt (ML)** 25.0-26.15' - yellowish gray, (5Y 8/1), wet, very stiff, low plasticity, rapid dilatancy, strong HCl reaction, 25% fine to coarse carbonate sand, 1" thick dark greenish gray (5GY 4/1) and 2-1/2" thick dark yellowish orange (10YR 6/6) fat clay lenses at 25.0' and 25.95' respectively **Silt (ML)** 26.15-26.5' - very pale orange, (10YR 8/2), wet, very stiff, low plasticity, rapid dilatancy, moderate to strong HCl reaction, carbonate material | | |
| 30 / 11.0 | 30.0–31.0 | 0.7 | SS-7 | 46-50/5.5 (96/11.5") | **Sandy Silt With Limestone Fragments (ML)** 30.0-30.7' - grayish orange, (10YR 7/4), wet, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 25% fine to coarse sand sized, 10-15% fine gravel sized limestone fragments, carbonate material | | |
| 35 / 6.0 | 35.0–36.5 | 0.8 | SS-8 | 5-9-16 (25) | **Sandy Silt And Limestone (ML)** 35.0-35.8' - Same as 30.0-30.7' except yellowish gray, (5Y 7/2), very stiff, 1-1/4" limestone fragments | | Driller's Remark: 36.5' below ground surface: hard rock |
| 40 | | | | | | | |

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

# SOIL BORING 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

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 START : 5/16/2007 END : 5/19/2007 LOGGER : C. Wallested

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 1.0 | 40.0 – 41.5 | 0.9 | SS-9 | 15-22-41 (63) | **Silt With Sand And Limestone (ML)** 40.0-40.9' - dusky yellow, (5Y 6/4), moist, hard, nonplastic, rapid dilatancy, moderate HCl reaction, 20-25% fine to coarse sand-sized, 10% fine to coarse 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) | | Driller's Remark: Lost 100 % circulation at 40.0' below ground surface; mixed thick mud and regained circulation |
| 45 -4.0 | 45.0 – 46.5 | 1.2 | SS-10 | 14-15-26 (41) | **Silt With Sand (ML)** 45.0-46.2' - yellowish gray, (5Y 7/2), wet, hard, low plasticity, rapid dilatancy, moderate to strong HCl reaction, 20% fine to coarse sand-sized, trace fine gravel-sized limestone fragments, carbonate material | | |
| 50 -9.0 | 50.0 – 51.5 | 1.3 | SS-11 | 22-18-23 (41) | **Limestone Fragments** 50.0-50.2' - moderate yellowish brown, (10YR 5/4), moderate HCl reaction<br>**Silt With Sand (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 -14.0 | 55.0 – 56.5 | 1.5 | SS-12 | 34-39-49 (88) | **Silt With Sand (ML)** 55.0-56.5' - Same as 50.2-51.3' except increase in fine gravel-sized limestone with depth to 10%, trace dark (possible organic) mottling | | 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: |
|---|---|
| 338884.FL | GSC-12 SHEET 4 OF 10 |

# SOIL BORING 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

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 START : 5/16/2007 END : 5/19/2007 LOGGER : C. Wallested

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -19.0 | 60.0 – 61.5 | 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 | 65.0 | | | | | | |
| -24.0 | 66.5 | 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 | | Driller's Remark: Increase in hardness of material at 68.0' below ground surface |
| 70 | 70.0 | | | | | | |
| -29.0 | 70.3 | 0.1 | SS-15 | 50/3 (50/3") | **Limestone Fragments** 70.0-70.1' - moderate yellowish brown, (10YR 5/4), moderate HCl reaction | | |
| 75 | 75.0 – 75.1 | 0.1 | SS-16 | 50/2 (50/2") | **Limestone Fragments** 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 | | |
| -34.0 | | | | | | | |
| 80 | | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: GSC-12 | SHEET 5 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 ft bgs on 05/17/2007 START : 5/16/2007 END : 5/19/2007 LOGGER : C. Wallested

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -34.0 | 75.0 | | | | | | Begin rock coring at 75' |
| | R1-NQ 5 ft 88% | 43 | 4 | 75.15, 78.15, 78.55, 78.65, 78.8' - Bedding plane (5), horizontal, smooth, undulating, tight | | **Limestone** 75.0-79.4' - moderate yellowish brown, (10YR 5/4), fine to medium grained, moderate to strong HCl reaction, extremely weak to weak (R0 to R2), up to 1/8" voids cover 15-40% of surface, up to 3/16"x3/8" fossil casts, up to 3/16" thick dark (possible organic) lamination, voids cover 40% of surface below 78.3' with trace grayish hard infill to 9/16" diameter, trace <9/16" cavities throughout the core | |
| | | | 3 | 75.6' - Bedding plane or mechanical break, 10 deg, smooth, undulating, open 1/2" | | | |
| | | | 2 | 75.7' - Fracture, 80 deg, smooth, undulating, tight<br>75.95' - Bedding plane, horizontal, smooth, planar, tight | | | |
| | | | 4 | 76.1' - Fracture, vertical, smooth, undulating, tight, vertical from 75.6-76.55'<br>76.55' - Bedding plane, horizontal, smooth, undulating, tight | | | R1:7 minutes |
| | | | 0 | | | | |
| 80 | 80.0 | | NR | 76.85' - Mechanical break or fracture, 40 deg, smooth, undulating, tight | | **No Recovery 79.4-80.0'** | |
| -39.0 | | | >10 | 77.2' - Fracture, 70 deg, smooth, undulating, tight | | **Limestone** 80.0-81.25' - Same as 75.0-79.4' except 3/4" thick brownish black (5YR 2/1) fat clay at 80.25-80.3' **No Recovery 81.25-85.0'** | |
| | | | >1 | 77.35' - Fracture, 30 deg, smooth, undulating, tight | | | |
| | R2-NQ 5 ft 25% | 10 | NR | 80.0-80.25' - Fracture zone, fragments to 1"x1-1/2"<br>80.25-80.3' - Clay seam, clay layer or infill<br>80.3' - Bedding plane, horizontal, smooth, planar, in contact with clay layer or infill<br>80.55' - Mechanical break or bedding plane, horizontal, smooth, stepped, tight<br>81.0-81.25' - Fracture zone, fragments to 1-3/4"x2" | | | R2:3 minutes |
| 85 | 85.0 | | | | | | |
| -44.0 | | | 2 | 85.4, 85.6, 86.3, 86.6, 86.8, 87.0' - Mechanical break (6), rough, undulating, associated with cavities, open 1/4"-2" | | **Limestone** 85.0-88.7' - moderate yellowish brown, (10YR 5/4), medium to coarse grained, moderate to strong HCl reaction, extremely weak to weak (R0 to R2), voids (up to 1/8") cover 25% of surface, moderately fossiliferous (casts and molds up to 3/16"-3/8"), 2"x1-3/8" cavities over 10% of surface, percentage of voids coverage decreases with depth | |
| | | | 3 | | | | |
| | R3-NQ 5 ft 100% | 73 | 1 | | | | |
| | | | 0 | | | | |
| | | | 1 | | | 88.7-90.0' - moderate yellowish brown, (10YR 5/4), medium to coarse grained, strong HCl reaction, weak to medium strong (R2 to R3), up to 1/8" voids cover 15% of surface, up to 3/8"x3/16" trace fossil casts, trace organic matter | R3:6 minutes |
| 90 | 90.0 | | | | | | |
| -49.0 | | | 0 | 89.8' - Fracture, 60 deg, smooth, undulating, tight | | 90.0-92.5' - Same as 88.7-90.0' except trace cavities up to 1-3/16"x2", fossiliferous material with casts up to 3/8"x3/4", up to 2"x2-3/4" trace infill | |
| | | | 1 | | | | |
| | R4-NQ 5 ft 97% | 85 | 2 | 91.65' - Bedding plane, horizontal, smooth, planar to stepped, tight<br>92.05' - Mechanical break, 10 deg, smooth, undulating, tight | | 92.5-94.85' - grayish orange, (10YR 7/4), fine to medium grained, strong HCl reaction, weak to medium strong (R2 to R3), voids (up to 1/16") cover 5-15% of surface, trace dark (possible organic) material, carbonate material | |
| | | | 1 | 92.8' - Fracture (2), 85 deg, smooth, undulating, intersecting, tight<br>93.5' - Fracture or mechanical break, 10 deg, smooth, undulating, tight | | | |
| | | | >3 | 94.2' - Fracture, 70 deg, smooth, undulating, tight | | | R4:11 minutes |
| 95 | 95.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
| 338884.FL | GSC-12 | SHEET 6 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 ft bgs on 05/17/2007 START : 5/16/2007 END : 5/19/2007 LOGGER : C. Wallested

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS | SYMBOLIC LOG | LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS | COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC. |
|---|---|---|---|---|---|---|---|
| -54.0 | | | NR | 94.5-94.55' - Fracture zone | | **No Recovery 94.85-95.0'** | |
| | | | 1 | 95.05' - Bedding plane or mechanical break, <10 deg, rough, undulating, tight | | **Limestone** 95.0-99.1' - grayish orange, (10YR 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 organic) mottling, extremely weak (R0) at 97.4-98.05', fossil casts (up to 3/8") over 5-10% of surface | |
| | | | 0 | | | | |
| | R5-NQ 5 ft 82% | 60 | >3 | 97.0' - Fracture, 80 deg, smooth, undulating, tight | | | Driller's Remark: Very crumbly feeling between 97.0-98.5' below ground surface; soft |
| | | | | 97.2' - Bedding plane, horizontal, smooth, planar, tight | | | |
| | | | 4 | 97.75-97.85' - Fracture zone, fragments to 2" | | | |
| | | | 0 | 98.0' - Fracture or mechanical break, 45 deg, rough, undulating, open to fracture zone | | **No Recovery 99.1-100.0'** | R5:7 minutes |
| | | | NR | 98.15' - Bedding plane, <10 deg, smooth, undulating, dark stain on one face, open 1/2" | | | |
| 100 | 100.0 | | | | | | |
| -59.0 | | | 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 | |
| | | | | 98.8' - Fracture, 50 deg, rough, undulating | | | |
| | | | 3 | 100.85' - Fracture, 20 deg, smooth, undulating to planar, tight | | | |
| | | | | 100.95' - Fracture, 70 deg, smooth, undulating to planar, tight, intersects fracture at 108.5' | | | |
| | R6-NQ 5 ft 98% | 68 | 2 | 101.8' - Fracture, 40 deg, smooth, undulating, tight | | | |
| | | | 3 | 101.9' - Fracture, 70 deg, smooth, undulating, tight | | | |
| | | | >2 | 102.0' - Fracture, 20 deg, smooth, undulating, tight | | | R6:8 minutes |
| 105 | 105.0 | | | 102.35' - Bedding plane, horizontal, smooth, undulating, tight | | | |
| -64.0 | | | NR | | | **No Recovery 104.9-105.0'** | |
| | | | >10 | 103.1' - Fracture, 65 deg, smooth, undulating, tight | | **Limestone** 105.0-108.75' - Same as 95.0-99.1 except moderate HCl reaction, extremely weak (R0) zone at 105.3-105.65' and 106.85-107.35' | Driller's Remark: Soft between 105.5-106.5' and 107.0-108.0' |
| | | | >2 | 103.45' - Fracture, 10 deg, smooth, undulating, tight | | | |
| | | | | 103.7' - Fracture, 20 deg, smooth, undulating, tight | | | |
| | R7-NQ 5 ft 75% | 26 | >3 | 104.4-104.55' - Fracture zone, fragments to 1"x2" | | | |
| | | | 3 | 104.55' - Fracture, 30 deg, smooth, undulating, tight, open to fracture zone | | | |
| | | | | 104.8' - Fracture, 80 deg, rough, undulating, tight | | **No Recovery 108.75-110.0'** | |
| | | | NR | 105.0-105.4' - Fracture zone, fragments to 1-1/2" | | | R7:6 minutes |
| 110 | 110.0 | | | | | | End of day on 05/17/2007 at 17:10 |
| -69.0 | | | 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' except extremely weak (R0) zone at 110.8-111.3', 103.6-104.8' depth intervals, trace dark (possible organic) lamination, mild HCl reaction in weak (R2) zone, moderate HCl reaction in extremely weak (R0) zone | 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" | | | |
| | R8-NQ 5 ft 100% | 60 | 1 | 106.45' - Fracture, 20 deg, smooth, undulating, tight to open | | | |
| | | | | 106.55' - Fracture, 60 deg, rough, undulating, tight to open | | | |
| | | | 3 | 106.85-107.35' - Fracture zone, fragments to 1/2" | | | Driller's Remark: Soft between 113.5-114.5' |
| | | | 2 | 107.75-107.95' - Fracture zone, fragments to 1"x2" | | | R8:7 minutes |
| 115 | 115.0 | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: 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 ORIENTATION : Vertical

WATER LEVELS : 3.5 ft bgs on 05/17/2007 START : 5/16/2007 END : 5/19/2007 LOGGER : C. Wallested

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -74.0 | R9-NQ 5 ft 52% | 10 | 3 | 108.4' - Fracture, 20 deg, smooth, undulating, tight | | **Limestone** 115.0-117.6' - moderate yellowish brown, (10YR 5/4), fine grained, mild to moderate HCl reaction, medium strong (R3) rock becoming weak (R2) rock below 117.0', voids (up to 1/16") cover 10% of the surface, trace cavities up to 1/4", similar to 95.0-99.1' **No Recovery 117.6-120.0'** | |
| | | | >3 | 108.6' - Fracture, 80 deg, smooth, undulating, tight, intersects fracture at 108.4' | | | |
| | | | >10 | 110.05' - Fracture, 80 deg, smooth, undulating, tight, continues same fracture at 108.6' | | | |
| | | | NR | 110.85' - Bedding plane, horizontal, smooth, undulating, tight | | | |
| | | | | 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' | | | R9:7 minutes |
| 120 | 120.0 | | | 112.4' - Fracture or mechanical break, 65 deg, rough, undulating, tight | | | |
| -79.0 | R10-NQ 5 ft 68% | 40 | 3 | 113.35' - Fracture, 30 deg, smooth, undulating, tight | | **Limestone** 120.0-121.5' - Same as 115.0-117.6' except extremely weak (R0) zone at 120.4-120.55' | |
| | | | >3 | 113.4' - Fracture, 75 deg, smooth, undulating, tight, intersects fracture at 113.35' | | | |
| | | | 1 | 113.8' - Bedding plane or mechanical break, 10 deg, smooth, undulating, tight, top of extremely weak (R0) zone | | 121.5-122.35' - moderate yellowish brown, (10YR 5/4), fine to medium grained, moderate HCl reaction, medium strong (R3), voids (up to 1/16") cover 5-20% of surface, moderately fossiliferous with up to 3/16"x3/8" echinoid casts, harder fine grained light colored infill, trace voids in 121.95-122.0' and 122.2-122.35' | Driller's Remark: At 121.5', 100% loss of circulation |
| | | | 3 | 114.2' - Bedding plane or mechanical break, 10 deg, smooth, undulating, tight, middle of extremely weak (R0) zone | | | |
| | | | NR | 114.7-114.8' - Fracture zone, extremely weak (R0) zone | | | R10:9 minutes |
| | | | | 115.55' - Fracture, 70 deg, smooth, undulating, tight | | | |
| 125 | 125.0 | | | 115.6' - Fracture, 20 deg, smooth, undulating, tight, intersects fracture at 115.55' | | 122.35-123.4' - moderate yellowish 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 cavities up to 3/8"x2", 3/8"x2" trace fossil casts **No Recovery 123.4-125.0'** | |
| -84.0 | R11-NQ 5 ft 46% | 0 | >10 | 115.9' - Fracture, 15 deg, smooth, undulating, tight | | **Limestone** 125.0-125.6' - Same as 95.0-99.1' except mild HCl reaction, no extremely weak (R0) zone | |
| | | | >10 | 116.2' - Fracture, 80 deg, smooth, undulating, tight | | | |
| | | | 2 | 116.4-116.6' - Fracture zone, fragments to 1"x1-1/2" | | | |
| | | | NR | 116.75' - Fracture, 20 deg, smooth, undulating, tight | | 125.6-126.4' - Same as 121.5-122.35 except interbedded with hard light colored fine grained rock | |
| | | | | 117.05-117.6' - Fracture zone, fragments to 1"x1-1/2" | | | |
| | | | | 120.4' - Bedding plane or mechanical break, 10 deg, rough, undulating, tight to open 1/4" | | | R11:6 minutes |
| | | | | 120.55' - Fracture, 35 deg, smooth, undulating, tight | | 126.4-127.3' - Same as 122.35-123.4 except weak to medium strong (R2 to R3) **No Recovery 127.3-130.0'** | |
| 130 | 130.0 | | | | | | |
| -89.0 | R12-NQ 5 ft 10% | 0 | >10 | 120.6' - Fracture, 10 deg, smooth, undulating, tight | | **Limestone** 130.0-130.5' - Same as 121.5-122.35 except interbedded **No Recovery 130.5-135.0'** | |
| | | | NR | 121.2' - Bedding plane, horizontal, smooth, undulating, tight | | | |
| | | | | 121.2-121.5' - Fracture zone, fragments to 1"x2" | | | Driller's Remark: Very soft between 131.5-134.0' |
| | | | | 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, tight | | | R12:3 minutes |
| 135 | 135.0 | | | | | | |

| PROJECT NUMBER: 338884.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 ft bgs on 05/17/2007 START : 5/16/2007 END : 5/19/2007 LOGGER : C. Wallested

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -94.0 | R13-NQ 5 ft 56% | 8 | >10<br>>10<br>2<br>NR | 123.3' - Bedding plane, horizontal, smooth, undulating, tight, voids and cast parallel to break<br>125.0-125.3, 125.6-125.7' - Fracture zone (2), fragments to 3/4"x1-1/2"<br>126.1-126.4' - Fracture zone, fragments to 1"x2", many parallel horizontal bedding plane breaks<br>126.65' - Bedding plane, horizontal, smooth, undulating, tight<br>126.75' - Fracture, 70 deg, smooth, undulating, tight<br>127.0, 127.15' - Fracture (2), 10 deg, smooth, undulating, tight<br>130.-130.5' - Fracture zone, fragments to 1"x2" parallel to horizontal bedding planes in many places | | **Limestone**<br>135.0-137.8' - dark yellowish orange to moderate yellowish brown, (10YR 6/6 to 10YR 5/4), medium grained, weak to medium strong (R2 to R3), voids (up to 3/16") over 5-15% of surface, casts (up to 3/16"x3/8") cover 5% of surface, 1" thick trace light gray fine grained infill at the end of run, no voids visible at 136.85-136.95'<br>**No Recovery 137.8-140.0'** | R13:6 minutes |
| 140 | 140.0 | | | | | | |
| -99.0 | R14-NQ 5 ft 66% | 27 | >10<br>2<br>>10<br>>1<br>NR | 135.0-137.0' - Fracture zone, fragments to 2"x3"<br>137.4' - Fracture, 20 deg, smooth, undulating<br>137.65' - Bedding plane, horizontal, smooth, undulating, open 1/4"<br>140.0-140.75' - Fracture zone, fragments to 2"x2"<br>141.85' - Fracture, 80 deg, smooth, undulating, tight<br>142.0' - Fracture, 10 deg, smooth, undulating, dark stain, tight<br>142.05-142.5' - Fracture zone, fragments to 1"x2"<br>142.85-142.95' - Fracture zone, 1" fragments | | **Limestone**<br>140.0-143.3' - pale yellowish brown with grayish orange mottling, (10YR 6/2 with 10YR 7/4), fine to medium grained, moderate HCl reaction, medium strong (R3), voids (up to 1/8") cover 5-15% of surface, cavities (up to 3/4"x9/16") over 5% of surface, casts (up to 1-3/16" size) cover 5-10% of surface, cavities filled with pale yellowish brown infill with voids over 30% of the infill; at 140.0-140.3' darker coarse grained and high percentage of void coverage<br>**No Recovery 143.3-145.0'** | R14:17 minutes |
| 145 | 145.0 | | | | | | |
| -104.0 | R15-NQ 5 ft 52% | 0 | >10<br>8<br>>2<br>NR | 143.1-143.3' - Fracture zone, fragments to 1"x2"<br>145.0-145.25' - Fracture zone, fragments to 1-1/2"x2"<br>145.35, 145.6, 146.15, 146.2, 146.3, 146.5, 146.7, 147.1, 147.35, 147.5, 147.5' - Bedding plane (10), horizontal, smooth, planar, tight<br>145.4' - Fracture, 45 deg, smooth, planar, tight<br>145.85-146.2' - Fracture zone, fragments to 2"x2-1/2", multiple high angle fractures and bedding planes<br>146.7' - Fracture, 65 deg, smooth, undulating, tight<br>147.35-147.6' - Fracture zone, fragments to 2"x2-1/2" | | **Limestone**<br>145.0-147.6' - grayish orange, (10YR 7/4), fine grained, strong HCl reaction, medium strong (R3), trace voids (up to 1/16"), trace fossil casts (up to 1/8"x3/16"), trace dark laminations<br>**No Recovery 147.6-150.0'** | Driller's Remark: Regained circulation at 149.0'<br>R15:12 minutes |
| 150 | 150.0 | | | | | | |
| -109.0 | R16-NQ 5 ft 78% | 48 | >4<br>>2<br>2<br>>4<br>NR | 150.1, 150.45, 150.65, 151.3, 151.7, 152.5, 152.6, 153.4, 153.55, 153.7, 153.8' - Bedding plane (11), horizontal, smooth, planar to undulating, tight to open 1/4"<br>150.8-151.3' - Fracture zone, fragments to 1"x2" | | **Limestone**<br>150.0-151.3' - moderate yellowish brown, (10YR 5/4), coarse grained, mild HCl reaction, weak (R2), voids (up to 1/8") cover 30-35% of surface, no visible fossil or cavities<br>151.3-153.9' - Same as 145.0-147.6' except mild HCl reaction, voids cover 5-10% of surface and increase abruptly to 15-30% at 153.4', trace fossil casts (up to 3/16"x3/8"), rock strength decreases to weak rock (R2) at 153.4' and coverage by dark wavy laminations increases to 10% after 153.4' | Driller's Remark: Regained 100% circulation at 150.0'; water level 4.0' below ground surface at 13:30<br>Driller's Remark: At 151.0', circulation drops to 25%<br>R16:10 minutes |
| 155 | 155.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
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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

WATER LEVELS : 3.5 ft bgs on 05/17/2007 START : 5/16/2007 END : 5/19/2007 LOGGER : C. Wallested

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -114.0 | R17-NQ 5 ft 95% | 34 | 3 | 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" | | **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 HCl 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 HCl 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% | |
| | | | 6 | 156.1' - Fracture, 45 deg, rough, undulating, tight | | | |
| | | | >7 | 156.2' - Fracture, 45 deg, rough, undulating, open | | | |
| | | | 2 | 156.8' - Mechanical break or bedding plane, horizontal, rough, undulating, tight 156.9, 156.95' - Fracture (2), 75 deg, rough, undulating, tight | | | Driller's Remark: Soft drilling at 158.5-159.0' R17:6 minutes |
| | | | 3 | 157.6-157.8' - Fracture zone, fragments to 2" | | | |
| 160 | 160.0 | | NR | 158.85' - Fracture, 30 deg, smooth, undulating, tight | | | |
| -119.0 | R18-NQ 5 ft 74% | 52 | >2 | 159.0-159.2' - Fracture zone, fragments to 3/4"x2" | | | |
| | | | >4 | 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" | | **No Recovery 159.75-160.0'** **Limestone** 160.0-161.4' - Same as 155.0-157.9' 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 160.0-161.4 162.5-163.7' - Same as 157.9-158.5' | Driller's Remark: Very soft at 161.0-162.0' |
| | | | 2 | 160.9' - Fracture, 70 deg, smooth, undulating, tight | | | |
| | | | 1 | 161.3-161.35' - Fracture zone, fragments to 1/4"x2", mostly planar bedding plane | | | |
| | | | NR | | | **No Recovery 163.7-165.0'** | R18:5 minutes |
| 165 | 165.0 | | | | | | End of day on 5/18/07 at 17:35 Begin coring on 5/19/07 at 08:05 |
| -124.0 | R19-NQ 5 ft 96% | 28 | >6 | 165.3' - Fracture, 80 deg, smooth, planar, open, fragments | | **Limestone** 165.0-167.8' - repeated alternating transitions between moderate yellowish brown and pale yellowish brown, (10YR 5/4 and 10YR 6/2), moderate HCl 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 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 HCl 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 HCl reaction | |
| | | | >4 | 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 | | | |
| | | | 5 | 166.55-166.65' - Fracture zone, fragments to 1/4"x1", mostly planar, horizontal bedding plane | | | |
| | | | 2 | 168.0, 168.1' - Fracture (2), 10 deg, smooth, planar, tight | | | |
| | | | 4 | 168.35' - Fracture, 45 deg, smooth, undulating, tight | | | R19:10 minutes |
| 170 | 170.0 | | NR | 169.1' - Fracture, 35 deg, smooth, undulating, tight | | | |
| -129.0 | R20-NQ 5 ft 100% | 69 | 5 | 169.3' - Fracture, 60 deg, smooth, undulating, tight | | | |
| | | | >3 | 169.55' - Fracture, 60 deg, smooth, undulating, tight | | | |
| | | | 2 | 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 | | | |
| | | | 1 | 170.7' - Fracture, 80 deg, smooth, undulating, tight | | **No Recovery 169.8-170.0'** | |
| | | | 4 | 171.55-171.9' - Fracture zone, fragments to 1"x2-1/2" | | | R20:7 minutes |
| 175 | 175.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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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

WATER LEVELS : 3.5 ft bgs on 05/17/2007 START : 5/16/2007 END : 5/19/2007 LOGGER : C. Wallested

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -134.0 | R21-NQ 5 ft 80% | 55 | 1 | 171.9' - Fracture, rough, undulating, open by fracture zone | | **Limestone** | |
| | | | 3 | 172.25' - Fracture, 30 deg, smooth, undulating, tight | | 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' | |
| | | | >7 | 172.7' - Fracture, 20 deg, smooth, undulating, tight | | | |
| | | | 10 | 173.7' - Bedding plane, <5 deg, smooth, undulating, dark stain, tight | | | |
| | | | NR | 174.6, 174.65' - Fracture (2), 50 deg, smooth, undulating, tight | | 175.0-176.4' - Same as 167.8-169.8' except trace cavities up to 3/16"x1-9/16" lying parallel to bedding | |
| | | | | 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 | | 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' | R21:7 minutes |
| 180 | 180.0 | | | | | | |
| -139.0 | R22-NQ 5 ft 100% | 80 | 3 | 177.2' - Fracture, vertical, smooth, undulating, missing opposite faces | | | |
| | | | 1 | 177.55-177.6' - Fracture zone, fragments to 1/4"x1/2" | | | |
| | | | 2 | 178.9, 178.95' - Fracture (2), 75 deg, smooth, undulating, tight | | | |
| | | | 0 | 180.05, 181.7, 182.55, 182.75' - Bedding plane, horizontal, smooth, planar to undulating, tight to open 1/4" | | **No Recovery 179.0-180.0'** | |
| | | | 1 | 180.4' - Fracture, 70 deg, smooth, undulating, missing face | | **Limestone** | |
| | | | | 180.75' - Fracture, 60 deg, smooth, undulating, tight to open 1/2" | | 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 weak (R0) at 182.55-182.75' | R22:9 minutes |
| 185 | 185.0 | | | 184.65' - Fracture, 25 deg, smooth, undulating, dark stain, tight | | 184.6-185.0' - Same as 165.0-167.8' | |
| -144.0 | | | | | | Bottom of Boring at 185.0 ft bgs on 5/19/2007 | |

| 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

DRILLING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/20/2007 END : 2/22/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.5 | 0.0 | | | | **Poorly Graded Sand (SP)**<br>0.0-1.3' - gray, (N3), moist to wet, fine grained, silica sand, trace nonplastic fines | | "Water level is based on Ground Water Monitoring at LNP site (FSAR Table 2.4.12.08)" |
| | | 6.0 | R1-SN | | **Silty Sand (SM)**<br>1.3-3.0' - moderate yellowish brown grading to dark yellowish orange, (10YR 5/4 to 10YR 6/6), moist to wet, fine grained, poorly graded, with nonplastic fines<br>**Silty Sand (SM)**<br>3.0-4.0' - dark yellowish orange, (10YR 6/6), wet, fine grained, silica sand, with nonplastic to low plasticity fines | | Water levels were not recorded for I-01 |
| 5<br>37.5 | | | | | **Sandy Silt/sandy Lean Clay (CL-ML)**<br>4.0-4.5' - yellowish gray, (5Y 7/2), moist, low to medium plasticity, blocky, with fine grained silica sand | | |
| | 6.0 | | | | **Fat Clay With Sand (CH)**<br>4.5-5.0' - medium light gray, (N6), moist to wet, medium to high plasticity, with fine grained silica sand<br>**Silt (ML)**<br>5.0-13.0' - very pale orange, (10YR 8/2), moist, nonplastic to low plasticity, carbonate materials | | |
| 10<br>32.5 | | 10.0 | R2-SN | | | | |
| | | | | | **Silt With Limestone Fragments (ML)**<br>13.0-16.0' - very pale orange, (10YR 8/2), moist, nonplastic to low plasticity, with sand to gravel-sized limestone fragments, sample is about 50% silt and 50% limestone fragments, all carbonate materials | | |
| 15<br>27.5 | | | | | | | |
| | 16.0 | | | | 16.0-19.0' - Same as 13.0-16.0' except greater percentage of silt (up to 60%) | | |
| | | | | | **Limestone**<br>19.0-19.5' - very pale orange, (10YR 8/2), full core-diameter (4") fragments 1" thick | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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

DRILLING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/20/2007 END : 2/22/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.5 | | 10.0 | R3-SN | | **Sandy Silt (ML)**<br>19.5-24.5' - pale yellowish brown, (10YR 6/2), moist to wet, nonplastic to low plasticity, blocky, all carbonate materials | | |
| 25<br>17.5 | | | | | **Limestone Fragments**<br>24.5-26.0' - very pale orange, (10YR 8/2), fossiliferous, fragments up to 3"-4" | | Top of rock estimated to be approximately 26.0' below ground surface |
| | | | | | Begin Rock Coring at 26.0 ft bgs<br>See the next sheet for the rock core log | | |
| 30<br>12.5 | | | | | | | |
| 35<br>7.5 | | | | | | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
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| 338884.FL | I-01 SHEET 3 OF 15 |

# ROCK CORE 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/20/2007 END : 2/22/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 26.0 | | | | | **Limestone**<br>26.0-29.7' - grayish orange to dark yellowish orange, (10YR 7/4 to 10YR 6/6), mild HCl reaction, fossiliferous, fine to coarse sand and fine to coarse gravel-size limestone fragments, all carbonate materials | |
| | | | | 26.0-36.0' - NA | | | Set 8" casing to 28" with bentonite around between 8" to 6" casing |
| | | | NA | | | | |
| 30<br>12.5 | | | | | | **Limestone Fragments**<br>29.7-33.0' - moderate yellowish brown to dark yellowish brown, (10YR 5/4 to 10YR 4/2), mild to strong HCl reaction, non fossiliferous, full core-diameter fragments up to 2" thick | NA = Not Applicable<br>NR = No Recovery |
| | R4-SN<br>10 ft<br>70% | NA | | | | | Coring run times not recorded for I-01 |
| | | | | | | **No Recovery 33.0-36.0'** | |
| | | | NR | | | | |
| 35<br>7.5 | | | | | | | |
| | 36.0 | | | | | | |
| | | | | | | **Limestone**<br>36.0-38.0' - dark yellowish brown, (10YR 4/2), dry, moderate HCl 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 | SC-1 collected at 36.0-37.3' |
| | | | | 36.0-46.0' - NA | | | |
| | | | | | | **Silt With Limestone Fragments**<br>38.0-41.0' - dark yellowish brown, (10YR 4/2), wet, sand to gravel-sized limestone fragments, fossiliferous | |
| | | | NA | | | | |
| 40<br>2.5 | | | | | | | |
| | R5-SN<br>10 ft<br>75% | NA | | | | | |
| | | | | | | **Limestone Fragments**<br>41.0-42.0' - limestone fragments from sand to fine gravel-sized, fossiliferous<br>42.0-43.5' - dark yellowish brown, moderate HCl reaction, silt to fine gravel-sized limestone fragments | |
| | | | | | | **No Recovery 43.5-46.0'** | |
| | | | NR | | | | |
| 45<br>-2.5 | | | | | | | |
| | 46.0 | | | | | | |

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# ROCK CORE 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/20/2007 END : 2/22/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 46.0-56.0' - NA | | **Limestone**<br>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<br>**Limestone Fragments**<br>47.0-51.0' - mild to moderate HCl reaction, fossiliferous, limestone fragments sand to gravel-sized and up to 2-1/2" | SC-2 collected at 46.0-46.7' |
| 50<br>-7.5 | R6-SN<br>10 ft<br>100% | NA | NA | | | 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" | |
| 55<br>-12.5 | | | | | | **Silt (ML)**<br>53.0-56.0' - moderate yellowish brown, (10YR 5/4), nonplastic, mild to moderate HCl reaction | |
| 56.0 | | | | | | | |
| | | | | 56.0-66.0' - NA | | **Limestone Fragments**<br>56.0-57.0' - limestone fragments <3-1/2" in size, fossiliferous<br>**Clay (CL)**<br>57.0-58.8' - dark yellowish orange, (10YR 6/6), low to medium plasticity, moderate HCl reaction, unconsolidated material, <20% silt at 58.8'<br>**Limestone Fragments**<br>58.8-61.0' - Same as 56.0-57.0' | |
| 60<br>-17.5 | R7-SN<br>10 ft<br>93% | NA | NA | | | **Clayey Silt (CL-ML)**<br>61.0-61.7' - light brown to moderate yellowish brown, (5YR 5/6 to 10YR 5/4)<br>**Limestone Fragments**<br>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' |
| 65<br>-22.5 | | | NR | | | **No Recovery 65.3-66.0'** | End drilling for the day; R8 is down-hole, will retrieve in morning |
| 66.0 | | | | | | | |

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# ROCK CORE 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/20/2007 END : 2/22/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 66.0-76.0' - NA | | **Limestone**<br>66.0-71.5' - moderate yellowish brown, (10YR 5/4), weak to medium strong (R2 to R3), <10% cavities across surface, fossiliferous | Resume drilling 2/21/07<br>SC-4 collected at 68.4-69.3' |
| 70<br>-27.5 | R8-SN<br>10 ft<br>100% | NA | NA | | | | |
| | | | | | | **Clay (CH)**<br>71.5-72.3' - dark yellowish orange, (10YR 6/6), moist, mild HCl reaction, carbonate material | |
| | | | | | | **Limestone Fragments**<br>72.3-73.6' - very fine grained, strong HCl reaction, extremely weak (R0), limestone fragments to 2", silty matrix | |
| 75<br>-32.5 | | | | | | **Silt (ML)**<br>73.6-75.5' - dry, very stiff, nonplastic, strong HCl reaction, blocky, carbonate material | |
| | 76.0 | | | | | | |
| | | | | 76.0-86.0' - NA | | **Silty Clay (CL)**<br>75.5-76.0' - light brown, (5YR 5/6), moist, low to medium plasticity | |
| | | | | | | **Limestone Fragments**<br>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) | |
| 80<br>-37.5 | | | NA | | | **Silty Clay (CL)**<br>79.0-79.3' - moderate yellowish brown, (10YR 5/4), moist to wet, soft, black organic partings in matrix | |
| | R9-SN<br>10 ft<br>75% | NA | | | | **Limestone Fragments**<br>79.3-81.0' - Same as 76.0-79.0'<br>**Limestone**<br>81.0-82.5' - fossiliferous | SC-5 collected at 81.0-82.5' |
| | | | | | | **Limestone Fragments**<br>82.5-83.5' - fragments up to 2-1/2", breaks between fragments mostly caused by fractures within rocks and mechanical breaks from drilling<br>**No Recovery 83.5-86.0'** | |
| 85<br>-42.5 | | | NR | | | | |
| | 86.0 | | | | | | |

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# ROCK CORE 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/20/2007 END : 2/22/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (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)**<br>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<br>-47.5 | R10-SN<br>10 ft<br>100% | NA | NA | | | **Limestone**<br>89.1-89.7' - very pale orange, (10YR 8/2), very fine grained, strong HCl reaction<br>**Clay (CH)**<br>89.7-90.7' - moderate yellowish brown, (10YR 4/2), dry to moist, very stiff, with silt (ML), blocky partings<br>**Limestone Fragments**<br>90.7-93.0' - very pale orange, (10YR 8/2), fine grained, strong HCl reaction, fragments up to 3/4"<br>**Clayey Silt (ML)**<br>93.0-94.0' - light brown, (5YR 5/6), dry to moist, strong HCl reaction, carbonate matrix | |
| 95<br>-52.5 | 96.0 | | | | | **Limestone Fragments**<br>94.0-96.0' - sand to gravel-sized fragments, weak (R0), fossiliferous (molds/casts/shell fragments)<br>96.0-99.0' - very pale orange, (10YR 8/2), strong HCl reaction, 50% silty matrix, sand to gravel-sized fragments, poorly to moderately fossiliferous (10-20%) | |
| | | | | 96.0-106.0' - NA | | | |
| 100<br>-57.5 | R11-SN<br>10 ft<br>100% | NA | NA | | | **Lignite**<br>99.0-99.2' - extremely weak (R0), black organic partings<br>**Limestone**<br>99.2-101.0' - Same as 96.0-99.0'<br>**Clayey Silt (ML)**<br>101.0-103.0' - dry, very stiff, low to medium plasticity, strong HCl reaction, blocky partings<br>**Limestone**<br>103.0-105.0' - Same as 96.0-99.0' | |
| 105<br>-62.5 | 106.0 | | | | | 105.0-105.1' - very pale orange, (10YR 8/2), very fine grained, poorly fossiliferous (<10% coverage) | |

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# ROCK CORE 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/20/2007 END : 2/22/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 106.0-116.0' - NA | | **Limestone**<br>105.1-105.8' - fragments<br>105.8-106.0' - Same as 105.0-105.1'<br>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 | |
| 110<br>-67.5 | R12-SN<br>10 ft<br>100% | NA | NA | | | 109.5-114.0' - very fine to fine grained, sand to gravel-sized fragments, non fossiliferous | |
| 115<br>-72.5 | 116.0 | | | | | 114.0-114.2' - dark yellowish brown, (10YR 4/2), strong HCl reaction, laminated bedding<br>114.2-121.0' - very pale orange, (10YR 8/2), very fine to fine grained, strong HCl reaction, 20-30% gravel-sized and 70-80% fines, fragments up to 2" | |
| | | | | 116.0-126.0' - NA | | | |
| 120<br>-77.5 | R13-SN<br>10 ft<br>100% | NA | NA | | | **Disaggregated Limestone**<br>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 |
| 125<br>-82.5 | 126.0 | | | | | | |

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# ROCK CORE 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/20/2007 END : 2/22/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 126.0-136.0' - NA | | **Limestone**<br>126.0-136.0' - grayish orange to pale yellowish brown, (10YR 7/4 to 10YR 6/4), very fine to fine grained, strong HCl reaction, sand to gravel-sized weak (R2) limestone fragments, grains and gravel reduce to silt-sized material (rock flour), few fine grained weak to medium strong (R2 to R3) fragments from 132.0-133.5' | |
| 130<br>-87.5 | | | | | | | |
| | R14-SN<br>10 ft<br>100% | NA | NA | | | | |
| 135<br>-92.5 | | | | | | | |
| | 136.0 | | | | | | |
| | | | | 136.0-146.0' - NA | | 136.0-136.9' - Same as 126.0-136.0'<br>136.9-142.5' - very pale yellowish brown, (10YR 6/2), medium strong to strong (R3 to R4), very fossiliferous, up to 70% covered in fossil shells/casts/molds, 10-20% covered in voids (<1/16" up to 3/8"), cavities up to 4-3/4", broken sand to gravel-sized pieces at 139.0-139.5' | |
| 140<br>-97.5 | | | | | | | |
| | R15-SN<br>10 ft<br>100% | NA | NA | | | | |
| | | | | | | **Silty Clay (CL)**<br>142.5-143.0' - moderate brown, (5YR 4/4), dry, low plasticity, blocky partings | |
| | | | | | | **Limestone**<br>143.0-146.0' - Same as 126.0-136.0' | |
| 145<br>-102.5 | | | | | | | |
| | 146.0 | | | | | | |

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# ROCK CORE 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/20/2007 END : 2/22/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 146.0-156.0' - NA | | **Limestone**<br>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<br>148.7-151.0' - strong HCl reaction, silt to fine gravel-sized limestone fragments | SC-6 collected at 146.3-147.2' |
| 150<br>-107.5 | R16-SN<br>10 ft<br>88% | NA | NA | | | 151.0-151.9' - strong HCl reaction, very weak to weak (R1 to R2), very fossiliferous<br>151.9-154.0' - Same as 148.7-151.0'<br>**Limestone Fragments**<br>154.0-154.8' - strong HCl reaction | |
| 155<br>-112.5 | | | NR | | | **No Recovery 154.8-156.0'** | |
| | 156.0 | | | 156.0-166.0' - NA | | **Disaggregated Limestone**<br>156.0-161.6' - pale yellowish brown, (10YR 6/2), strong HCl reaction, silt to coarse gravel-sized limestone fragments | |
| 160<br>-117.5 | R17-SN<br>10 ft<br>100% | NA | NA | | | **Limestone**<br>161.6-161.8' - moderate yellowish brown, (10YR 5/4), fine grained, strong HCl reaction, medium strong to strong (R3 to R4), non fossiliferous<br>**Disaggregated Limestone**<br>161.8-163.0' - strong HCl reaction, carbonate materials<br>**Limestone Fragments**<br>163.0-165.7' - moderate brown, (5YR 4/4), fine grained with silt, silt to 1" size limestone fragments | |
| 165<br>-122.5 | 166.0 | | | | | | |

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# ROCK CORE 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/20/2007 END : 2/22/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 166.0-176.0' - NA | | **Limestone**<br>165.7-166.0' - moderate brown, (5YR 4/4), fine grained, weak to medium strong (R2 to R3), fossiliferous<br>166.0-170.0' - moderate yellowish brown, (10YR 5/4), fine grained, strong HCl reaction, sand to gravel-sized fragments, trace laminated bedding with mild HCl reaction | |
| 170<br>-127.5 | | | | | | | |
| | R18-SN<br>10 ft<br>100% | NA | NA | | | 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)<br>172.0-173.7' - moderate yellowish brown, (10YR 5/4), fine grained, mild HCl reaction, rock-floor, silty matrix, sand to coarse gravel-sized fragments<br>173.7-174.2' - moderate yellowish brown, (10YR 5/4), fine grained, strong HCl reaction, medium strong to strong (R3 to R4), laminated | |
| 175<br>-132.5 | | | | | | **Disaggregated Limestone**<br>174.2-176.0' - mild HCl reaction, up to 3/4" gravel-sized pieces of compacted silt and limestone | |
| | 176.0 | | | | | **Limestone**<br>176.0-179.5' - Same as 126.0-136.0' except core fragments up to 2-1/2" | |
| | | | | 176.0-186.0' - NA | | | |
| 180<br>-137.5 | | | | | | 179.5-180.6' - moderate yellowish brown, (10YR 5/4), moderate HCl reaction, silt to fragments, soil like properties | |
| | R19-SN<br>10 ft<br>100% | NA | NA | | | 180.6-183.0' - grayish orange, (10YR 7/4), medium to coarse grained, strong HCl reaction, shell fragments, molds, casts, 30-40% cavities to 3/8" in size<br>183.0-184.5' - Same as 179.5-180.6' | |
| 185<br>-142.5 | | | | | | 184.5-185.2' - Same as 176.0-179.5'<br>185.2-185.5' - Same as 180.6-183.0'<br>185.5-185.7' - Same as 183.0-184.5' | |
| | 186.0 | | | | | | |

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# ROCK CORE 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/20/2007 END : 2/22/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 186.0-196.0' - NA | | **Limestone**<br>185.7-186.0' - Same as 176.0-179.5'<br>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' | |
| 190<br>-147.5 | | | | | | | |
| | R20-SN<br>10 ft<br>100% | NA | NA | | | | |
| 195<br>-152.5 | | | | | | | |
| | 196.0 | | | | | | |
| | | | | 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 | |
| | | | NA | | | | |
| 200<br>-157.5 | | | | | | | |
| | R21-SN<br>10 ft<br>58% | NA | | | | | |
| | | | | | | **No Recovery 201.8-206.0'** | |
| | | | NR | | | | |
| 205<br>-162.5 | | | | | | | |
| | 206.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# ROCK CORE 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/20/2007 END : 2/22/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 206.0-216.0' - NA | | **Limestone**<br>206.0-216.0' - Same as 196.0-201.8' | |
| 210<br>-167.5 | | | | | | | |
| | R22-SN<br>10 ft<br>100% | NA | NA | | | | |
| 215<br>-172.5 | | | | | | | |
| | 216.0 | | | | | | |
| | | | | 216.0-226.0' - NA | | 216.0-223.0' - Same as 196.0-201.8' | |
| 220<br>-177.5 | | | | | | | |
| | R23-SN<br>10 ft<br>100% | NA | NA | | | | |
| | | | | | | **Clayey Silt (ML)**<br>223.3-224.0' - light brown to very pale orange, (5YR 6/4 to 10YR 8/2), dry to moist, low plasticity when wet | |
| 225<br>-182.5 | | | | | | **Limestone**<br>224.0-226.0' - Same as 196.0-201.8' | |
| | 226.0 | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: I-01 | SHEET 13 OF 15 |
|---|---|---|

# ROCK CORE 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/20/2007 END : 2/22/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 226.0-236.0' - NA | | **Limestone**<br>226.0-233.0' - very pale orange, (10YR 8/2), fine grained, strong HCl reaction, extremely weak (R0), sand to coarse gravel-sized fragments, friable | |
| 230<br>-187.5 | | | | | | | |
| | R24-SN<br>10 ft<br>100% | NA | NA | | | | |
| | | | | | | 233.0-236.0' - Same as 226.0-233.0' except increase in dark yellowish brown (10YR 4/2) silt | |
| 235<br>-192.5 | | | | | | | |
| | 236.0 | | | | | 236.0-246.0' - Same as 226.0-233.0' | |
| | | | | 236.0-246.0' - NA | | | |
| 240<br>-197.5 | | | | | | | |
| | R25-SN<br>10 ft<br>100% | NA | NA | | | | |
| 245<br>-202.5 | | | | | | | |
| | 246.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# ROCK CORE 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/20/2007 END : 2/22/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 246.0-256.0' - NA | | **Limestone**<br>246.0-255.7' - Same as 226.0-233.0' | |
| 250<br>-207.5 | | | | | | | |
| | R26-SN<br>10 ft<br>100% | NA | NA | | | | |
| 255<br>-212.5 | | | | | | | |
| | 256.0 | | | | | **Silt (ML)**<br>255.7-256.0' - grayish orange, (10YR 7/4), strong HCl reaction, unconsolidated material, silt to sand grain-sized | |
| | | | | 256.0-266.0' - NA | | **Limestone**<br>256.0-265.7' - Same as 226.0-233.0' | |
| 260<br>-217.5 | | | | | | | |
| | R27-SN<br>10 ft<br>97% | NA | NA | | | | |
| 265<br>-222.5 | | | | | | | |
| | 266.0 | | NR | | | **No Recovery 265.7-266.0'** | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# ROCK CORE 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/20/2007 END : 2/22/2007 LOGGER : R. Gomez

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES | | | SYMBOLIC LOG | LITHOLOGY | COMMENTS |
|---|---|---|---|---|---|---|---|
| | | 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. |
| | | | | | | Bottom of Boring at 266.0 ft bgs on 2/22/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/23/2007 END : 2/26/2007 LOGGER : C. Sump, S. Parks

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.3 | 0.0 | | | | **Topsoil**<br>0.0-1.0' | | Water level is based on Ground Water Monitoring at LNP site (FSAR Table 2.4.12.08)" |
| | | 6.4 | R1-SN | | **Poorly Graded Sand (SP)**<br>1.0-5.4' - light gray to medium gray, (N7 to N5), medium to coarse grained, with variable iron oxide staining, silica sand | | Water levels were not recorded for I-02 |
| 5<br>37.3 | | | | | **Sandy Silt (ML)**<br>5.4-6.4' - yellowish gray, (5Y 7/2), moist to wet, low to non plasticity, some fine to medium grain sand<br>**No Recovery 6.4-7.0'** | | |
| | 7.0 | | | | **Sandy Silt (ML)**<br>7.0-9.0' - Same as 5.4-6.4' | | |
| 10<br>32.3 | | 10.0 | R2-SN | | 9.0-15.0' - grayish yellow to yellowish gray, (5Y 7/2 to 5Y 8/4), moist, nonplastic to low plasticity, some fine to coarse sand-size and gravel-size, some "clasts" <1" size at 9.5-10.5', all carbonate material | | |
| 15<br>27.3 | | | | | **Limestone Fragments With Silt**<br>15.0-17.0' - fragments are 1"-3" diameter, making up >50% of sample, with silt <50% of soil, all carbonate materials (soil may be thin limestone beds with silty interbeds) | | Possibly drill induced breakage |
| | 17.0 | | | | **Silty Sand With Limestone Fragments (SM)**<br>17.0-22.0' - yellowish gray, (5Y 7/2), moist, fine to coarse grained, grades to sandy silt with depth, <10% fine to coarse gravel-sized (<1/2") limestone clasts, all carbonate materials | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/23/2007 END : 2/26/2007 LOGGER : C. Sump, S. Parks

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.3 | | | | | | | |
| | | 10.0 | R3-SN | | **Limestone Fragments** 22.0-23.6' - moderate yellowish brown, (10YR 5/4), 1"-3" thick fragments with 1"-2" thick light tan/gray silt/clay infill (possible interbeds) | | Possibly drill induced breakage (breaks without infilling of fines) |
| 25 / 17.3 | | | | | **Silty Sand With Limestone Fragments (SM)** 23.6-27.0' - grayish orange, (10YR 7/4), fine to coarse grained, strong HCl reaction, 10-20% fine to coarse gravel-sized limestone fragments (1/4"-1-1/4") | | |
| | 27.0 | | | | | | |
| | | | | | **Limestone Fragments** 27.0-29.0' - moderate yellowish brown, (10YR 5/4), 1"-4" thick fragments, fossiliferous with small (1/16"-1/8") voids across the surface (40-60%), clay/silt on fragment faces, all carbonate derived | | |
| 30 / 12.3 | | | | | **Silty Sand With Limestone Fragments (SM)** 29.0-31.4' - moderate yellowish brown, (10YR 5/4), fine to coarse grained, 10-15% fine to coarse gravel-sized limestone fragments (<1" diameter), all carbonate material | | Possibly drill induced breakage |
| | | 7.8 | R4-SN | | **Limestone Fragments** 31.4-31.7' - yellowish gray, (5Y 8/1), moderate HCl reaction, 1" thick fragments, light gray (N7) clay interbeds between fragments, all carbonate materials | | |
| | | | | | **Sandy Silt (ML)** 31.7-33.0' - moderate yellowish brown, (10YR 5/4), 10-15% fine to coarse gravel-sized limestone fragments, all carbonate derived materials | | Possibly drill induced breakage |
| 35 / 7.3 | | | | | **Limestone Fragments** 33.0-34.8' - dark gray, (N3), fine grained, moderate HCl reaction, medium strong (R3), silt material infilling around fragments, all carbonate materials **No Recovery 34.8-37.0'** | | |
| | 37.0 | | | | | | |
| | | | | | **Limestone** 37.0-39.6' - olive gray, (5Y 4/1), medium strong (R3), finer grained than above, poorly fossiliferous, fine laminations/bedding planes visible in zones (1/8"-1/2"), horizontal partings 1"-4" spacing, light gray to medium gray (N7 to N6) clayey infill on partings, all carbonate materials | | |
| 40 | | | | | | | Possibly drill induced breakage |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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

DRILLING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/23/2007 END : 2/26/2007 LOGGER : C. Sump, S. Parks

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.3 | | 10.0 | R5-SN | | **Silty Sand With Limestone Fragments (SM)** 39.6-44.0' - pale yellowish brown, (10YR 6/2), fine to coarse grained, 20-50% fine to coarse gravel-sized limestone fragments, increasing with depth, all carbonate materials | | |
| 45 -2.7 | | | | | **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 | | |
| | 47.0 | | | | **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 materials | | |
| 50 -7.7 | | 6.2 | R6-SN | | **Silty 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<br>Top of rock estimated to be approximately 53.0' below ground surface |
| 55 -12.7 | | | | | Begin Rock Coring at 53.2 ft bgs<br>See the next sheet for the rock core log | | |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
| 338884.FL | I-02 | SHEET 4 OF 17 |

# 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/23/2007 END : 2/26/2007 LOGGER : C. Sump, S. Parks

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 53.2 | | | | | **Limestone**<br>53.2-57.0' - yellowish brown to gray, moderate to strong HCl reaction, light gray silty clay interbed/infill material on horizontal parting surfaces spaced 1"-2" with few up to 4", medium yellowish brown silt (<15%) zone at 54.0-54.5', highly fragmented 56.0-57' with angular to subangular fragments 2"-3" in size, increasing silt sized component with depth | Start of rock core |
| | | | | 47.0-57.0' - NA | | | |
| 55<br>-12.7 | R6-SN<br>3.8 ft<br>100% | NA | NA | | | | Coring run times not recorded for I-02 |
| | 57.0 | | | | | **Limestone Fragments**<br>57.0-59.5' - strong HCl reaction, angular to subangular fragments 1-3" in diameter, <40% carbonate derived clayey silt, fines change color from light gray to moderate yellowish brown at 58.0' | Highly fragmented limestone<br>Possibly drill induced breakage |
| | | | | 57.0-67.0' - NA | | | |
| 60<br>-17.7 | | | | | | **Limestone**<br>59.5-63.0' - moderate yellowish brown, (10YR 5/4), horizontal partings 1"-2" spacing with dark grayish brown clayey silt interbed material rough and undulating, fine black laminar inclusions 1/16"-1/8" in length (horizontal) | NA = Not Applicable<br>NR = No Recovery |
| | R7-SN<br>10 ft<br>100% | NA | NA | | | | |
| | | | | | | 63.0-64.7' - yellowish gray to olive gray, fine grained, trace to no fossils, few small surface voids (1/16"-1/8"), horizontal partings at various spacing from 1"-8", parting surfaces mostly clean with trace silty clayey material | Possibly drill induced breakage |
| 65<br>-22.7 | | | | | | **Silt (ML)**<br>64.7-65.5' - dark brown, black mottling/laminations, possibly organics, possible bioturbation | |
| | 67.0 | | | | | **Limestone**<br>65.5-68.1' - grayish yellow brown, medium strong (R3), fossiliferous, horizontal partings with 2"-4" spacing, trace to no infill in partings, surface coverage of small (<1/8") voids >50% | Possibly drill induced breakage<br>Possibly drill induced breakage |
| | | | | 67.0-77.0' - NA | | | |
| | | | | | | **Silt With Limestone Fragments (ML)**<br>68.1-68.8' - orange gray, limestone fragments 1/2"-1" diameter | Repeating limestone/silt interbeds |
| 70<br>-27.7 | | | | | | **Limestone**<br>68.8-70.0' - yellowish brown, fine grained, medium strong to strong (R3 to R4), few fossils (<5% ) few surface voids, dense partings 3/4"-4", light gray silty infilling (interbeds) | |
| | R8-SN<br>10 ft<br>100% | NA | NA | | | **Silt (ML)**<br>70.0-70.5' - Same as 68.1-68.8' except strong HCl reaction | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | I-02 SHEET 5 OF 17 |

# 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/23/2007 END : 2/26/2007 LOGGER : C. Sump, S. Parks

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 75<br>-32.7 | | | | | | **Limestone**<br>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'<br>74.2-75.9' - dusky orange to gray, fragmented, fine sand-sized material (carbonate derived) with sparse 1/2" limestone clasts, few fine black organic laminations<br>75.9-76.5' - dark gray, strong HCl reaction, fossiliferous, large solution cavities (1"x3"), interconnected rounded cavities (possible tube borings) | |
| | 77.0 | | | | | | |
| | | | | 77.0-87.0' - NA | | **Silt (ML)**<br>76.5-77.0' - light gray to tan, laminated | |
| 80<br>-37.7 | | | | | | **Limestone**<br>77.0-81.5' - moderate yellowish brown, (10YR 5/4), dense, moderate HCl reaction, medium strong to strong (R3 to R4), small surface voids (1/16"-1/8") covering 40-50% surface, limestone parting (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)<br>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 | |
| | R9-SN<br>10 ft<br>93% | NA | NA | | | | |
| 85<br>-42.7 | | | | | | **Limestone Fragments**<br>82.3-84.2' - moderate HCl reaction, gravel sized fragments (1/4"-1-1/2"), smaller fragments are subangular to subrounded, larger fragments angular to subangular | |
| | 87.0 | | NR | | | | |
| | | | | 87.0-97.0' - NA | | **Limestone**<br>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<br>**No Recovery 86.3-87.0'** | |
| 90<br>-47.7 | | | | | | **Disaggregated Limestone**<br>87.0-91.4' - mottled gray/tan/brown, moderate HCl reaction, <20% limestone fragments (<3/4"), few fragments >1-1/2" | Possibly drill induced breakage |
| | R10-SN<br>10 ft<br>100% | NA | NA | | | | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/23/2007 END : 2/26/2007 LOGGER : C. Sump, S. Parks

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 95 -52.7 | | | | | | 91.4-91.6' - light grayish tan, weak (R2) **Limestone** 91.6-92.7' - light yellowish gray, medium strong (R3), <10% small surface voids (1/16"-1/8"), fossiliferous **Disaggregated Limestone** 92.7-94.4' - light grayish tan, compacted, <20% gravel size (<1") limestone fragments, dark olive brown laminations (possible organics) **Limestone** 94.4-94.8' - Same as 91.6-92.7' **Disaggregated Limestone** 94.8-97.0' - light grayish orange, few (<10%) gravel sized (<3/4") limestone fragments, dark brown lamination appears to transect bedding **Limestone Fragments** 97.0-107.0' - 0-25% carbonate derived clay, gravel size (<1") limestone fragments, few fragments >1-1/2", friable fragments of slightly more competent material are easily broken by hand, sparse dark brown roughly horizontal laminations associated with finer grained zones (organics) | Upward fining sequences of increasing clay and decreasing sand fractions over 4.0'-6.0' intervals |
| | 97.0 | | | | | | |
| 100 -57.7 | R11-SN 10 ft 100% | NA | NA | 97.0-107.0' - NA | | | |
| 105 -62.7 | | | | | | | |
| | 107.0 | | | | | 107.0-117.0' - Same as 97.0-107.0' | |
| 110 -67.7 | R12-SN 10 ft 100% | NA | NA | 107.0-117.0' - NA | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: I-02 | SHEET 7 OF 17 |
|---|---|---|

# 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/23/2007 END : 2/26/2007 LOGGER : C. Sump, S. Parks

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 115 -72.7 | | | | | | | |
| | 117.0 | | | | | **Limestone Fragments** 117.0-127.0' - Same as 97.0-107.0' | |
| | | | | 117.0-127.0' - NA | | | |
| 120 -77.7 | | | | | | | |
| | R13-SN 10 ft 100% | NA | NA | | | | |
| 125 -82.7 | | | | | | | |
| | 127.0 | | | | | 127.0-137.0' - Same as 97.0-107.0' | |
| | | | | 127.0-137.0' - NA | | | |
| 130 -87.7 | | | | | | | |
| | R14-SN 10 ft 100% | NA | NA | | | | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/23/2007 END : 2/26/2007 LOGGER : C. Sump, S. Parks

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 135<br>-92.7 | | | | | | | |
| | 137.0 | | | | | | |
| | | | | 137.0-147.0' - NA | | **Limestone Fragments**<br>137.0-139.5' - Same as 97.0-107.0' | |
| 140<br>-97.7 | | | | | | **Limestone**<br>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 | Fossiliferous, partial recrystallization (very fine subhedral/cross faces) |
| | R15-SN<br>10 ft<br>100% | NA | NA | | | 143.0-145.6' - moderate yellowish brown, (10YR 5/4), strong HCl reaction, dense, less fossiliferous than above, few surface voids/cavities (<10%), horizontal partings 2"-4" spacing, 2"-3" semi-compacted clayey silt interbeds | |
| 145<br>-102.7 | | | | | | **Disaggregated Limestone**<br>145.6-147.0' - grayish orange brown, few gravel sized (<1/2") limestone fragments | |
| | 147.0 | | | | | 147.0-148.9' - Same as 145.6-147.0' except increasing percent of limestone fragments and increase in size of fragments (1"-3") | Repeating sequences of limestone with softer (carbonate derived) interbeds separated by zones of unconsolidated carbonates with limestone fragments (possibly drill induced breakage) |
| | | | | 147.0-157.0' - NA | | **Limestone**<br>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 | |
| 150<br>-107.7 | | | | | | | |
| | R16-SN<br>10 ft<br>100% | NA | NA | | | **Disaggregated Limestone**<br>151.6-152.3' - moderate yellowish brown, (10YR 5/4), with friable limestone fragments 3/4"-1 1/2" diameter | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/23/2007 END : 2/26/2007 LOGGER : C. Sump, S. Parks

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 155<br>-112.7 | | | | | | **Limestone**<br>152.3-153.9' - Same as 148.9-151.6'<br>**Disaggregated Limestone**<br>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%<br>**Limestone**<br>155.1-156.0' - Same as 148.9-151.6' | |
| | 157.0 | | | | | **Limestone Fragments**<br>156.0-157.0' - limestone fragments (60%) 3/4"-2" size, friable, with sandy silt-sized carbonates | Possibly drill induced breakage |
| | | | | 157.0-167.0' - NA | | **Disaggregated Limestone**<br>157.0-160.8' - with 30-40% grayish orange limestone fragments (1/2"-1-1/2") | |
| 160<br>-117.7 | | | | | | | |
| | R17-SN<br>10 ft<br>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 |
| 165<br>-122.7 | | | | | | | |
| | 167.0 | | NR | | | **Limestone**<br>165.7-166.3' - dark dusky yellow, (5Y 6/4), 50% surface voids (1/16"-1/8"), fossiliferous<br>**No Recovery 166.3-167.0'** | Material lost may have been fines from above |
| | | | | 167.0-177.0' - NA | | **Limestone**<br>167.0-167.2' - fossiliferous, large number of solution cavities (1/2"), molds and casts<br>167.2-168.4' - pale yellowish gray, dense, horizontal partings, 3/4"-1" thick | Repeating sequence of limestone (with interbeds) separated by zones of silty material with limestone fragments<br>Possibly drill induced breakage |
| 170<br>-127.7 | | | | | | **Limestone Fragments**<br>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 | |
| | R18-SN<br>10 ft<br>94% | NA | NA | | | **Limestone**<br>168.9-170.5' - Same as 167.2-168.4' except 2"-4" horizontal partings becoming large fragments at end | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/23/2007 END : 2/26/2007 LOGGER : C. Sump, S. Parks

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 175<br>-132.7 | | | | | | **Pasty Limestone**<br>170.5-171.0' - yellowish gray to orange gray, dark brown laminations (possible organics), no gravel sized fragments<br>**Limestone**<br>171.0-173.9' - Same as 167.2-168.4'<br>**Disaggregated Limestone**<br>173.9-176.4' - brown, limestone fragments generally 3/4" but up to 1"-3" diameter, light gray interbeds | Possibly drill induced breakage |
| | 177.0 | | NR | | | **No Recovery 176.4-177.0'** | |
| | | | | 177.0-187.0' - NA | | **Disaggregated Limestone**<br>177.0-177.3' - Same as 173.9-176.4'<br>**Limestone**<br>177.3-179.0' - yellowish gray, dense, little to no surface voids, horizontal partings 1"-3" spacing<br>**Limestone Fragments**<br>179.0-179.9' - moderate yellowish brown, (10YR 5/4), fine grained, 50% limestone fragments 3/4"-1-1/2" size<br>**Limestone**<br>179.9-180.9' - Same as 177.3-179.0' except increase in small (1/16"-1/8") surface voids and soft interbeds on 1"-2" partings | Possibly drill induced breakage |
| 180<br>-137.7 | R19-SN<br>10 ft<br>100% | NA | NA | | | **Disaggregated Limestone**<br>180.9-183.6' - moderate yellowish brown, (10YR 5/4), fine grained, with limestone fragments<br>**Limestone**<br>183.6-187.0' - yellowish gray, fragmented, fragments <1/2"-3" size | |
| 185<br>-142.7 | | | | | | | |
| | 187.0 | | | | | 187.0-189.0' - fragmented, angular to subangular, 1-1/2"-3" size | Possibly drill induced breakage |
| | | | | 187.0-197.0' - NA | | 189.0-192.0' - fossiliferous (molds/casts), horizontal partings 1"-3" spacing, very thin soft interbeds (1/2") | |
| 190<br>-147.7 | | | NA | | | | |
| | R20-SN<br>10 ft<br>81% | NA | | | | **Limestone Fragments**<br>192.0-195.1' - limestone fragments, sand-sized to 1/2"-2" size | Possibly drill induced breakage |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/23/2007 END : 2/26/2007 LOGGER : C. Sump, S. Parks

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 195<br>-152.7 | | | | | | | |
| | | | NR | | | **No Recovery 195.1-197.0'** | |
| | 197.0 | | | | | | |
| | | | | 197.0-207.0' - NA | | **Limestone Fragments**<br>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 200.0' are fossiliferous (molds/casts) and exhibit 30-40% small (1/16"-1/8") surface voids and small cavities (<1/2") | |
| 200<br>-157.7 | | | NA | | | | |
| | R21-SN<br>10 ft<br>74% | NA | | | | | |
| | | | | | | **Disaggregated Limestone**<br>203.3-204.4' - yellowish gray/moderate brown, 25% limestone fragments<br>**No Recovery 204.4-207.0'** | Lost material may be fines from across entire run |
| 205<br>-162.7 | | | NR | | | | |
| | 207.0 | | | | | | |
| | | | | 207.0-217.0' - NA | | **Limestone Fragments**<br>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 |
| 210<br>-167.7 | | | | | | | |
| | | | NA | | | | |
| | R22-SN<br>10 ft<br>87% | NA | | | | | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/23/2007 END : 2/26/2007 LOGGER : C. Sump, S. Parks

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 215<br>-172.7 | | | | | | | |
| | | | NR | | | **No Recovery 215.7-217.0'** | |
| | 217.0 | | | | | | |
| | | | | 217.0-227.0' - NA | | **Disaggregated Limestone**<br>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<br>**Limestone Fragments**<br>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 | |
| 220<br>-177.7 | | | | | | | |
| | R23-SN<br>10 ft<br>90% | NA | NA | | | | |
| 225<br>-182.7 | | | | | | | |
| | | | NR | | | **No Recovery 226.0-227.0'** | |
| | 227.0 | | | | | | |
| | | | | 227.0-237.0' - NA | | **Limestone Fragments**<br>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) | |
| 230<br>-187.7 | | | | | | | |
| | R24-SN<br>10 ft<br>100% | NA | NA | | | | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/23/2007 END : 2/26/2007 LOGGER : C. Sump, S. Parks

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 235<br>-192.7 | | | | | | | |
| | 237.0 | | | | | **Disaggregated Limestone**<br>235.5-236.5' - orange gray/moderate brown, contorted laminations, organics<br>**Limestone**<br>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 | |
| | | | | 237.0-247.0' - NA | | **Limestone Fragments**<br>237.0-247.0' - grayish orange and yellowish gray, (10YR 7/4 and 5Y 7/2), very fine to medium grained, moderate to mild HCl reaction, two zones with organic laminations (3"-4" thick), gravel-sized material is subangular, size varies from 1/4"-2" | |
| 240<br>-197.7 | | | | | | | |
| | R25-SN<br>10 ft<br>100% | NA | NA | | | | |
| 245<br>-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 zones of fragments that appear to have been possibly laminated prior to drilling | |
| 250<br>-207.7 | | | | | | | |
| | R26-SN<br>10 ft<br>87% | NA | NA | | | | |

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|---|---|
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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/23/2007 END : 2/26/2007 LOGGER : C. Sump, S. Parks

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (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'** | |
| | | | NR | | | | |
| | 257.0 | | | | | **Limestone Fragments** 257.0-268.5' - Same as 247.0-255.7' | |
| | | | | 257.0-267.0' - NA | | | |
| 260 -217.7 | | | | | | | |
| | R27-SN 10 ft 100% | NA | 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 reaction, laminated with organic layers in top 6", limestone fragments are angular to subangular, average 1/4"-1/2" size | |
| 270 -227.7 | | | | | | | |
| | R28-SN 10 ft 100% | NA | NA | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: I-02 | SHEET 15 OF 17 |
|---|---|---|

# 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/23/2007 END : 2/26/2007 LOGGER : C. Sump, S. Parks

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 275 -232.7 | | | | | | **Limestone Fragments** 271.5-277.0' - grayish orange, (10YR 7/4), moderate to mild HCl reaction, limestone fragment size ranges from 1/4"-4", predominately subangular with some rounded fragments, percentage of limestone fragments increases with depth | |
| | 277.0 | | | | | | |
| | | | | 277.0-287.0' - NA | | 277.0-282.0' - grayish orange, (10YR 7/4), moderate to mild HCl reaction, graded into fining up sequence 2.0'-2-1/2' thick, varies from angular to rounded, 1/4"-4", fossiliferous with molds and casts, vuggy | |
| 280 -237.7 | | | | | | | |
| | | | NA | | | | |
| | R29-SN 10 ft 87% | NA | | | | 282.0-285.7' - very light gray, (N8), moderate to mild HCl reaction, some organic laminations in upper 0.5', 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" | |
| 285 -242.7 | | | | | | | |
| | | | NR | | | **No Recovery 285.7-287.0'** | |
| | 287.0 | | | | | | |
| | | | | 287.0-297.0' - NA | | **Disaggregated Limestone** 287.0-297.0' - yellowish gray with very pale orange and dark gray mottling, (10YR 8/2 and N3), 1/4" average size | Note: Using 20.0' core barrel to increase sample depth beyond bottom of 6" casing (302.0') |
| 290 -247.7 | | | | | | | |
| | | | NA | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: I-02 | SHEET 16 OF 17 |
|---|---|---|

# 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/23/2007 END : 2/26/2007 LOGGER : C. Sump, S. Parks

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 295 -252.7 | R30-SN 15 ft 67% | NA | | | | | |
| | | | | | | **No Recovery 297.0-302.0'** | |
| | | | | 297.0-307.0' - NA | | | |
| 300 -257.7 | | | NR | | | | |
| | 302.0 | | | | | | |
| | | | NA | | | **Limestone Fragments**<br>302.0-302.75' - Same as 287.0-297.0'<br>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 | Note: Using 20.0' 4" cave barrel to sample material beyond 6" casing depth (302.0')<br>1st attempt failed to recover material (fell out during retrieval)<br>2nd attempt with flapper bit successful although sample is disturbed |
| 305 -262.7 | | | | | | | |
| | | | | | | 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 limestone<br>**No Recovery 306.5-317.0'** | |
| | | | | 307.0-317.0' - NA | | | |
| 310 -267.7 | R31-SN 15 ft 30% | NA | | | | | |
| | | | NR | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | I-02 SHEET 17 OF 17 |

# 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.65 bgs on 3/6/07 START : 2/23/2007 END : 2/26/2007 LOGGER : C. Sump, S. Parks

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 315<br>-272.7 | | | | | | | |
| | 317.0 | | | | | Bottom of Boring at 317.0 ft bgs on 2/26/2007 | Total depth of boring is 317.0' |

| 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

DRILLING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 2.0 ft bgs on 3/21/07 START : 3/21/2007 END : 3/23/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.1 | 0.0 | | | | **Poorly Graded Sand (SP)**<br>0.0-3.0' - fine to medium grained, no HCl reaction, brownish black (5YR 2/1) and organic rich from 0.0-1.0' (topsoil) grading to pale brown (5YR 5/2) to dark yellowish brown (10YR 4/2) between 2.0-3.0' | | Start drilling 12:32<br>Set 8" casing<br>0-27' below ground surface<br><br>Water level: 2 ft below ground surface |
| | | 5.4 | R1-SN | | **Clayey Sand (SC)**<br>3.0-6.0' - medium plasticity, no HCl reaction, fine silica sand, finely laminated with dark yellowish orange (10YR 6/6) layers and light gray (N7) layers | | |
| 5<br>37.1 | 6.0 | | | | | | R1: 2 minutes |
| | | 10.0 | R2-SN | | **Silt With Sand (ML)**<br>6.0-16.0' - grayish orange, (10YR 7/4), mild to strong HCl reaction, very fine to fine sand-sized particles, 2-1/2" limestone fragments at 15.8', carbonate materials | | |
| 10<br>32.1 | | | | | | | |
| 15<br>27.1 | 16.0 | | | | | | R2: 10 minutes<br><br>5 bolts sheared off on drill head. Down for maintance 12:55-15:13 (2:18) |
| | | | | | **Limestone**<br>16.0-17.5' - very pale orange, (10YR 8/2), fossiliferous with molds/casts. Fossils exhibit preferential horizontal orientation (bedding plane), few large molds (3/4"), numerous small voids (3/8" to 1-3/16") over 40% of surface. Horizontal partings (1-4") with clay/silt interbeds up to 2" thick, partings may be mechanical breaks | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | I-03 SHEET 2 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

DRILLING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 2.0 ft bgs on 3/21/07 START : 3/21/2007 END : 3/23/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 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 | | | | | **No Recovery 24.6-26.0'** | | R3: 20 minutes |
| | 26.0 | | | | **Silty Sand And Limestone Fragments (SM)** 26.0-27.2' - Same as 17.5-24.6' | | Drill induced breakage |
| | | | | | **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) | | |
| 30 / 12.1 | | 10.0 | R4-SN | | **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" | | |
| 35 / 7.1 | | | | | | | R4: 12 minutes |
| | | | | | Begin Rock Coring at 36.0 ft bgs<br>See the next sheet for the rock core log | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
| 338884.FL | I-03 | SHEET 3 OF 14 |

# ROCK CORE 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 2.0 ft bgs on 3/21/07 START : 3/21/2007 END : 3/23/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (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**<br>36.0-39.6' - with horizontal partings (2-4" spacing) with clayey silt interbeds/infilling on partings (1/4"-3/4" thick) | |
| 40<br>2.1 | R5-SN<br>10 ft<br>89% | NA | NA | | | **Silt (ML)**<br>39.6-41.0' - moderate yellow brown, (10YR 5/4), mild to moderate HCl reaction | NA = Not Applicable<br>NR = No Recovery |
| | | | | | | **Well Graded Limestone Fragments With Sand**<br>41.0-43.0' - limestone fragments <1". At 41.0' large, irregularly shaped limestone fragment (5") | |
| | | | | | | **Limestone**<br>43.0-44.9' - Same as 36.0-39.6' except with very thin clayey silt infilling on horizontal parting surfaces (bedding planes) | |
| 45<br>-2.9 | | | NR | | | **No Recovery 44.9-46.0'** | R5: 13 minutes |
| | 46.0 | | | 46.0-56.0' - NA | | **Limestone And Limestone Fragments**<br>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 | |
| 50<br>-7.9 | R6-SN<br>10 ft<br>96% | NA | NA | | | | |
| 55<br>-12.9 | | | | | | | R6: 14 minutes |
| | 56.0 | | NR | | | **No Recovery 55.6-56.0'** | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | I-03 SHEET 4 OF 14 |

# ROCK CORE 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 2.0 ft bgs on 3/21/07 START : 3/21/2007 END : 3/23/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 56.0-66.0' - NA | | **Limestone**<br>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" | |
| 60<br>-17.9 | | | | | | **Calcareous Silt With Limestone Fragments (ML)**<br>58.3-60.0' | |
| | R7-SN<br>10 ft<br>100% | NA | NA | | | **Limestone**<br>60.0-61.4'<br><br>**Limestone Fragments**<br>61.4-66.0' - up to 4" | |
| 65<br>-22.9 | | | | | | | R7: 38 minutes |
| | 66.0 | | | | | | |
| | | | | 66.0-76.0' - NA | | **Limestone**<br>66.0-68.6' - medium to coarse grained, voids (<1/16") over 80% of surface | Core run times not recorded below R7-SN |
| | | | | | | **Limestone Fragments**<br>68.6-70.1' | |
| 70<br>-27.9 | | | NA | | | **Limestone**<br>70.1-71.5' | |
| | R8-SN<br>10 ft<br>85% | NA | | | | **Limestone Fragments**<br>71.5-72.5'<br><br>**Disaggregated Limestone**<br>72.5-74.5' - contains limestone fragments | |
| 75<br>-32.9 | | | NR | | | **No Recovery 74.5-76.0'** | |
| | 76.0 | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: I-03 | SHEET 5 OF 14 |
|---|---|---|

# ROCK CORE 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 2.0 ft bgs on 3/21/07 START : 3/21/2007 END : 3/23/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 76.0-86.0' - NA | | **Limestone**<br>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<br>-37.9 | R9-SN<br>10 ft<br>100% | NA | NA | | | 79.0-81.0' - Same as 76.0-79.0' except limestone fragments with increased fines and interbeds of clay and sand-sized particles<br>81.0-82.5' - pale yellowish brown, (10YR 6/2), moderate HCl reaction<br>82.5-83.7' - gravel-sized limestone fragments with silt size fines | |
| 85<br>-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<br>-47.9 | R10-SN<br>10 ft<br>100% | NA | NA | | | **Limestone Fragments**<br>88.0-88.8' - Same as 86.0-88.0' except gravel-sized fragments<br>88.8-90.3' - Same as 83.7-86.0' except with black organic matter (1-1/2"- 1/2" spacing)<br>**Limestone Fragments With Clay And Sand**<br>90.3-92.4' - yellowish gray, (5Y 7/2), strong HCl reaction, fragments are gravel-sized<br>**Limestone Fragments**<br>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<br>-52.9 | | | | | | 95.0-96.0' - Same as 92.4-95.0' except with thin beds of dry lean clay | |
| | 96.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | I-03 SHEET 6 OF 14 |

# ROCK CORE 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 2.0 ft bgs on 3/21/07 START : 3/21/2007 END : 3/23/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 96.0-106.0' - NA | | **Disaggregated Limestone**<br>96.0-106.0' - very pale orange, (10YR 8/2), strong HCl reaction, with lean clay interbedding and isolated limestone disc, moderately moist, 20-40% lean clay at 99.0-99.8' and 103.0-106.0' | |
| 100<br>-57.9 | | | | | | | |
| | R11-SN<br>10 ft<br>100% | NA | NA | | | | |
| 105<br>-62.9 | | | | | | | |
| | 106.0 | | | | | | |
| | | | | 106.0-116.0' - NA | | 106.0-116.0' - very pale orange, (10YR 8/2), strong HCl reaction | |
| 110<br>-67.9 | | | | | | | |
| | R12-SN<br>10 ft<br>100% | NA | NA | | | | |
| 115<br>-72.9 | | | | | | | |
| | 116.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | I-03 SHEET 7 OF 14 |

# ROCK CORE 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 2.0 ft bgs on 3/21/07 START : 3/21/2007 END : 3/23/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 116.0-126.0' - NA | | **Disaggregated Limestone**<br>116.0-126.0' - Same as 106.0-116.0' | |
| 120<br>-77.9 | | | | | | | |
| | R13-SN<br>10 ft<br>100% | NA | NA | | | | |
| 125<br>-82.9 | | | | | | | |
| | 126.0 | | | | | | |
| | | | | 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 | |
| 130<br>-87.9 | | | NA | | | | |
| | R14-SN<br>10 ft<br>85% | NA | | | | | |
| 135<br>-92.9 | | | NR | | | **No Recovery 134.3-136.0'** | |
| | 136.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# ROCK CORE 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 2.0 ft bgs on 3/21/07 START : 3/21/2007 END : 3/23/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 136.0-146.0' - NA | | **Limestone Fragments**<br>136.0-139.4' - yellowish gray, (5Y 7/2), strong HCl reaction, gravel-sized fragments | |
| 140<br>-97.9 | R15-SN<br>10 ft<br>93% | NA | NA | | | 139.4-142.3' - moderate brown, (10YR 6/2), strong HCl reaction, limestone fragments up to 2" in length with little to no fines, with worm holes that contain pyrite, fine grained, moderately fossiliferous | |
| | | | | | | 142.3-143.6' - gravel-sized rock fragments up to 2" in diameter with thin clay coating | |
| 145<br>-102.9 | | | | | | **Limestone**<br>143.6-146.0' - yellowish gray, (5Y 7/2), 13" long with no fines, voids over 50-75% of surface, fine grained, poorly fossiliferous | SC-1 collected at 144.2-145.3' |
| | 146.0 | | NR | | | **No Recovery 145.3-146.0'** | |
| | | | | 146.0-156.0' - NA | | **Limestone Fragments**<br>146.0-148.0' - yellowish gray, (5Y 7/2), strong HCl reaction, fragments are gravel-sized | |
| | | | | | | 148.0-149.5' - dusky yellow, (5Y 6/4), strong HCl reaction, fragments are gravel-sized, silica sand present | |
| 150<br>-107.9 | R16-SN<br>10 ft<br>100% | NA | NA | | | **Limestone**<br>149.5-152.9' - pale yellowish brown, (10YR 6/2), fine grained, strong HCl reaction, limestone core segment with interbedded clay lenses 1/8" to 2" thick, poorly fossiliferous | |
| | | | | | | **Limestone Fragments**<br>152.9-156.0' - dusky yellow, (5Y 6/4), strong HCl reaction, fragments are gravel-sized, silica sand present | |
| 155<br>-112.9 | | | | | | 154.3-156.0' - pale yellowish brown, (10YR 6/2), strong HCl reaction, limestone core segment up to 5" in length with interbedded clay, poorly fossiliferous | |
| | 156.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# ROCK CORE 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 2.0 ft bgs on 3/21/07 START : 3/21/2007 END : 3/23/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 156.0-166.0' - NA | | **Disaggregated Limestone**<br>156.0-163.7' - yellowish gray, (5Y 7/2), strong HCl reaction, contains isolated limestone fragments up to 3" in diameter | |
| 160<br>-117.9 | | | | | | | |
| | R17-SN<br>10 ft<br>100% | NA | NA | | | | |
| | | | | | | **Limestone**<br>163.7-166.0' - dusky yellow, (5Y 6/4), fine grained, strong HCl reaction, limestone fragments up to 1" in length with interbedded silty sand, poorly fossiliferous | |
| 165<br>-122.9 | | | | | | | |
| | 166.0 | | | | | | |
| | | | | 166.0-176.0' - NA | | **Limestone Fragments**<br>166.0-168.9' - yellowish gray, (10YR 6/2), fine grained, strong HCl reaction, up to 3" in length with no fines, moderately fossiliferous, voids over 25-50% of surface | |
| | | | | | | **Disaggregated Limestone**<br>168.9-170.5' - grayish orange, (10YR 7/4), strong HCl reaction | Possible rip-up clast at 168.8' |
| 170<br>-127.9 | | | | | | | |
| | R18-SN<br>10 ft<br>100% | NA | NA | | | **Limestone**<br>170.5-172.3' - pale yellowish brown, (10YR 6/2), moderate HCl reaction, with limestone discs up to 4" in length with thin interbeds of clay, voids over 20-40% of surface<br>**Disaggregated Limestone**<br>172.3-173.5' - dusky yellow, (5Y 6/4), strong HCl reaction<br>**Limestone**<br>173.5-176.0' - Same as 170.5-172.3' | |
| 175<br>-132.9 | | | | | | | |
| | 176.0 | | | | | | |

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|---|---|
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# ROCK CORE 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 2.0 ft bgs on 3/21/07 START : 3/21/2007 END : 3/23/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 176.0-186.0' - NA | | **Limestone Fragments**<br>176.0-181.0' - light olive gray to yellowish gray, (5Y 5/2 to 5Y 7/2), fine grained, strong HCl reaction, 4" in length, poorly fossiliferous, voids over 10-20% of surface | |
| 180<br>-137.9 | | | | | | | |
| | R19-SN<br>10 ft<br>100% | NA | NA | | | **Disaggregated Limestone**<br>181.0-182.1' - yellowish gray, (5Y 7/2), moderate HCl reaction<br>182.1-183.6' - moderate yellowish brown, (10YR 5/4), strong HCl reaction | |
| 185<br>-142.9 | | | | | | **Limestone**<br>183.6-186.0' - pale yellowish brown, (10YR 6/2), strong HCl reaction, discs up to 3" in length with interbedded clays 1/8" to 1" thick, highly fossiliferous with voids over 30-60% of surface | |
| | 186.0 | | | 186.0-196.0' - NA | | **Disaggregated Limestone**<br>186.0-196.0' - yellowish gray, (5Y 7/2), mild to moderate HCl reaction, limestone fragments throughout 10' section, 60-80% limestone fragments from 186.0-188.8', decreases with depth to <10% from 192.0-196.0' | |
| 190<br>-147.9 | | | | | | | |
| | R20-SN<br>10 ft<br>100% | NA | NA | | | | |
| 195<br>-152.9 | | | | | | | |
| | 196.0 | | | | | | |

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|---|---|---|

# ROCK CORE 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 2.0 ft bgs on 3/21/07 START : 3/21/2007 END : 3/23/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 196.0-206.0' - NA | | **Limestone Fragments** 196.0-199.7' - yellowish gray, (5Y 7/2), fine grained, mild to moderate HCl reaction, vary from 2"-5" in length and discs 1/8" to 2-1/2" in diameter | |
| 200 -157.9 | | | NA | | | **Disaggregated Limestone** 199.7-203.0' - grayish orange, (10YR 7/4), mild to moderate HCl reaction, fragments with voids over 50-70% of surface | |
| | R21-SN 10 ft 80% | NA | | | | | |
| | | | | | | **Limestone Fragments** 203.0-204.0' - moderate yellowish brown, (10YR 5/4), strong HCl reaction, fragments are gravel-sized, up to 1/2" in diameter | |
| 205 -162.9 | | | NR | | | **No Recovery 204.0-206.0'** | |
| | 206.0 | | | 206.0-216.0' - NA | | **Limestone Fragments** 206.0-207.0' - yellowish gray, (5Y 7/2), very fine to fine grained, mild HCl reaction, poorly fossiliferous **Disaggregated Limestone** 207.0-216.0' - yellowish gray, (5Y 7/2), mild to strong HCl reaction, gravel-sized fragments up to 1" in diameter, subrounded to subangular | |
| 210 -167.9 | | | | | | | |
| | R22-SN 10 ft 100% | NA | NA | | | | |
| 215 -172.9 | | | | | | | |
| | 216.0 | | | | | | |

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|---|---|
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# ROCK CORE 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 2.0 ft bgs on 3/21/07 START : 3/21/2007 END : 3/23/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 216.0-226.0' - NA | | **Disaggregated Limestone**<br>216.0-233.0' - yellowish gray, (5Y 7/2), moderate to strong HCl 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 HCl reaction | |
| 220<br>-177.9 | | | | | | | |
| | R23-SN<br>10 ft<br>100% | NA | NA | | | | |
| 225<br>-182.9 | | | | | | | |
| | 226.0 | | | 226.0-236.0' - NA | | | |
| 230<br>-187.9 | | | NA | | | | |
| | R24-SN<br>10 ft<br>85% | NA | | | | | |
| | | | | | | **Limestone Fragments**<br>233.0-234.5' - moderate yellowish brown, (10YR 5/4), mild to moderate HCl reaction, fragments are gravel-sized<br>**No Recovery 234.5-236.0'** | |
| 235<br>-192.9 | | | NR | | | | |
| | 236.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# ROCK CORE 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 2.0 ft bgs on 3/21/07 START : 3/21/2007 END : 3/23/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 236.0-246.0' - NA | | **Limestone Fragments**<br>236.0-246.0' - yellowish gray, (5Y 7/2), fine grained, moderate to strong HCl reaction, fine-grained limestone fragments, subrounded to subangular gravel-sized fragments up to 1" in diameter | |
| 240<br>-197.9 | | | | | | | |
| | R25-SN<br>10 ft<br>100% | NA | NA | | | | |
| 245<br>-202.9 | | | | | | | |
| | 246.0 | | | | | | |
| | | | | 246.0-256.0' - NA | | **Disaggregated Limestone**<br>246.0-254.6' - Same as 236.0-246.0' | |
| 250<br>-207.9 | | | NA | | | **Limestone Fragments**<br>249.5-254.6' - fine grained, mild HCl reaction, non fossiliferous | |
| | R26-SN<br>10 ft<br>86% | NA | | | | 250.8-254.6' - mild HCl reaction, highly fossiliferous limestone fragments with voids over 60-80% of surface | |
| 255<br>-212.9 | | | NR | | | **No Recovery 254.6-256.0'** | |
| | 256.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | I-03 SHEET 14 OF 14 |

# ROCK CORE 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 8" surface casing, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 2.0 ft bgs on 3/21/07 START : 3/21/2007 END : 3/23/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 256.0-266.0' - NA | | **Limestone Fragments**<br>256.0-266.0' - Same as 249.5-254.6' | |
| 260<br>-217.9 | | | | | | | |
| | R27-SN<br>10 ft<br>100% | NA | NA | | | | |
| 265<br>-222.9 | | | | | | | |
| | 266.0 | | | | | | |
| | | | | | | Bottom of Boring at 266.0 ft bgs on 3/23/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

DRILLING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 3/23/07 START : 3/23/2007 END : 3/24/2007 LOGGER : A. Teal, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 41.6 | 0.0 | 6.0 | R1-SN | | **Poorly Graded Sand (SP)**<br>0.0-4.0' - moderate yellowish brown, (10YR 5/4), trace fine gravel, fine to medium silica sand to 1/16", trace fines, trace organics, color varies to dark yellowish orange (10YR 6/6) between 1.0-2.0' , dusky yellow (5Y 6/4) between 2.0-4.0' | | |
| 5<br>36.6 | 6.0 | 10.0 | R2-SN | | **Sandy Lean Clay (CL)**<br>4.0-5.0' - pale olive, (10Y 6/2), moist, soft, low to medium plasticity, slow to rapid dilatancy, no HCl reaction, 30-35% very fine to fine silica sand<br>**Silt (ML)**<br>5.0-6.0' - grayish yellow, (5Y 8/4), wet, stiff, nonplastic, rapid dilatancy, moderate HCl reaction, 10% very fine sand-sized sand, carbonate materials<br>6.0-7.9' - Same as 5.0-6.0' | | R1: 3 minutes |
| 10<br>31.6 | 16.0 | | | | **Limestone**<br>7.9-9.9' - dusky yellow, (5Y 6/4), medium grained, mild HCl reaction, very weak (R1), moderately cemented, 60% coverage of small voids<br>**Silt (ML)**<br>9.9-16.0' - Same as 4.0-5.0' except small 1-2" thick sections of limestone | | |
| 15<br>26.6<br>20 | | | | | 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" | | R2: 7 minutes |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | I-04 SHEET 2 OF 14 |

# SOIL BORING 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

DRILLING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 3/23/07 START : 3/23/2007 END : 3/24/2007 LOGGER : A. Teal, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 21.6 | | 10.0 | R3-SN | | | | |
| 25 / 16.6 | | | | | | | R3: 9 minutes |
| | 26.0 | | | | **Silt With Sand And Limestone Fragments (ML)** 26.0-36.0' - Same as 16.0-26.0' except strong HCl reaction, limestone fragments up to 2", 20% very fine to fine sand-sized fragments, last 3" slightly darker in color to light olive gray (5Y 5/2) | | |
| 30 / 11.6 | | 10.0 | R4-SN | | | | |
| 35 / 6.6 | | | | | | | R4: 12 minutes |
| | 36.0 | | | | **Limestone** 36.0-44.7' - light olive gray, (5Y 5/2), fine to medium grained, strong HCl reaction, medium strong to strong (R3 to R4), strongly cemented, 80-90% coverage of small voids, few cavities up to 1/4" in size | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | I-04 SHEET 3 OF 14 |

# SOIL BORING 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

DRILLING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 3/23/07 START : 3/23/2007 END : 3/24/2007 LOGGER : A. Teal, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 1.6 | | 10.0 | R5-SN | | | | |
| 45<br>-3.4 | 46.0 | | | | **Sandy Lean Clay (CL)**<br>44.7-46.0' - moderate olive brown, (5Y 4/4), moist, low to moderate plasticity, strong HCl reaction, 30-40% sand-sized sand, carbonate materials | | R5: 8 minutes |
| | | | | | **Silt (ML)**<br>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**<br>47.6-55.5' - Same as 36.0-46.0' except many zones where rock fragments from fine to medium sand-sized up to cobble sized fragments, possibly from drilling | | |
| 50<br>-8.4 | | 9.5 | R6-SN | | | | |
| 55<br>-13.4 | | | | | **No Recovery 55.5-56.0'** | | R6: 9 minutes |
| | | | | | Begin Rock Coring at 56.0 ft bgs<br>See the next sheet for the rock core log | | |
| 60 | | | | | | | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 3/23/07 START : 3/23/2007 END : 3/24/2007 LOGGER : A. Teal, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 56.0 | | | | | **Limestone** | |
| | | | | 56.0-66.0' - NA | | 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<br>57.4-58.7' - Same as 56.0-57.4' | |
| | | | NA | | | | 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.<br>NA = Not Applicable<br>NR = No Recovery |
| 60<br>-18.4 | | | | | | 59.9-60.7' - Same as 56.0-57.4' | |
| | R7-SN<br>10 ft<br>55% | NA | | | | | |
| | | | | | | **No Recovery 61.5-66.0'** | |
| | | | NR | | | | |
| 65<br>-23.4 | | | | | | | R7: 43 minutes |
| | 66.0 | | | | | | |
| | | | | 66.0-76.0' - NA | | **Limestone**<br>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 |
| 70<br>-28.4 | | | NA | | | | |
| | R8-SN<br>10 ft<br>76% | NA | | | | | |
| | | | | | | **No Recovery 73.6-76.0'** | |
| 75<br>-33.4 | | | NR | | | | R8: 21 minutes |
| | 76.0 | | | | | | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 3/23/07 START : 3/23/2007 END : 3/24/2007 LOGGER : A. Teal, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 76.0-86.0' - NA | | **Limestone**<br>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"<br>77.0-86.0' - several silt zones, possibly due to drilling | |
| 80<br>-38.4 | R9-SN<br>10 ft<br>93% | NA | NA | | | | The limestone matrix (olive gray limestone) has strong HCl reaction, while dark gray features have mild HCl reaction |
| 85<br>-43.4 | | | | | | | R9: 26 minutes |
| | 86.0 | | NR | | | **No Recovery 85.3-86.0'** | |
| | | | | 86.0-96.0' - NA | | **Limestone**<br>86.0-91.7' - Same as 36.0-46.0' except yellowish gray, (5Y 7/2), 60-70% coverage of small voids | |
| 90<br>-48.4 | R10-SN<br>10 ft<br>100% | NA | NA | | | | |
| | | | | | | **Organic Clay (OH)**<br>91.7-92.0' - greenish black, (5GY 2/1), very stiff, low plasticity, micro stress features (folding) bedding features | |
| 95<br>-53.4 | | | | | | | R10: 15 minutes |
| | 96.0 | | | | | | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 3/23/07 START : 3/23/2007 END : 3/24/2007 LOGGER : A. Teal, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 96.0-106.0' - NA | | **Limestone**<br>96.0-106.0' - Same as 36.0-46.0' | |
| | | | NA | | | | |
| 100<br>-58.4 | | | | | | | |
| | R11-SN<br>10 ft<br>50% | NA | | | | **No Recovery 101.0-106.0'** | |
| | | | NR | | | | |
| 105<br>-63.4 | | | | | | | R11: 27 minutes |
| | 106.0 | | | | | | |
| | | | | 106.0-116.0' - NA | | **Disaggregated Weak Limestone**<br>106.0-116.0' - very pale orange, (10YR 8/2), strong HCl reaction, gravel-sized clasts of more indurated fine grained material, thin (<1/32") calcite fracture coating observed on one indurated fragment, fossil molds visible on few indurated fragments; 115.5-116.0' - weak (R2), roughly horizontal parting surfaces (2-3" apart), rough and undulating | Logger changes to C. Sump at 106.0' until end of log<br><br>Driller's Remark: maintaining drilling fluid circulation at 106.0-112.0'<br><br>Weak limestone completely disaggregated by drilling method<br><br>Run time: N/A, core at end of previous shift retrieved at start of this shift (3/24/07) |
| 110<br>-68.4 | | | | | | | |
| | R12-SN<br>10 ft<br>100% | NA | NA | | | | |
| 115<br>-73.4 | | | | | | | |
| | 116.0 | | | | | | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 3/23/07 START : 3/23/2007 END : 3/24/2007 LOGGER : A. Teal, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 116.0-126.0' - NA | | **Limestone Fragments**<br>116.0-124.5' - very pale orange, (10YR 8/2), strong HCl 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 | |
| 120<br>-78.4 | R13-SN<br>10 ft<br>85% | NA | NA | | | | |
| 125<br>-83.4 | | | NR | | | **No Recovery 124.5-126.0'** | Material lost from 124.5-126.0' may have been fines lost over length of run<br>R13: 17 minutes |
| | 126.0 | | | | | | |
| | | | | 126.0-136.0' - NA | | **Disaggregated Limestone With Limestone Fragments**<br>126.0-133.9' - very pale orange to yellowish gray, (10YR 8/2 to 5Y 7/2), very strong HCl 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 | |
| 130<br>-88.4 | R14-SN<br>10 ft<br>79% | NA | NA | | | | |
| | | | | | | **No Recovery 133.9-136.0'** | |
| 135<br>-93.4 | | | NR | | | | R14: 20 minutes |
| | 136.0 | | | | | | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 3/23/07 START : 3/23/2007 END : 3/24/2007 LOGGER : A. Teal, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (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**<br>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<br>-98.4 | | | NA | | | **Limestone And Limestone Fragments**<br>140.0-142.5' - very pale orange, (10YR 8/2), strong HCl 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 0.75-30" with little or no fragment infill material | |
| | R15-SN<br>10 ft<br>87% | NA | | | | | |
| 145<br>-103.4 | | | NR | | | | R15: 24 minutes |
| | 146.0 | | | | | **Limestone**<br>142.5-143.5' - medium yellow brown, (10YR 5/4), medium HCl reaction<br>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<br>**No Recovery 144.7-146.0'**<br>**Limestone Fragments**<br>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 | Driller's Remark: Lost circulation (driving 6" casing) at approximately 141'<br><br>Trace very fine silica sand grains (<5%) |
| | | | | 146.0-156.0' - NA | | | |
| 150<br>-108.4 | | | NA | | | | |
| | R16-SN<br>10 ft<br>75% | NA | | | | | |
| 155<br>-113.4 | | | NR | | | | R16: 22 minutes |
| | 156.0 | | | | | | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 3/23/07 START : 3/23/2007 END : 3/24/2007 LOGGER : A. Teal, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 156.0-166.0' - NA | | **Limestone**<br>147.8-150.5' - pale yellowish brown, (10YR 6/2), strong HCl reaction, medium strong to strong (R3 to R4), dense, poorly fossiliferous with few small voids (1/32-1/8") on <5% of surface, light gray (N7) clayey silt interbed at 148.2' (2" thick) with thin coatings on partings below, slight recrystallization evident on fresh surfaces | Driller's Remark: Sample fell out of core barrel during retrieval. Used 20' core barrel to recover this interval plus following run (166.0-176.0'). Sample is disturbed, upward fining sequence from 156.0-161.0' may be the result of losing the sample on first attempt. |
| 160<br>-118.4 | R17-SN<br>10 ft<br>87% | NA | NA | | | 150.5-151.5' - moderate yellowish brown, (10YR 5/4), mild to moderate HCl reaction, friable thinly bedded (<1/2") limestone fragments with sandy fines, trace silica sand grains (<5%) | |
| | | | | | | 151.5-153.5' - Same as 150.5-151.5' except moderate yellowish brown, sandy silt at bottom | Up to 10% silica sand grains |
| | | | | | | **No Recovery 153.5-156.0'** | With up to 10% fine silica sand grains |
| | | | | | | **Disaggregated Limestone With Limestone Fragments**<br>156.0-161.6' - with few subangular to subrounded limestone fragments at top of run grading with depth to Poorly Graded Gravel with Sand (GP), sand-sized and gravel-sized fragments are all carbonate derived and likely segregated during drilling | |
| 165<br>-123.4 | | | NR | | | | |
| | 166.0 | | | | | 161.6-161.8' - moderate yellow brown, (10YR 5/4), strong HCl reaction | 166.0-176.0' interval not disturbed |
| | | | | 166.0-176.0' - NA | | **Limestone**<br>161.8-164.7' - moderate yellow brown to dark yellowish brown, (10YR 5/4 to 10YR 4/2), moderate to strong particularly at grain boundaries HCl reaction, argillaceous, horizontal partings, 1-6" spacing with light gray sandy silt interbeds/coating (light gray, N7) | |
| 170<br>-128.4 | | | | | | **No Recovery 164.7-166.0'** | |
| | R18-SN<br>10 ft<br>89% | NA | NA | | | **Limestone**<br>166.0-168.5' - light olive gray, (5Y 5/2), moderate especially grain boundaries HCl reaction, poorly to moderately indurated argillaceous fine grained limestone, finely laminated, with very thin (1/16-1/8") very pale orange (10YR 8/2) laminations, 1/8"-3/8" spacing, more indurated zones exhibit well developed bedding plane partings, less indurated zones are soft and friable and exhibit contorted lamination surfaces, pale orange greater than olive gray | |
| 175<br>-133.4 | | | NR | | | | |
| | 176.0 | | | | | | |

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|---|---|
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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 3/23/07 START : 3/23/2007 END : 3/24/2007 LOGGER : A. Teal, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 176.0-186.0' - NA | | **Limestone**<br>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<br>**Limestone Fragments**<br>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<br>**No Recovery 174.9-176.0'**<br>**Limestone Fragments**<br>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)<br>**Disaggregated Limestone With Limestone Fragments**<br>178.6-178.9' - moderate yellow brown, (10YR 8/9), medium to coarse grained, moderate HCl reaction<br>**Limestone**<br>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"<br>**Disaggregated Limestone With Limestone Fragments**<br>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<br>**Limestone**<br>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<br>**No Recovery 184.4-186.0'** | 10% silica fine sand<br>Up to 10% silica sand<br>R19: 33 minutes<br>R20: 23 minutes |
| 180<br>-138.4 | | | NA | | | | |
| | R19-SN<br>10 ft<br>84% | NA | | | | | |
| 185<br>-143.4 | | | NR | | | | |
| | 186.0 | | | | | | |
| | | | | 186.0-196.0' - NA | | | |
| 190<br>-148.4 | | | NA | | | | |
| | R20-SN<br>10 ft<br>93% | NA | | | | | |
| 195<br>-153.4 | | | NR | | | | |
| | 196.0 | | | | | | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 3/23/07 START : 3/23/2007 END : 3/24/2007 LOGGER : A. Teal, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 196.0-206.0' - NA | | **Limestone And Limestone Fragments**<br>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 >3.0", 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'<br>**No Recovery 195.3-196.0'**<br>**Limestone Fragments**<br>196.0-199.0' - fine grained, mild to moderate HCl 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 than fine grained limestone fragments noted earlier, trace silt-sized particles<br>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<br>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<br>**Disaggregated Limestone**<br>204.2-205.2' - moderate yellow brown, (10YR 7/4), strong HCl reaction, "punky texture", weakly indurated, somewhat mottled/remnant laminations<br>**No Recovery 205.2-206.0'**<br>**Disaggregated Limestone With Limestone Fragments**<br>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) | |
| 200<br>-158.4 | R21-SN<br>10 ft<br>92% | NA | NA | | | | |
| 205<br>-163.4 | | | NR | | | | R21: 22 minutes |
| | 206.0 | | | | | | |
| | | | | 206.0-216.0' - NA | | | |
| 210<br>-168.4 | R22-SN<br>10 ft<br>100% | NA | NA | | | | |
| 215<br>-173.4 | | | | | | | |
| | 216.0 | | | | | | |

| PROJECT NUMBER: | 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 3/23/07 START : 3/23/2007 END : 3/24/2007 LOGGER : A. Teal, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 216.0-226.0' - NA | | **Disaggregated Limestone With Limestone Fragments**<br>216.0-226.0' - mild HCl 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)<br><br>216.6-217.0' moderately indurated silt-sized, light gray (N7) bed, friable | |
| 220<br>-178.4 | | | | | | | |
| | R23-SN<br>10 ft<br>94% | NA | NA | | | | |
| 225<br>-183.4 | | | | | | | R23: 24 minutes |
| | 226.0 | | NR | | | **No Recovery 225.4-226.0'** | |
| | | | | 226.0-236.0' - NA | | **Disaggregated Limestone With Limestone Fragments**<br>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) | |
| 230<br>-188.4 | | | | | | | |
| | R24-SN<br>10 ft<br>100% | NA | NA | | | | |
| 235<br>-193.4 | | | | | | | R24: 36 minutes |
| | 236.0 | | | | | | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 3/23/07 START : 3/23/2007 END : 3/24/2007 LOGGER : A. Teal, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 236.0-246.0' - NA | | **Disaggregated Limestone With Limestone Fragments**<br>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 | |
| 240<br>-198.4 | | | | | | | |
| | R25-SN<br>10 ft<br>100% | NA | NA | | | | |
| 245<br>-203.4 | | | | | | | R25: 27 minutes |
| | 246.0 | | | | | | |
| | | | | 246.0-256.0' - NA | | 246.0-256.0' - mild to moderate HCl 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 | |
| 250<br>-208.4 | | | | | | | |
| | R26-SN<br>10 ft<br>100% | NA | NA | | | | |
| 255<br>-213.4 | | | | | | | R26: 31 minutes |
| | 256.0 | | | | | | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 3/23/07 START : 3/23/2007 END : 3/24/2007 LOGGER : A. Teal, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 256.0-266.0' - NA | | **Disaggregated Limestone With Limestone Fragments** 256.0-266.0' - Same as 246.0-256.0' except lack of distinct laminated beds of silt-sized material, silty sand-sized, with gravel-sized limestone fragments (weak, friable), all carbonate derived | No silica sand grains visible (too fine grained) |
| 260 -218.4 | | | | | | | |
| | R27-SN 10 ft 100% | NA | NA | | | | |
| 265 -223.4 | | | | | | | R27: 37 minutes |
| | 266.0 | | | | | Bottom of Boring at 266.0 ft bgs on 3/24/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/9/2007 END : 2/12/2007 LOGGER : M. Faurote, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.2 | 0.0 | 6.0 | R1-SN | | **Poorly Graded Sand (SP)**<br>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<br>1.0-1.5' - brownish black to moderate brown, (5YR 2/1 to 5YR 3/4)<br>1.5-5.0' - light brown to dark yellowish orange, (5YR 5/6 to 10YR 6/6) | | "Water level is based on Ground Water Monitoring at LNP site (FSAR Table 2.4.12.08)"<br>Water levels were not recorded for I-05<br>Coring run times were not recorded for I-05 |
| 5<br>37.2 | 6.0 | 10.0 | R2-SN | | **Well Graded Sand With Silt And Limestone Fragments (SW-SM)**<br>5.0-6.0' - pale green, (10G 6/2), no to mild HCl reaction, 10-15% fines and 20% rock fragments (very hard, with shell fragments)<br>**Poorly Graded Sand With Silt (SP-SM)**<br>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<br>**Clayey Sand (SC)**<br>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<br>**Sandy Silt (ML)**<br>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<br>**Sandy Silt And Limestone Fragments (ML)**<br>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 | | Drilled extremely fast, sands are loose and friable with enough silt to be cohesive<br>These fine grained materials may be the friable limestone destroyed via sonic drilling methods |
| 10<br>32.2<br>15<br>27.2 | 16.0 | | | | **Silt (ML)**<br>19.0-20.0' - grayish orange, (10YR 7/4), low plasticity, mild to moderate HCl reaction, carbonate material | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/9/2007 END : 2/12/2007 LOGGER : M. Faurote, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.2 | | 10.0 | R3-SN | | **Silty Sand With Limestone Fragments (SM)** 20.0-21.3' - dusky yellow, (5Y 6/4), limestone fragments are friable, 1/4" to 2" in size, fossiliferous (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 | | |
| 25 17.2 | 26.0 | | | | **Silty Sand With Limestone Fragments (SM)** 24.8-31.2' - grayish orange, (10YR 7/4), fine to coarse grained, moderate HCl reaction, with nonplastic to low plasticity fines and fine to coarse gravel-sized (1/4 to 1/2") limestone (fossiliferous [molds/casts], friable), all carbonate materials, iron oxide staining at 27.0' | | Forams, gastropods, possible bryozoans |
| 30 12.2 | | 10.0 | R4-SN | | | | |
| | | | | | **Limestone** 31.2-34.0' - greenish gray, (5GY 6/1), very fine to fine grained, mild HCl reaction, fragmented (up to 2" size), fragments separated by fat clay with sand (pale 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 | | Interfragmental filling of fat clay, clay and clayey silt, with or without additional smaller gravel-sized fragments; the fines have moderate reaction to HCl, limited plasticity |
| 35 7.2 | 36.0 | | | | **Silt With Sand (ML)** 34.0-36.0' - pale yellowish brown, (10YR 6/2), nonplastic, moderate HCl reaction, with very fine grained sand-size particles, all carbonate materials | | |
| | | | | | **Fat Clay With Sand (CH)** 36.0-37.6' - grayish brown, (5YR 3/2), high plasticity, no HCl reaction, with very fine to fine grained silica sand, organic rich | | Silica grains (very fine) to silt-sized in very thin pseudobeds may exhibit microstructures of deformation and bedding |
| 40 | | | | | **Silty Sand To Sandy Silt (SM)** 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 | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/9/2007 END : 2/12/2007 LOGGER : M. Faurote, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.2 | | | | | | | |
| | | 10.0 | R5-SN | | | | |
| 45 -2.8 | | | | | | | |
| | 46.0 | | | | | | |
| | | | | | | | Grayish brown clay (5YR 3/2) as stringers, tacky, soft and contains minor sand size grains |
| | | | | | **Sandy Silt With Limestone Fragments (ML)** 47.8-56.0' - pale yellowish brown, (5YR 3/2), moist, nonplastic, moderate HCl reaction, with very fine to fine sand-sized particles and 20-35% fine to coarse gravel-sized limestone fragments, percentage of limestone fragments increases with depth, all carbonate materials | | |
| 50 -7.8 | | | | | | | Brown clay seams |
| | | 10.0 | R6-SN | | | | |
| | | | | | | | Clay seams |
| | | | | | | | Gravel-sized fragments increase in percentage to end of run |
| 55 -12.8 | | | | | | | |
| | | | | | Begin Rock Coring at 56.0 ft bgs<br>See the next sheet for the rock core log | | |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/9/2007 END : 2/12/2007 LOGGER : M. Faurote, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 56.0 | | | 56.0-66.0' - NA | | **Limestone Fragments**<br>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<br>**Disaggregated Limestone With Limestone Fragments**<br>57.5-62.5' - dusky yellow, (5Y 6/4), moderate HCl reaction, sparse limestone fragments to 4" | Rock may have been fragmented due to the drilling process<br>Limestone fragments 58.5-59.3', 61.7-62.0' |
| 60<br>-17.8 | R7-SN<br>10 ft<br>100% | NA | NA | | | **Limestone**<br>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 | NA = Not Applicable<br>NR = No Recovery |
| 65<br>-22.8 | | | | | | | |
| | 66.0 | | | 66.0-76.0' - NA | | 66.0-70.0' - moderate olive brown, (5Y 4/4), fine grained, strong HCl 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 | |
| 70<br>-27.8 | R8-SN<br>10 ft<br>100% | NA | NA | | | **Disaggregated Weak Limestone**<br>70.0-71.0' - light brown, (5YR 6/4), moderate to strong HCl reaction, all carbonate derived<br>71.0-71.8' - light medium brown to grayish orange, (10YR 7/4)<br>**Limestone**<br>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'<br>Possible organics in 1/4" or less stringers |
| 75<br>-32.8 | | | | | | | |
| | 76.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/9/2007 END : 2/12/2007 LOGGER : M. Faurote, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (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**<br>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<br>-37.8 | R9-SN<br>10 ft<br>90% | NA | NA | | | **Limestone**<br>79.5-85.0' - moderate yellowish brown, (10YR 5/4), moderate HCl 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 HCl | |
| 85<br>-42.8 | | | NR | | | **No Recovery 85.0-86.0'** | |
| | 86.0 | | | | | | |
| | | | | 86.0-96.0' - NA | | **Limestone**<br>86.0-87.0' - moderate yellowish brown, (10YR 5/4), moderate HCl reaction, pulverized to sand-sized particles<br>**Limestone Fragments**<br>87.0-88.0' - light brown, (5YR 5/6), fragments are in a sandy silt matrix, probably separated from material 86.0-87.0'<br>**Disaggregated Limestone With Limestone Fragments**<br>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<br>**Disaggregated Limestone**<br>89.8-92.5' - yellowish gray, thinly bedded (<3/8") down to varve-like planes<br>**Limestone**<br>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 |
| 90<br>-47.8 | R10-SN<br>10 ft<br>90% | NA | NA | | | | |
| 95<br>-52.8 | | | NR | | | | |
| | 96.0 | | | | | | |

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|---|---|
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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/9/2007 END : 2/12/2007 LOGGER : M. Faurote, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 96.0-106.0' - NA | | **Disaggregated Limestone With Limestone Fragments**<br>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<br>**No Recovery 95.0-96.0'**<br>**Disaggregated Limestone With Limestone Fragments**<br>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 | |
| 100<br>-57.8 | | | | | | | |
| | R11-SN<br>10 ft<br>100% | NA | NA | | | | |
| 105<br>-62.8 | | | | | | | |
| | 106.0 | | | | | | |
| | | | | 106.0-116.0' - NA | | | |
| 110<br>-67.8 | | | | | | | |
| | R12-SN<br>10 ft<br>95% | NA | 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 HCl reaction | Loose carbonate grains ar the same as the constituents of the limestone fragments, suggesting that the drilling method disaggregates the limestone |
| 115<br>-72.8 | | | | | | | |
| | 116.0 | | NR | | | **No Recovery 115.5-116.0'** | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/9/2007 END : 2/12/2007 LOGGER : M. Faurote, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 116.0-126.0' - NA | | **Disaggregated Limestone With Limestone Fragments**<br>116.0-118.3' - very fine grained, 6" of light brown sandy silt-sized particles with gravel-sized particles atop 0.8' of limestone fragments, pale yellowish brown (micritic) limestone clasts with 15% void space and poorly fossiliferous<br>**Disaggregated Limestone**<br>118.3-123.1' - very pale orange to grayish orange, (10YR 8/2 to 10YR 7/4), strong HCl reaction, strong reaction to HCl in all carbonate derived particles, gravel-sized fragments at 120.5-121.0' | Delayed mild to moderate reaction to HCl on actual limestone, finer grained clast fillings react strongly to HCl<br>This is carbonate silt-sized material |
| 120<br>-77.8 | R13-SN<br>10 ft<br>100% | NA | NA | | | | |
| | | | | | | **Disaggregated Limestone With Limestone Fragments**<br>123.1-125.2' - very pale orange, (10YR 8/2), strong HCl reaction, limestone fragments up to 1" in size | |
| 125<br>-82.8 | | | | | | 125.2-126.0' - very pale orange, (10YR 8/2), 15% fragments (up to 3/4") of very fine grained limestone | |
| | 126.0 | | | | | | |
| | | | | 126.0-136.0' - NA | | 126.0-128.1' - very pale orange, (10YR 8/2), moderate HCl reaction, sand and silt-sized carbonate grains, limestone fragments are composed of sand and silt-sized grains and 3-5% black spots (1/16") that appear organic<br>**Disaggregated Interbedded Weak Limestone**<br>128.1-135.6' - grayish orange pink, (5YR 7/2), moderate to strong HCl reaction, friable to micritic thin (<1/2") limestone beds; beds are undulant and generally discontinuous across the width of the core | The sequence at 126.0-136.0' looks very similar to the immediately preceding fining upward materials<br>The major part of these runs were sliced in half by the spatula and moved with a mortar trowel; the gravelly parts tend to be in more pieces |
| 130<br>-87.8 | R14-SN<br>10 ft<br>100% | NA | NA | | | | |
| 135<br>-92.8 | | | | | | | |
| | 136.0 | | | | | | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/9/2007 END : 2/12/2007 LOGGER : M. Faurote, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 136.0-146.0' - NA | | **Limestone Fragments**<br>135.6-137.5' - pale yellowish brown, (10YR 6/2), fine grained, mild HCl reaction, strong to very strong (R4 to R5), partings show thin re-crystallized coatings of carbonate and minor iron oxide<br>**Disaggregated Weak Limestone With Limestone Fragments**<br>137.5-141.0' - light brown, (5YR 6/4), fine grained, mild HCl reaction, fragments are angular, with apparent carbonaceous material on fracture surfaces and 5-15% of "spots" in fine grained limestone<br>**Limestone Fragments**<br>141.0-142.5' - grayish orange, (10YR 7/4), very fine grained, mild HCl reaction, fragments up to 4" long, many partings with not much infilling, some iron oxides noted, particularly at 142.0-142.5'<br>**Limestone**<br>142.5-145.0' - angular, granulated fragments, fragments are very friable and composed of silt and sand-sized carbonate particles | Large fossil (possible gastropod) in pale yellowish brown (10YR 6/2) limestone<br>This unit appears to be weak rock; limestone destroyed during sonic drilling<br>Limestone fragments appear broken due to drilling methods |
| 140<br>-97.8 | R15-SN<br>10 ft<br>90% | NA | NA | | | | |
| 145<br>-102.8 | | | NR | | | **No Recovery 145.0-146.0'** | |
| | 146.0 | | | 146.0-156.0' - NA | | **Limestone**<br>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<br>**Disaggregated Weak Limestone**<br>148.6-151.0' - yellowish gray, (5Y 7/2), strong HCl reaction, all size ranges are carbonate derived grains | |
| 150<br>-107.8 | R16-SN<br>10 ft<br>100% | NA | NA | | | **Limestone**<br>151.0-151.3' - light brown, (5YR 6/4), fossiliferous (casts), fragments up to 1" in size<br>**Disaggregated Limestone With Limestone Fragments**<br>151.3-156.5' - strong HCl reaction, limestone fragments (5-20%) are 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 | |
| 155<br>-112.8 | | | | | | | |
| | 156.0 | | | | | | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/9/2007 END : 2/12/2007 LOGGER : M. Faurote, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 156.0-166.0' - NA | | **Arenaceous Limestone**<br>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 | 159.0-161.0' may have been broken apart by the drilling method |
| 160<br>-117.8 | | | | | | | |
| | R17-SN<br>10 ft<br>100% | NA | NA | | | **Limestone**<br>161.0-162.3' - light brown, (5YR 6/4), very fine grained, moderate to strong HCl reaction, weak to medium strong (R2 to R3), fossiliferous (casts)<br>**Limestone To Arenaceous Limestone**<br>162.3-163.8' - light brown, (5YR 6/4), mild HCl reaction, very thinly to thinly bedded, limestone contains silica grains<br>**Disaggregated Weak Limestone**<br>163.8-165.2' - light olive gray, (5Y 5/2), carbonate derived silt-sized particles along bedding planes <1/8" to 3/8" thick, beds contain <10% silica sand | This material is highly broken |
| 165<br>-122.8 | | | | | | | |
| | 166.0 | | | | | | |
| | | | | 166.0-176.0' - NA | | **Arenaceous Limestone**<br>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')<br>**Disaggregated Weak Limestone**<br>170.8-171.6' - moderate brown, (5YR 4/4), moderate HCl reaction, <2% muscovite and pyrite as slightly oxidized blebs, some small rock fragments<br>**Limestone**<br>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 | The drilling method may have created the partings and vibrated the fines between individual pieces of rock<br><br>No euhedral or subhedral crystals visible<br>SC-2 collected at 171.6-172.3' |
| 170<br>-127.8 | | | | | | | |
| | R18-SN<br>10 ft<br>90% | NA | NA | | | | |
| 175<br>-132.8 | | | | | | **No Recovery 175.0-176.0'** | |
| | | | NR | | | | |
| | 176.0 | | | | | | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/9/2007 END : 2/12/2007 LOGGER : M. Faurote, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 176.0-186.0' - NA | | **Limestone**<br>176.0-183.2' - grayish orange to pale brown, (10YR 7/4 to 5YR 5/2), very fine grained, mild to moderate HCl reaction, arenaceous, thinly interbedded with carbonate intergranular filling, HCl reaction is mainly in void filling and fossil cast lining, poorly fossiliferous, overt porosity is <35%, limestone contact is irregular and gradational in a very thin zone (<1/16") | Partings or interbed surfaces exhibit organic or iron oxide (Gothite) patinas or stains |
| 180<br>-137.8 | | | NA | | | | 179.0-179.6' - Appears as a breccia, gray clast in pale brown limestone matrix |
| | R19-SN<br>10 ft<br>90% | NA | | | | | 181.0-182.1' - Thinly bedded limestone |
| | | | | | | | 182.1-183.2' - Thin broken beds, drilling related |
| | | | | | | **Disaggregated Weak Limestone**<br>183.2-185.0' - grayish orange, (10YR 7/4), very fine grained, strong HCl reaction, carbonate derived silt-sized and very fine sand-sized grains in irregular thin beds with organic material defining some of the planar features, silica <5% and sparse | 183.2-185.0' - Unit may have been broken by drilling method, particularly in "harder" beds |
| 185<br>-142.8 | | | NR | | | | |
| | 186.0 | | | | | **No Recovery 185.0-186.0'** | |
| | | | | 186.0-196.0' - NA | | **Disaggregated Limestone With Limestone Fragments**<br>186.0-194.1' - grayish orange, (10YR 7/4), mild to moderate HCl reaction, up to 40% gravel-sized limestone fragments, broken and granulated, fragments range from <1/4" to 1-1/2"x2"x1", independent clasts exhibit bedding plane discontinuities and settling features, limestone moderately fossiliferous (casts) | This appears to be partially to be a very weak agglomeration of silt, sand and rock (gravel-sized fragments) that may represent a collapse feature |
| 190<br>-147.8 | | | | | | | |
| | R20-SN<br>10 ft<br>100% | NA | NA | | | | |
| 195<br>-152.8 | | | | | | | |
| | 196.0 | | | | | | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/9/2007 END : 2/12/2007 LOGGER : M. Faurote, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 196.0-206.0' - NA | | **Limestone**<br>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) | The rock fragments (195.5-196.0') appear to have been broken by the drilling method<br>Possible collapse infilling, or extremely broken from the drilling method |
| 200<br>-157.8 | | | | | | | |
| | R21-SN<br>10 ft<br>100% | NA | NA | | | | |
| 205<br>-162.8 | | | | | | **Disaggregated Interbedded Limestone**<br>204.7-206.0' - very pale orange, (10YR 8/2), moderate to strong HCl reaction, very tacky when wet | |
| | 206.0 | | | | | | |
| | | | | 206.0-216.0' - NA | | **Disaggregated Interbedded Limestone With Limestone Fragments**<br>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' | 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 |
| 210<br>-167.8 | | | | | | | |
| | R22-SN<br>10 ft<br>100% | NA | NA | | | **Disaggregated Weak Limestone**<br>210.5-213.5' | |
| | | | | | | **Disaggregated Interbedded Limestone With Limestone Fragments**<br>213.5-216.0' - Same as 206.0-210.5' | |
| 215<br>-172.8 | | | | | | | |
| | 216.0 | | | | | | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/9/2007 END : 2/12/2007 LOGGER : M. Faurote, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 216.0-226.0' - NA | | **Disaggregated Fossiliferous Limestone**<br>216.0-225.5' - grayish orange to grayish orange pink, (10YR 7/4 to 5YR 7/2), moderate to strong HCl reaction, friable and pliable, with carbonate derived sand and silt-sized grains that react to HCl, 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 HCl reactions primarily in void filling or along partings | At 218.5' there are apparent carbonaceous organic materials, but they are degraded |
| 220<br>-177.8 | | | | | | | |
| | R23-SN<br>10 ft<br>95% | NA | NA | | | | |
| 225<br>-182.8 | | | | | | | |
| | 226.0 | | NR | | | **No Recovery 225.5-226.0'** | |
| | | | | 226.0-236.0' - NA | | **Disaggregated Fossiliferous Limestone**<br>226.0-236.0' - Same as 216.0-225.5' | |
| 230<br>-187.8 | | | | | | | |
| | R24-SN<br>10 ft<br>100% | NA | NA | | | | |
| 235<br>-192.8 | | | | | | | |
| | 236.0 | | | | | | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/9/2007 END : 2/12/2007 LOGGER : M. Faurote, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 236.0-246.0' - NA | | **Disaggregated Fossiliferous Limestone**<br>236.0-246.0' - Same as 216.0-236.0' except with occasional limestone fragments | At 236.5' - very fine grained, small (1/2"x3/8") limestone fragment is moderate orange pink (5YR 8/4), with very few fossil casts, strong HCl reaction |
| 240<br>-197.8 | | | | | | | |
| | R25-SN<br>10 ft<br>100% | NA | NA | | | | |
| | | | | | | | All of these samples were split with the spatula blade and one-half the core was placed in the core box; very few rock fragments impeded the cut |
| 245<br>-202.8 | | | | | | | The final 20-30' of drilling was quite difficult, and many runs in and out were required to drill the hole and maintain the borehole; some of the rock appears completely broken due to the drilling technique |
| | 246.0 | | | | | | |
| | | | | 246.0-256.0' - NA | | 246.0-254.5' - very pale orange, (10YR 8/2), strong HCl reaction, fragments of very fine grained fossiliferous limestone at 247.5' exhibit very sharp angular edges, fragments are easily broken, a fragment at 254.3' shows a nearly horizontal contact between fossiliferous (casts) and very fine grained limestone, both exhibiting strong reactions to HCl, the rock character change is obvious | |
| 250<br>-207.8 | | | NA | | | | |
| | R26-SN<br>10 ft<br>85% | NA | | | | | |
| 255<br>-212.8 | | | NR | | | **No Recovery 254.5-256.0'** | |
| | 256.0 | | | | | | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/9/2007 END : 2/12/2007 LOGGER : M. Faurote, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 256.0-266.0' - NA | | **Disaggregated Limestone With Limestone Fragments**<br>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) | |
| 260<br>-217.8 | | | | | | 259.7-265.0' - light brown, (5YR 6/4), moderate HCl reaction, limestone fragments average less than 1" in size | |
| | R27-SN<br>10 ft<br>100% | NA | NA | | | | |
| 265<br>-222.8 | | | | | | **Disaggregated Limestone**<br>265.0-266.0' - moderate orange pink, (5YR 8/4), contains no limestone fragments<br>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 recover casing and core |
| | 266.0 | | | | | | |
| | | | NA | 266.0-271.0' - NA | | | |
| | | | | | | **No Recovery 267.5-271.0'** | |
| | 5 ft<br>30% | NA | NR | | | | |
| 270<br>-227.8 | | | | | | | |
| | 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)

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

WATER LEVELS : 4.41 bgs on 3/6/07 START : 3/7/2007 END : 3/10/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.3 | 0.0 | | | | **Topsoil**<br>0.0-0.3' - brownish black, (5YR 2/1), organic rich | | Reduced recovery typical of partial core lengths (6' in 10' core barrel)<br>"Water level is based on Ground Water Monitoring at LNP site (FSAR Table 2.4.12.08)" |
| | | 4.5 | R1-SN | | **Poorly Graded Sand Grading To Poorly Graded Sand With Silt (SP-SM)**<br>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, silica sands<br>3.3-4.5' - light gray, (N7 to N8), fine grained, 10-15% 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 HCl reaction) | | Water levels were not recorded for I-06 |
| 5<br>37.3 | 6.0 | | | | **No Recovery 4.5-6.0'** | | Coring run times were not recorded for I-06 |
| | | 10.0 | R2-SN | | **Poorly Graded Sand (SP)**<br>6.0-7.0' - light gray, (N7), brownish black (5YR 2/1) organic material (slough) | | |
| | | | | | **Silty Sand With Limestone Fragments (SM)**<br>7.0-8.5' - 3" yellowish gray (5Y 8/1), disc shaped, rounded clast at 7.4' | | |
| 10<br>32.3 | | | | | **Sandy Silt (ML)**<br>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 | | At 10.0-14.0' possible stromatolites, large euhedral crystals (associated with globular concretionary masses), smoky clear with tetrahedral form well defined, twinning visible, no reaction to HCl |
| 15<br>27.3 | 16.0 | | | | 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<br>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 limestone fragments, carbonate materials | | |
| 20 | | | | | | | |

| 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

DRILLING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 3/7/2007 END : 3/10/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.3 | | 10.0 | R3-SN | | | | |
| 25 / 17.3 | | | | | | | |
| | 26.0 | | | | 26.0-30.3' - Same as 16.0-26.0' except no very fine sand, no fine gravel-sized limestone fragments | | |
| 30 / 12.3 | | | | | Begin Rock Coring at 30.0 ft bgs<br>See the next sheet for the rock core log | | |
| 35 / 7.3 | | | | | | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 3/7/2007 END : 3/10/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 12.3 | 30.0 | | | 30.3-36.0' - NA | | **Limestone** 30.3-36.0' - grayish orange and medium gray, (10YR 7/4 and N5), moderate to strong HCl reaction, medium strong (R3), thin to medium bedding, horizontal partings 3/4"-4", numerous small (1/32"-1/8") voids, few (<3/4") cavities, fossiliferous with significantly more molds than casts, thin horizontal zones (possibly beds) of fine grained limestone with no voids; 1/2"-4" thick (1"-3" average) silt/clay interbeds with gravel-sized limestone fragments, light gray (N6) grading to medium dark gray (N4) with depth, sharp contacts | NA = Not Applicable<br>NR = No Recovery |
| | R4-SN 6 ft 100% | NA | NA | | | | |
| 35<br>7.3 | | | | | | | |
| | 36.0 | | | 36.0-46.0' - NA | | **Sandy Silt With Limestone Fragments (ML)** 36.0-46.0' - moderate yellowish brown, (10YR 5/4), nonplastic to low plasticity, moderate HCl reaction, fine gravel-sized fragments (<10%) <1/2" diameter, <10% very fine to fine sand-sized, dark brown organic material at 42.0' | |
| 40<br>2.3 | | | | | | | |
| | R5-SN 10 ft 100% | NA | NA | | | | |
| 45<br>-2.8 | | | | | | | |
| | 46.0 | | | 46.0-56.0' - NA | | 46.0-52.5' - Same as 36.0-46.0' except coarse grained sand-sized limestone fragments, dark brown organic mottling, 10% to >50% sand content, <10% fine gravel-sized limestone fragments | |
| 50 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 3/7/2007 END : 3/10/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -7.8 | R6-SN 10 ft 100% | NA | NA | | | | |
| | | | | | | **Limestone** 52.5-52.8' - yellowish gray, (5Y 7/2), fossiliferous (significantly more molds than casts), numerous <1/32"-1/8" voids, very few small cavities 1/4"-1/2" diameter, full diameter core fragments; horizontal, smooth, planar partings; thin silty clay coating on fracture surface | |
| 55 -12.8 | | | | | | | |
| 56.0 | | | | 56.0-66.0' - NA | | **Sandy Lean Clay With Limestone Fragments (CL)** 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 -17.8 | R7-SN 10 ft 100% | NA | NA | | | | |
| | | | | | | **Interbedded Limestone And Clay** 61.0-63.4' - light medium gray (clay), (N6), moderate to strong HCl reaction, few fossils or surface voids or cavities, dark brown/black laminated inclusions, thin partings every 1"-3" | |
| | | | | | | **Disaggregated Limestone** 63.4-66.0' - moderate yellowish brown, moderate to strong HCl reaction, mostly very fine sand-sized limestone fragments, with gravel-sized limestone fragments similar to 61.0-63.4' | |
| 65 -22.8 | | | | | | | |
| 66.0 | | | | 66.0-76.0' - NA | | **Limestone** 66.0-66.9' - Same as 61.0-63.4' except thin bedding and clayey silt interbeds **Limestone Fragments** 66.9-68.7' - fine gravel-sized (4"-6") particles, sandy silt, carbonate derived | Repeating sequences of mostly thinly bedded limestone with silty clay / clayey silt interbeds (1-2") with larger zones of sandy silt +/- clay with gravel sized limestone fragments (3-5') Driller's Remark: Difficulty advancing 6" casing |
| 70 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
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# 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 3/7/2007 END : 3/10/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -27.8 | R8-SN 10 ft 100% | NA | NA | | | **Interbedded Limestone** 68.7-73.5' - thin bedding, similar to 66.9-68.7' except increasing interbed thickness with depth (<1"-6"), limestone partings | |
| 75 -32.8 | | | | | | **Disaggregated Limestone** 73.5-76.0' - moderate HCl reaction, 10-20% gravel-sized (1/2"-1") limestone fragments, carbonate derived material | |
| 76.0 | | | | 76.0-86.0' - NA | | 76.0-83.0' - 20-50% gravel-sized limestone fragments, dark brown organic silt laminae, coarse sand | Driller's Remark: Extremely difficult advancing 6" casing, lost drilling fluid circulation |
| 80 -37.8 | R9-SN 10 ft 100% | NA | NA | | | | |
| | | | | | | **Limestone Fragments** 83.0-86.0' - yellowish gray, coarse sand to coarse gravel-sized fragments (1/4" to >3") | |
| 85 -42.8 | | | | | | | |
| 86.0 | | | | 86.0-96.0' - NA | | 86.0-86.3' - yellowish gray to dusky yellow, (5Y7/2 to 5Y6/4), fragments 3" diameter<br>86.3-89.5' - moderate yellowish brown, moderate HCl reaction, 30-50% gravel-sized limestone fragments, friable, 30-40% small voids (1/32"-1/8"), with coarse sand-sized matrix, thin silty zones with thin (1/4"-1/2") dark brown to black organic layers | Driller's Remark: Difficult advancing 6" casing; no drilling mud circulation |
| 90 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
| 338884.FL | I-06 | SHEET 6 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 3/7/2007 END : 3/10/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -47.8 | R10-SN 10 ft 100% | NA | 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") | |
| 95 -52.8 | | | | | | | |
| | 96.0 | | | 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%) | |
| 100 -57.8 | R11-SN 10 ft 100% | NA | NA | | | | |
| 105 -62.8 | | | | | | | |
| | 106.0 | | | 106.0-116.0' - NA | | | 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 |
| 110 | | | | | | | |

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|---|---|---|

# 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 3/7/2007 END : 3/10/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -67.8 | R12-SN 10 ft 100% | NA | NA | | | **Limestone Fragments With 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 fossils | |
| 115 -72.8 | | | | | | | |
| 116.0 | | | | 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 material | Driller's Remark: Difficulty advancing 6" casing |
| 120 -77.8 | R13-SN 10 ft 100% | NA | NA | | | | |
| 125 -82.8 | | | | | | **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"), 5% dark yellowish gray horizontal banding, horizontal partings 2"-4" with clayey carbonaceous silt interbeds (1"-3"), contains limestone fragments <1" | |
| 126.0 | | | | 126.0-136.0' - NA | | **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") <5%, single full core diameter piece | |
| 130 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
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| 338884.FL | I-06 | SHEET 8 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 3/7/2007 END : 3/10/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -87.8 | R14-SN 10 ft 100% | NA | NA | | | **Limestone** 127.7-133.0' - limestone fragments 2"-4" diameter with varying amounts of fine grained disaggregated limestone, interval at 128.5-129.0' has 3 full size core fragments with fragments in between and exhibits fine (1/10"-1/2") bedding planes 133.0-134.9' - yellowish gray, (5Y 7/2), similar to 127.0-127.7', horizontal partings vary from 1"-7", light gray clayey silt infilling on partings | |
| 135 -92.8 | 136.0 | | | 136.0-146.0' - NA | | 134.9-136.0' - limestone fragments with sandy silt to gravel-sized fragments, angular to subangular, similar to above except more silt to sand-sized particles 136.0-141.0' - medium gray intermixed with yellowish gray, (N6 with 5Y 7/2), moderate to strong HCl reaction, medium strong (R3), fragmented, fossiliferous (molds & casts), large burrows (1/2" wide, 3"-4" long), voids in irregular zones (up to 30% surface), cavities (1/2" diameter, circular), fragments 1"-4" diameter/length, lack of fines except in interval at 140.0-140.4' which is medium brown, fine grained disaggregated limestone (5-10% silica grains) with moderate HCl reaction 141.0-143.4' - with limestone fragments up to 3", intact core sections up to 0.3' in length | Driller's Remark: Advancing 6" casing becoming easier (better rock) |
| 140 -97.8 | R15-SN 10 ft 86% | NA | NA | | | **Disaggregated Limestone** 143.4-144.6' - mild to moderate HCl reaction, 10-20% silica grains | |
| 145 -102.8 | 146.0 | | NR | | | **No Recovery 144.6-146.0'** | |
| | | | | 146.0-156.0' - NA | | **Limestone Fragments** 146.0-147.6' - very coarse grained, with >50% of fragments 1/4" or larger, grading to coarse sand-sized with 2"-3" limestone fragments, all carbonate derived 147.6-147.9' - yellowish brown, 1-1/2"-2" thick, no interbed 147.9-151.0' - similar to 147.6-147.9', bedding plane parting evident 1/2"-3/4" thick | |
| 150 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
|---|---|---|
| 338884.FL | I-06 | SHEET 9 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 3/7/2007 END : 3/10/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (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 | 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 | |
| 155 -112.8 | | | | | | **Limestone** 155.0-155.4' - Same as 151.0-151.8' **Disaggregated Limestone** 155.4-156.0' - Same as 153.9-155.0 | |
| | 156.0 | | | 156.0-166.0' - NA | | **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' | |
| 160 -117.8 | | | | | | | |
| | R17-SN 10 ft 100% | NA | NA | | | | |
| 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 |
| 170 | | | | | | | |

| PROJECT NUMBER: 338884.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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 3/7/2007 END : 3/10/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -127.8 | R18-SN 10 ft 100% | NA | 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 | |
| 175 -132.8 | 176.0 | | | 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 HCl reaction when scratched 176.2-183.4' - limestone fragments are fine grained and angular to subangular, increasing disaggregation with depth | |
| 180 -137.8 | R19-SN 10 ft 100% | NA | NA | | | | |
| 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 |
| 190 | | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: I-06 | SHEET 11 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 3/7/2007 END : 3/10/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -147.8 | R20-SN 10 ft 100% | NA | 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' | |
| 195 -152.8 | | | | | | | |
| | 196.0 | | | 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' | |
| 200 -157.8 | R21-SN 10 ft 100% | NA | NA | | | | |
| 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) | |
| 210 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | I-06 SHEET 12 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 3/7/2007 END : 3/10/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (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 | NA | | | **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 | | | NR | | | **No Recovery 214.5-216.0'** | |
| 216.0 | R23-SN 10 ft 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 **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) | |
| 220 -177.8 | | | | | | | |
| 225 -182.8 | | | NR | | | | |
| 226.0 | | | | 226.0-236.0' - NA | | | |
| 230 | | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: I-06 | SHEET 13 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 3/7/2007 END : 3/10/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -187.8 | R24-SN 10 ft 100% | NA | NA | | | **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' | |
| 235 -192.8 | | | | | | | |
| | 236.0 | | | 236.0-246.0' - NA | | 236.0-246.0' - Same as 228.0-236.0' except medium brown with gravel-sized fragments (<15%) | |
| 240 -197.8 | R25-SN 10 ft 100% | NA | NA | | | | |
| 245 -202.8 | | | | | | 244.2-245.4' - few larger (>1") limestone fragments, moderate HCl reaction | |
| | 246.0 | | | 246.0-256.0' - NA | | | Driller's Remark: 6" casing advanced very easily |
| 250 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | I-06 SHEET 14 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 3/7/2007 END : 3/10/2007 LOGGER : C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (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 | 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 | 256.0 | | NR | | | **No Recovery 254.5-256.0'** | |
| | R27-SN 10 ft 92% | NA | 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 |
| 260 -217.8 | | | | | | | |
| 265 -222.8 | 266.0 | | NR | | | **No Recovery 265.2-266.0'** | |
| | | | | | | Bottom of Boring at 266.0 ft bgs on 3/10/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | I-07 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

DRILLING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/27/2007 END : 3/7/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.4 | 0.0 | | | | **Topsoil**<br>0.0-0.7' - dark brownish black, (5YR 2/1), fine silica sand, organic matter | | Note: Retrieved core appears compressed (larger diameter >6"); actual recovery is likely closer to 100%<br>"Water level is based on Ground Water Monitoring at LNP site (FSAR Table 2.4.12.08)"<br>Water levels not recorded during drilling |
| | | 5.0 | R1-SN | | **Poorly Graded Sand Grading To Poorly Graded Sand With Silt (SP/SP-SM)**<br>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 | | Coring run times not recorded for I-07 |
| 5<br>37.4 | | | | | **Silty Sand / Sandy Silt (SM/ML)**<br>4.8-5.0' - yellowish gray, (5Y 7/2), strong HCl reaction, very fine to fine sand, nonplastic fines, carbonate materials<br>**No Recovery 5.0-7.0'** | | |
| | 7.0 | | | | **Poorly Graded Sand (SP)**<br>7.0-8.3' - no HCl reaction, fine silica sand, may be slough material | | Retrieved core greater than 10.0 ft; 1.3 ft silica sand may be slough from run R1-SN |
| 10<br>32.4 | | 10.0 | R2-SN | | **Silt With Sand (ML)**<br>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 | | Two stromatolite-like semi-spherical 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<br>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 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 | | |
| 20 | | | | | | | |

| 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

DRILLING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/27/2007 END : 3/7/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.4 | | | | | | | |
| | | 10.0 | R3-SN | | | | |
| 25<br>17.4 | | | | | | | |
| | 27.0 | | | | | | |
| | | | | | **Silty Sand With Limestone Fragments (SM)**<br>27.0-29.5' - grayish orange, (10YR 7/4), fine grained, with gravel-sized (1/4"-3/4") limestone fragments (similar to fragments described for 19.0-22.0' above), gravel fragments are <15% of sample, clayey zone at 29.0' with dark brown silt layer (possible organics), all carbonate materials | | Core "hot" immediately following drilling, likely drying thin layers |
| 30<br>12.4 | | | | | **Limestone**<br>29.5-36.6' - pale yellowish brown, (10YR 6/2), core is fragmented, with one piece 8" in length, fossiliferous (casts/molds), small (1/16"-1/8") surface voids over 10-15% of surface, horizontal partings roughly 1"-2-1/2" apart, yellowish gray (5YR 7/2) clayey silt interbeds between partings, interbeds average <1" and are compacted, between 34.0-35.0' and 36.0-36.7' there are some 12" thick clay/silt interbeds with 10% coarse sand and fine gravel-sized particles | | |
| | | 9.6 | R4-SN | | | | |
| 35<br>7.4 | | | | | | | |
| | | | | | **No Recovery 36.6-37.0'** | | Top of rock estimated to be approximately 37' below ground surface |
| | | | | | Begin Rock Coring at 37.0 ft bgs<br>See the next sheet for the rock core log | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | I-07 SHEET 3 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 METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/27/2007 END : 3/7/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 37.0 | | | | | **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 |
| | | | | 37.0-47.0' - NA | | | Coring run times not recorded for I-07 |
| 40 2.4 | | | | | | | |
| | | | | | | | NA = Not Applicable NR = No Recovery |
| | R5-SN 10 ft 100% | NA | NA | | | | |
| 45 -2.6 | | | | | | | |
| | 47.0 | | | | | | |
| | | | | | | **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) | |
| | | | | 47.0-57.0' - NA | | | |
| 50 -7.6 | | | | | | | |
| | R6-SN 10 ft 92% | NA | NA | | | | |
| 55 -12.6 | | | | | | **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 |
| | | | NR | | | | |
| | 57.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | I-07 SHEET 4 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 METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/27/2007 END : 3/7/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 57.0-67.0' - NA | | **Disaggregated Weak Limestone**<br>55.3-56.2' - Same as 47.0-54.5'<br>**No Recovery 56.2-57.0'**<br>**Disaggregated Limestone**<br>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 | |
| 60<br>-17.6 | | | | | | | |
| | R7-SN<br>10 ft<br>95% | NA | NA | | | **Limestone Fragments**<br>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<br>**Disaggregated Limestone**<br>63.5-66.5' - pale yellowish brown, changing with depth to limestone fragments 1/4"-2" in diameter, dark brown/black thin organic rich lamination<br>**No Recovery 66.5-67.0'** | |
| 65<br>-22.6 | | | | | | | |
| | 67.0 | | NR | | | | |
| | | | | 67.0-77.0' - NA | | **Limestone Fragments**<br>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) | |
| 70<br>-27.6 | | | | | | | |
| | R8-SN<br>10 ft<br>96% | NA | NA | | | | |
| 75<br>-32.6 | | | | | | | |
| | 77.0 | | NR | | | **No Recovery 76.6-77.0'** | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: I-07 | SHEET 5 OF 16 |
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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/27/2007 END : 3/7/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 77.0-87.0' - NA | | **Limestone Fragments**<br>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' |
| 80<br>-37.6 | | | | | | | |
| | R9-SN<br>10 ft<br>100% | NA | NA | | | | |
| | | | | | | 83.3-85.6' - 4"-5" limestone fragments, light gray clayey silt with 15% small (1/4"-3/4") limestone fragments | |
| 85<br>-42.6 | | | | | | | |
| | 87.0 | | | | | **Limestone**<br>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 | |
| | | | | 87.0-97.0' - NA | | **Disaggregated Limestone**<br>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' | |
| 90<br>-47.6 | | | | | | | |
| | R10-SN<br>10 ft<br>100% | NA | NA | | | | |
| | | | | | | **Limestone**<br>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' | |
| 95<br>-52.6 | | | | | | | |
| | 97.0 | | | | | | |

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|---|---|
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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/27/2007 END : 3/7/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 97.0-107.0' - NA | | **Limestone**<br>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<br>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' |
| 100<br>-57.6 | | | | | | | |
| | R11-SN<br>10 ft<br>96% | NA | NA | | | | |
| | | | | | | **Limestone Fragments**<br>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' | |
| 105<br>-62.6 | | | | | | | |
| | 107.0 | | NR | | | **No Recovery 106.6-107.0'** | |
| | | | | 107.0-117.0' - NA | | **Disaggregated Limestone**<br>107.0-108.0' - with limestone fragments 1/4"-3/4" in diameter<br>**Limestone**<br>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 |
| 110<br>-67.6 | | | | | | | |
| | R12-SN<br>10 ft<br>100% | NA | NA | | | **Limestone Fragments**<br>110.9-113.1' - Same as 108.0-110.9' except larger fragments (3"-4"), with irregular subangular shape | Possible drill induced breakage |
| | | | | | | **Limestone**<br>113.1-113.9' - Same as 108.0-110.9' except less fragmented<br>**Limestone Fragments**<br>113.9-114.4' - very friable | SC-2 collected at 113.1-113.9' |
| 115<br>-72.6 | | | | | | **Limestone**<br>114.4-117.0' - Same as 113.9-114.4' except less fragmented | SC-3 collected at 115.8-116.6' |
| | 117.0 | | | | | | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/27/2007 END : 3/7/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 117.0-127.0' - NA | | **Disaggregated Limestone With Limestone Fragments**<br>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 | |
| 120<br>-77.6 | | | | | | | |
| | R13-SN<br>10 ft<br>100% | NA | NA | | | **Limestone**<br>121.2-122.0'<br>**Limestone Fragments**<br>122.0-125.4' - moderate yellowish brown, (10YR 5/4), fragments of fine grained limestone in a light gray clayey silt matrix | Possible drill induced breakage |
| 125<br>-82.6 | | | | | | | |
| | | | | | | **Limestone**<br>125.4-127.0' - Same as 108.0-110.9' except moderate yellowish brown, fragmented at 126.5-127.0' | |
| | 127.0 | | | | | | |
| | | | | 127.0-137.0' - NA | | **Disaggregated Limestone With Limestone Fragments**<br>127.0-128.0' - moderate yellowish brown, (10YR 5/4), moderate HCl reaction, carbonate derived<br>**Limestone**<br>128.0-137.0' - pale yellowish brown, (10YR 6/2), fine to medium grained, strong HCl 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' | |
| 130<br>-87.6 | | | | | | | |
| | R14-SN<br>10 ft<br>100% | NA | NA | | | | |
| 135<br>-92.6 | | | | | | | |
| | 137.0 | | | | | | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/27/2007 END : 3/7/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 137.0-147.0' - NA | | **Limestone Fragments**<br>137.0-137.9' - pale yellowish brown, (10YR 6/2), moderate HCl reaction, fragments are well graded gravel-size, carbonate derived<br>**Limestone**<br>137.9-138.6' - pale yellowish brown, (10YR 6/2), medium to fine grained, 25-50% voids on surface, possible alteration zone<br>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 | |
| 140<br>-97.6 | | | | | | | |
| | R15-SN<br>10 ft<br>85% | NA | NA | | | | |
| | | | | | | 143.0-143.9' - medium grained, strong HCl reaction, 25-50% voids (<1/16") on surface<br>**Limestone Fragments**<br>143.9-145.5' - grayish orange, (10YR 6/2), silty sand-sized disaggregated limestone with gravel-sized limestone fragments<br>**No Recovery 145.5-147.0'** | |
| 145<br>-102.6 | | | | | | | Core barrel quickly dropped while drilling 145.0-147.0' |
| | | | NR | | | | |
| | 147.0 | | | | | | |
| | | | | 147.0-157.0' - NA | | **Disaggregated Limestone**<br>147.0-147.4' - pale yellowish brown, (10YR 6/2), strong HCl reaction<br>**Limestone**<br>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' | SC-4 collected at 147.6-148.4' |
| 150<br>-107.6 | | | | | | | |
| | R16-SN<br>10 ft<br>100% | NA | NA | | | | |
| | | | | | | 152.9-154.4' - light brownish gray, (5YR 6/1), medium to fine grained, with fragments ranging from sand-size to 1" in diameter<br>154.4-155.6' - pale yellowish brown, (10YR 6/2), strong HCl reaction, interbedded clays, trace voids<br>**Limestone Fragments**<br>155.6-157.0' - Same as 154.4-155.6' except fragmented | |
| 155<br>-112.6 | | | | | | | |
| | 157.0 | | | | | | |

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|---|---|
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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/27/2007 END : 3/7/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 157.0-167.0' - NA | | **Disaggregated Limestone With Limestone Fragments**<br>157.0-157.8' - pale yellowish brown, (10YR 6/2), sand-sized disaggregated limestone material, with gravel-sized limestone fragments<br>**Limestone**<br>157.8-158.3' - yellowish gray, (6Y 7/2), fine to medium grained, strong HCl reaction<br>158.3-160.9' - light olive gray, (5YR 5/2), fine to medium grained, strong HCl reaction, delayed HCl reaction, fragmented<br>160.9-164.6' - light olive gray, (5Y 5/2), fine to medium grained, strong HCl reaction, partially broken into disc-shaped fragments, numerous small solution cavities | |
| 160<br>-117.6 | | | | | | | |
| | R17-SN<br>10 ft<br>90% | NA | NA | | | | |
| 165<br>-122.6 | | | | | | 164.6-166.0' - Same as 160.9-164.6' except more fragmented, with silt at bottom of section | |
| | | | NR | | | **No Recovery 166.0-167.0'** | |
| | 167.0 | | | | | | |
| | | | | 167.0-177.0' - NA | | **Disaggregated Limestone With Limestone Fragments**<br>167.0-167.3' - pale yellowish brown, (10YR 6/2), fragments are gravel-sized<br>**Limestone**<br>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 167.3-171.0' |
| 170<br>-127.6 | | | | | | | |
| | R18-SN<br>10 ft<br>85% | NA | NA | | | | Possible drill induced breakage 172.0-173.0' |
| 175<br>-132.6 | | | | | | | |
| | | | NR | | | **No Recovery 175.5-177.0'** | |
| | 177.0 | | | | | | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/27/2007 END : 3/7/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 177.0-187.0' - NA | | **Limestone Fragments**<br>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<br>-137.6 | | | | | | **Limestone Fragments With Disaggregated Limestone**<br>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 | |
| | R19-SN<br>10 ft<br>100% | NA | NA | | | | |
| 185<br>-142.6 | | | | | | **Limestone**<br>185.3-187.0' - light olive gray, (5Y 5/2), fine to medium grained, moderate to strong HCl reaction, fragmented, voids (1/16") over 10-40% of surface, fossiliferous | |
| | 187.0 | | | | | | |
| | | | | 187.0-197.0' - NA | | **Limestone Fragments**<br>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 | |
| 190<br>-147.6 | | | | | | | |
| | R20-SN<br>10 ft<br>94% | NA | NA | | | | |
| 195<br>-152.6 | | | | | | | |
| | 197.0 | | NR | | | **No Recovery 196.4-197.0'** | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/27/2007 END : 3/7/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 197.0-207.0' - NA | | **Disaggregated Limestone**<br>197.0-198.2' - coarse grained, carbonate derived, few (<10%) gravel-sized limestone fragments<br>**Limestone**<br>198.2-203.0' - yellowish gray to dusky yellow, (5Y 7/2 to 5Y 6/1), abundant voids, thin (1/16" thick) light olive gray (5Y 5/2) convoluted bedding lamination with variable spacing (1/16"-1/2"), horizontal parting surfaces, also thin zones of limestone fragments with little or no surface voids or fossils visible | Possible drill induced segregation of core materials<br>Run drilled 2/28/07<br>Infill material may have been lost during drilling 198.2-200.0' (parting/ fracture surfaces do not match) |
| 200<br>-157.6 | R21-SN<br>10 ft<br>100% | NA | NA | | | | Possible drill induced breakage |
| 205<br>-162.6 | | | | | | **Limestone Fragments**<br>203.0-207.0' - yellowish gray, with light olive gray to medium gray inclusions, (5Y 7/2 with 5Y 5/2 to N5), medium to coarse grained, moderate to strong HCl reaction, fragmented, void rich, fossiliferous, inclusions (1/2"-4") that are very hard/dense with mild HCl reaction even when pulverized (may be breccia fragments) | |
| 207.0 | | | | 207.0-217.0' - NA | | 207.0-208.0' - yellowish gray, (5Y 7/2), fine grained, fragmented into 1"-4" diameter angular to subangular fragments<br>208.0-215.4' - moderate yellowish brown to light olive gray, (10YR 5/4 to 5Y 5/2), fine grained, medium strong (R3), fragmented (3/4"-2" diameter) with few pieces of full diameter core, highly fossiliferous (molds/casts), abundant voids, zone of less competent rock at 213.5', fine grained fossil-poor zone at 211.5' | Possible drill induced breakage |
| 210<br>-167.6 | | | NA | | | | |
| | R22-SN<br>10 ft<br>84% | NA | | | | | |
| 215<br>-172.6 | | | | | | **No Recovery 215.4-217.0'** | |
| | | | NR | | | | |
| 217.0 | | | | | | | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/27/2007 END : 3/7/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (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 | NA | 217.0-227.0' - NA | | **Limestone Fragments** 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 breccia zone) | |
| 225 -182.6 | | | | | | | Possible limestone breccia zones |
| | 227.0 | | | | | | |
| 230 -187.6 | R24-SN 10 ft 100% | NA | NA | 227.0-237.0' - NA | | 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) | Possible drill induced breakage |
| 235 -192.6 | | | | | | | |
| | 237.0 | | | | | | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/27/2007 END : 3/7/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 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" |
| 240 -197.6 | | | | | | | |
| | R25-SN 10 ft 100% | NA | NA | | | | |
| 245 -202.6 | | | | | | | |
| | 247.0 | | | | | | |
| | | | | 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. |
| 250 -207.6 | | | | | | | |
| | R26-SN 10 ft 100% | NA | NA | | | | |
| 255 -212.6 | | | | | | | |
| | 257.0 | | | | | | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/27/2007 END : 3/7/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| 260 -217.6 | R27-SN 10 ft 100% | NA | NA | 257.0-267.0' - NA | | **Limestone Fragments** 257.0-267.0' - Same as 247.0-257.0' except consisting of sand to gravel-size (1") limestone fragments, with fragments decreasing and becoming more friable with depth, few large fragments of more competent fine grained limestone, silt zone is absent | |
| 265 -222.6 | | | | | | | |
| 267.0 | R28-SN 10 ft 100% | NA | NA | 267.0-277.0' - NA | | 267.0-277.0' - Same as 257.0-267.0' except with gravel-sized fragments (1/4"-1-1/2") and sand-sized fragments of varying percentages, few large (>3") limestone fragments at 267.0' and 269.5' that exhibit fine bedding laminations (1/8"-1/2") and bedding plane partings, medium brown silty zone at 275.0' | Material appears drier than similar zone at boring I-02--drilling with mud Repeating upward fining sequences (3-4' thick) |
| 270 -227.6 | | | | | | | |
| 275 -232.6 | | | | | | | |
| 277.0 | | | | | | | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/27/2007 END : 3/7/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 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<br>6" casing driving very hard entire length of run |
| 280 -237.6 | | | NA | | | | 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 |
| | R29-SN 10 ft 64% | NA | | | | | |
| | | | | | | **No Recovery 283.4-287.0'** | |
| 285 -242.6 | | | NR | | | | |
| | 287.0 | | | | | | |
| | | | | 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 | 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 |
| | | | NA | | | | |
| 290 -247.6 | | | | | | **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 diameter | 6" casing driven to 292' with difficulty, 4" core barrel retrieved and 6" casing advanced to 297 (causing slough to accumulate in hole) |
| | R30-SN 10 ft 95% | NA | NR | | | | |
| | | | | | | **No Recovery 291.5-292.0'** | |
| | | | NA | | | **Disaggregated Limestone With Limestone Fragments** 292.0-297.0' - moderate HCl reaction, gravel-sized (1/2") limestone fragments 5-10%, HCL reaction is delayed | |
| 295 -252.6 | | | | | | | |
| | 297.0 | | | | | | |

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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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 4.41 bgs on 3/6/07 START : 2/27/2007 END : 3/7/2007 LOGGER : C. Sump, J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 297.0-307.0' - NA | | **Disaggregated Limestone With Limestone Fragments**<br>297.0-297.8' - Same as 292.0-297.0' except limestone fragments are up to 3/4" diameter and make up 10% of sample | 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' |
| 300<br>-257.6 | | | | | | **Disaggregated Limestone**<br>297.8-298.8' - light gray, (N6), compacted, with friable clasts 1/16"-3/16" in length, fine bedding structure visible with lighter clasts oriented along bedding / lamination planes, distinctive downward curving laminations may represent subsidence feature | |
| | R31-SN<br>10 ft<br>100% | NA | NA | | | **Clayey Silt (ML)**<br>298.8-299.0' - dark brown and black, no HCl reaction, finely laminated, vitreous sheen on laminae surfaces, organics | Core material at 292.0-297.0' is from 2nd attempt and is disturbed |
| 305<br>-262.6 | | | | | | **Disaggregated Limestone With Limestone Fragments**<br>299.0-306.0' - mottled yellowish gray, light olive gray, and light gray, (5Y 7/2, 5Y 5/2, and N6), strong HCl reaction, compacted, with gravel-sized limestone fragments (<10%)<br>306.0-307.0' - Same as 299.0-306.0' except clear subhedral quartz (silica) crystals (<1/16"-1/4") in discrete irregular zones (possible void infilling) | Similar quartz crystals observed at depth >300.0' in boring I-02<br>Total depth of boring is 307.0' |
| | 307.0 | | | | | Bottom of Boring at 307.0 ft bgs on 3/7/2007 | |

| 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

DRILLING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 3.5 ft bgs on 3/13/07 START : 3/13/2007 END : 3/15/2007 LOGGER : L. Prochaska, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.5 | 0.0 | | | | **Road Base Limestone**<br>0.0-1.0' - very pale orange, (10YR 8/2), dry, fragments (<3" diameter) imported fill | | |
| | | 6.0 | R1-SN | | **Silty Sand (SM)**<br>1.0-2.5' - dark gray, (N3), moist, fine to medium grained, no HCl reaction, <20% fines, organics-wood/rootlets, silica<br>2.5-3.0' - Same as 1.0-2.5' except brownish black, (5YR 2/1), 30-50% fines and organic<br>3.0-5.1' - Same as 1.0-2.5' except moderate yellowish brown, (10YR 4/2), no organics | | Water Level: 3/13/07 approximately 3.5' below ground surface based on moisture content increase |
| 5<br>37.5 | 6.0 | | | | 5.1-5.2' - Same as 1.0-2.5' except dusky brown, (5YR 2/2), highly organic - rootlets up to 20%, up to 40% fines<br>5.2-5.8' - Same as 1.0-2.5' except dark yellowish brown, (10YR 4/2), 15-30% silt<br>**Poorly Graded Sand (SP)**<br>5.8-6.0' - white, (N7), medium grained, silica sand, trace fines<br>**Silty Sand (SM)**<br>6.0-8.2' - pale yellowish brown, (10YR 4/2), fine grained, no HCl reaction, fine silica sand, 10-20% fines grades to Fat Clay (CH)<br>8.2-9.3' - Same as 6.0-8.2' except pale blue, (5B 6/2), moist, extremely high plasticity, no dilatancy, no HCl reaction, <10% very fine silica sand | | R1: 1 minute |
| 10<br>32.5 | | | | | **Fat Clay (CH)**<br>9.3-10.9' - pale blue, mottled pale yellowish brown, (5B 6/2, 10YR 5/4), moist, extremely high plasticity, no dilatancy, <10% fine silica sand, up to 10% calcareous gravel-sized fragments up to 1/2", trace fossil structure<br>10.9-11.0' - Same as 9.3-10.9' except grading to Silt (ML), very pale orange (10YR 8/2), moist, nonplastic, moderate to rapid dilatancy, strong HCl reaction, <10% very fine sand-sized carbonate materials<br>Begin Rock Coring at 11.0 ft bgs<br>See the next sheet for the rock core log | | |
| 15<br>27.5 | | | | | | | |
| 20 | | | | | | | |

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# ROCK CORE 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

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 on 3/13/07 START : 3/13/2007 END : 3/15/2007 LOGGER : L. Prochaska, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R2-SN 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 HCl reaction, extremely fine to very fine sand-sized, very friable fragments up to 4" in diameter | NA = Not Applicable NR = No Recovery |
| 15 27.5 | | | | | | | R2: 9 minutes, 6' slough at top of core (discarded) |
| | 16.0 | | | 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) | Note: Installed 30' of 8" casing during run |
| 20 22.5 | | | | | | | |
| | R3-SN 10 ft 100% | NA | NA | | | 21.6-24.4' - Same as 11.3-16.0' except strong HCl reaction, 20-30% sand-sized particles, 30% gravel-sized fragments (<2"), carbonate materials | |
| 25 17.5 | | | | | | 24.4-26.0' - Same as 16.0-21.6' except grayish orange, (10YR 7/4) | R3: 26 minutes |
| | 26.0 | | | 26.0-36.0' - NA | | **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') | |
| 30 12.5 | | | | | | | |
| | R4-SN | | | | | | |

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# ROCK CORE 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

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 on 3/13/07 START : 3/13/2007 END : 3/15/2007 LOGGER : L. Prochaska, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 10 ft 100% | NA | NA | | | | |
| 35 7.5 | | | | | | **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 carbonate, dusky yellowish brown is organics and moderate HCl reaction | R4: 11 minutes |
| | 36.0 | | | 36.0-46.0' - NA | | **Silty Sand And Limestone Fragments (SM)** 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 | |
| 40 2.5 | R5-SN 10 ft 100% | NA | NA | | | **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' fragments up to 3-1/2" in diameter and 2" in length of medium strong (R3) rock, voids up to 3/16" covering approximately 20% of the surface, no fossils; 36.8-37.2': fracture zone same as 36.0-36.8' except maximum 2" diameter; 37.2-37.5': fragment zone same as 36.8-37.2' except gravel fragments up to 1/2"; 41.1-42.0': black (N1) mottling, organics | Driller's Remark: Broke threads on 6" casing during run<br>41.1-42.0' Possible carbonized organics |
| 45 -2.5 | | | | | | | R5: 11 minutes<br>End drilling 3/13/07<br>Resume drilling on 3/14/07 |
| | 46.0 | | | 46.0-56.0' - NA | | **Disaggregated Weak Limestone With Limestone Fragments** 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 material, carbonate derived with possible trace silica fine sand-sized grains | |
| 50 -7.5 | R6-SN | | | | | | |

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# ROCK CORE 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

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 on 3/13/07 START : 3/13/2007 END : 3/15/2007 LOGGER : L. Prochaska, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 10 ft 100% | NA | NA | | | | Higher percentage of sand-sized particles at top of run, possible segregation during drilling or slough material |
| 55 -12.5 | | | | | | | R6: 11 minutes |
| | 56.0 | | | | | | |
| | | | | 56.0-66.0' - NA | | **Disaggregated Limestone With Limestone Fragments** 56.0-66.0' - similar to 46.0-56.0' (carbonate derived) from 56.0-61.0', thin limestone beds (1" thick) with light gray clayey silt interbeds (1/2"-1" thick) from 61.0-62.0', from 62.0-66.0 grayish orange (10YR 7/4) sandy-silt with gravel-sized limestone fragments as described above from 56.0-61.0', fragments angular to subangular and most (90%) are <3/4" diameter | Driller's Remark: Slightly more difficulty advancing 6" casing |
| 60 -17.5 | | | | | | | |
| | R7-SN 10 ft 100% | NA | NA | | | | |
| 65 -22.5 | | | | | | | R7: 15 minutes |
| | 66.0 | | | | | | |
| | | | | 66.0-76.0' - NA | | **Limestone** 66.0-69.5' - thinly bedded (3/4"-2") with silty sand material on parting surfaces, highly fossiliferous (mold, casts, brachiopods), numerous small voids (1/32"-1/8") over 40-50% surface area, few voids/molds filled with black platy soft material (possible organics) 69.5-71.0' - thin beds with finer clayey soft interbed material (1/2"-1" thick), limestone exhibits fine bedding laminations with dark brown/black shining on parting surfaces | Silty sand interbeds washed out during drilling<br><br>Continued repeating sequences of thin limestone beds with fine grained interbeds separated by silty sands with limestone fragment zones 4.0-6.0' thick |
| 70 -27.5 | | | | | | | |
| | R8-SN | | | | | | |

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# ROCK CORE 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

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 on 3/13/07 START : 3/13/2007 END : 3/15/2007 LOGGER : L. Prochaska, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 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) | |
| 75 -32.5 | | | | | | | R8: 24 minutes |
| | 76.0 | | | 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 HCl), 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 |
| 80 -37.5 | | | | | | | |
| | R9-SN 10 ft 100% | NA | NA | | | | |
| 85 -42.5 | | | | | | **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' | Fine interbed material possibly washed out during drilling<br>R9: 18 minutes |
| | 86.0 | | | 86.0-96.0' - NA | | | |
| | | | | | | 87.4-88.5' - coarse grained, sandy gravel-sized limestone fragments (1-3" diameter), increasing clay content | Driller's Remark: Lost drilling fluid (bentonite mud) circulation |
| 90 -47.5 | | | | | | **Limestone** 88.5-91.4' - 1"-4" thick with light gray (N7) clayey silt interbeds (1/2"-2" thick) | |
| | R10-SN | | | | | | |

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# ROCK CORE 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

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 on 3/13/07 START : 3/13/2007 END : 3/15/2007 LOGGER : L. Prochaska, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 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 | |
| 95 -52.5 | | | | | | 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% of surface), grayish yellow (5Y 8/4) 4" thick silt with 1/2"-1" gravel sized limestone fragments at 96.0' | R10: 26 minutes |
| | 96.0 | | | 96.0-106.0' - NA | | **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 | |
| 100 -57.5 | | | | | | **Disaggregated Limestone With Limestone Fragments** 98.7-102.9' - moderate yellowish brown, (10YR 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 | |
| | R11-SN 10 ft 92% | NA | NA | | | **Limestone Fragments** 102.9-105.2' - increasing clay content, large fragments (>3") separated by finer <1-1/2" fragments with silt and sand, all carbonate derived | |
| 105 -62.5 | | | | | | | R11: 25 minutes |
| | 106.0 | | NR | 106.0-116.0' - NA | | **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 | Approximately 50% of run limestone fragments |
| 110 -67.5 | | | | | | | |
| | R12-SN | | | | | | |

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# ROCK CORE 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

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 on 3/13/07 START : 3/13/2007 END : 3/15/2007 LOGGER : L. Prochaska, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 10 ft 100% | NA | NA | | | | |
| 115 -72.5 | | | | | | **Disaggregated Limestone** 115.0-116.0' - with gravel-sized limestone fragments as found in 106.0-115.0' (sharp contact) | R12: 16 minutes |
| | 116.0 | | | 116.0-126.0' - NA | | **Fragmented Limestone** 116.0-123.8' - moderate yellowish brown, (10YR 5/4), moderate to strong HCl 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 |
| 120 -77.5 | | | NA | | | | |
| | R13-SN 10 ft 78% | NA | | | | | |
| | | | | | | **No Recovery: 123.8-126.0'** | |
| 125 -82.5 | | | NR | | | | R13: 29 minutes |
| | 126.0 | | | 126.0-136.0' - NA | | | |
| 130 -87.5 | | | | | | | |
| | R14-SN | | NA | | | | |

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# ROCK CORE 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

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 on 3/13/07 START : 3/13/2007 END : 3/15/2007 LOGGER : L. Prochaska, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 10 ft 93% | NA | | | | **Limestone Fragments** 126.0-135.3' - alternating 1.0-2.0' intervals of large limestone fragments (>3") and coarse sandy gravel-sized limestone fragments (1/2"-2") with finely laminated (1/16"-1/6") argillaceous fragments from 132.3-133.9', fragments exhibit well defined bedding plane parting (smooth and planar) and react moderately to HCl when scratched (poorly when not), fine quartz grains visible on fresh fracture faces and corners (10-15% quartz) no fossils or voids, siliceous, well bedded, finely laminated, calcareous, silty sandy limestone material below | Driller's Remark: Possible void at 131.0-133.0' based on 4" core penetration rate |
| 135 -92.5 | | | | | | | R14: 18 minutes |
| | 136.0 | | NR | | | | |
| | | | | 136.0-146.0' - NA | | **No Recovery 135.3-136.0'** **Limestone Fragments** 136.0-144.6' - mild HCl reaction, medium strong (R3), limestone fragments with coarse sand and gravel-sized fragments of limestone (1/4"-1"), larger limestone fragments (>3" diameter), at 136.8 finely bedded limestone, 1/4" bedding planes, smooth & planar, fine alternating light/dark laminations, quartz (silica) grains visible on fracture edges (approximately 10%) | |
| 140 -97.5 | | | NA | | | | |
| | R15-SN 10 ft 86% | NA | | | | | |
| 145 -102.5 | | | NR | | | **No Recovery 144.6-146.0'** | R15: 37 minutes |
| | 146.0 | | | | | | |
| | | | | 146.0-156.0' - NA | | **Limestone** 146.0-146.3' - light olive gray, (5Y 5/2), fine grained, mild to moderate HCl reaction, fine silica grains, drusy calcite, fine, clear yellowish recrystallized grains, poorly fossiliferous, sharp contact with underlying rock 146.3-148.0' - yellowish grey, (5Y 7/2), strong HCl reaction, fossiliferous, with small voids (1/32"-1/8") over 10% of surface | Disaggregated due to drilling method |
| 150 -107.5 | | | | | | | |
| | R16-SN | | | | | | |

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# ROCK CORE 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

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 on 3/13/07 START : 3/13/2007 END : 3/15/2007 LOGGER : L. Prochaska, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 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' | |
| 155 -112.5 | | | | | | | Disaggregated due to drilling method R16: 34 minutes |
| | 156.0 | | | 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) | |
| 160 -117.5 | | | | | | | |
| | R17-SN 10 ft 94% | NA | NA | | | **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 |
| 165 -122.5 | | | | | | | |
| | 166.0 | | NR | 166.0-176.0' - NA | | | |
| 170 -127.5 | | | NA | | | | |
| | R18-SN | | | | | | |

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# ROCK CORE 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

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 on 3/13/07 START : 3/13/2007 END : 3/15/2007 LOGGER : L. Prochaska, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 10 ft 78% | 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 | |
| 175 -132.5 | | | NR | | | | R18: 16 minutes |
| | 176.0 | | | 176.0-186.0' - NA | | **No Recovery 173.8-176.0'** | |
| | | | | | | **Limestone Fragments** 176.0-179.0' - light olive gray, (5Y 5/2), slow to moderate HCl 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 HCl and is well rounded (gravel-sized <1") | Driller's Remark: possible void from 177.0-181.0' based on advancement of 4" core barrel, void not suggested based on 100% recovery |
| 180 -137.5 | | | | | | | |
| | R19-SN 10 ft 100% | NA | NA | | | **Limestone** 179.0-179.8' - dark yellowish orange to grayish orange, (10YR 6/6, 10YR 7/4), strong HCl reaction, small voids (1/32"-1/16") over 5-10% of surface, poorly fossiliferous with few molds (1/2"), fine recrystallization, | |
| 185 -142.5 | | | | | | **Limestone Fragments** 179.8-181.7' - silty sandy gravel-sized material, carbonate derived, yellowish gray (5Y 7/2) fines | R19: 38 minutes |
| | 186.0 | | | 186.0-196.0' - NA | | 181.7-182.7' - moderate brown grading to pale yellowish brown, (5YR 4/4 to 10YR 6/2), moderate HCl 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 HCl reaction, with clayey silt-sized material | |
| 190 -147.5 | | | | | | | |
| | R20-SN | | | | | | |

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# ROCK CORE 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

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 on 3/13/07 START : 3/13/2007 END : 3/15/2007 LOGGER : L. Prochaska, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 10 ft 100% | NA | NA | | | **Limestone Fragments** 186.0-196.0' - alternating sequences of fragmented limestone and fossiliferous limestone fragments, fragmented limestone exhibit fine laminations (1/32"-3/4") and planar bedding plane partings, silty sand and gravel-sized limestone fragments at 192.5-193.0' and 195.0-196.0', sharp contact between fragmented finely laminated limestone and coarse fossiliferous limestone with large (1/2") fossil casts/molds at 194.0' | |
| 195 -152.5 | | | | | | | R20: 25 minutes |
| | 196.0 | | | 196.0-206.0' - NA | | 196.0-205.0' - with coarse sand/fine gravel-sized material (<10%), limestone fragments alternating between fine grained finely bedded limestone (argillaceous) and fossiliferous massive limestone with small voids (1/32"-1/8") over 10-15% of surfaces, fine grained limestone forms very angular fragments and are typically <3" in size and are <3/4" thick, fine grained limestone is light olive gray (5Y 5/2) with slow mild HCl reaction, fossiliferous limestone is yellowish gray to grayish orange (5Y 7/2 to 10YR 7/4) with moderate HCl reaction and is typically associated with coarse sand-sized material, coarse moderately graded sand-sized material at top of run (196.0-196.7'), possibly segregated during drilling | |
| 200 -157.5 | | | | | | | |
| | R21-SN 10 ft 90% | NA | NA | | | | |
| 205 -162.5 | | | NR | | | **No Recovery 205.0-206.0'** | R21: 18 minutes<br>Finished drilling on 3/14/07 |
| | 206.0 | | | 206.0-216.0' - NA | | **Limestone Fragments** 206.0-216.0' - silty sandy gravel-sized well graded limestone fragments 1/2"-3" and larger in diameter with fines grading to coarse sand and silt-sized (<5%), fragments are subangular, fossiliferous (more molds than casts), and exhibit small voids (1/32"-1/8") over 10-20% over the surface | Resume drilling on 3/15/07 |
| 210 -167.5 | | | | | | | |
| | R22-SN | | | | | | |

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# ROCK CORE 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

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 on 3/13/07 START : 3/13/2007 END : 3/15/2007 LOGGER : L. Prochaska, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 10 ft 100% | NA | NA | | | | |
| 215 -172.5 | | | | | | | R22: 11 minutes |
| | 216.0 | | | 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<br><br>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 | |
| 220 -177.5 | | | | | | | |
| | R23-SN 10 ft 100% | NA | NA | | | | |
| 225 -182.5 | | | | | | | R23: 26 minutes |
| | 226.0 | | | 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 | |
| 230 -187.5 | | | | | | | |
| | R24-SN | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# ROCK CORE 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

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 on 3/13/07 START : 3/13/2007 END : 3/15/2007 LOGGER : L. Prochaska, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 10 ft 100% | NA | NA | | | | |
| 235 -192.5 | | | | | | | R24: 27 minutes |
| | 236.0 | | | 236.0-246.0' - NA | | **Limestone Fragments** 236.0-246.0' - Same as 226.0-236.0' except increasing percentage silt and fine sand-sized component, medium yellowish brown (10YR 5/4) silty zones | |
| 240 -197.5 | | | | | | | |
| | R25-SN 10 ft 100% | NA | NA | | | | |
| 245 -202.5 | | | | | | | R25: 13 minutes |
| | 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 carbonate | |
| 250 -207.5 | | | | | | | |
| | R26-SN | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | I-08 SHEET 14 OF 14 |

# ROCK CORE 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

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 on 3/13/07 START : 3/13/2007 END : 3/15/2007 LOGGER : L. Prochaska, C. Sump

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 10 ft 100% | NA | NA | | | | |
| 255 -212.5 | | | | | | | R26: 35 minutes |
| | 256.0 | | | | | | |
| | | | | 256.0-266.0' - NA | | **Limestone Fragments** 256.0-266.0' - Same as 246.0-256.0' except increased percentage of large limestone fragments (>3/4") from 256.0-259.0' (approximately 50% by volume) 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 146.3-148.0' - yellowish grey, (5Y 7/2), strong HCl reaction, fossiliferous, with small voids (1/32"-1/8") over 10% of surface | |
| 260 -217.5 | | | | | | | |
| | R27-SN 10 ft 100% | NA | NA | | | | |
| | | | | | | | Boring at total planned depth 3/15/07 |
| 265 -222.5 | | | | | | | R27: 29 minutes |
| | 266.0 | | | | | | |
| | | | | | | Bottom of Boring at 266.0 ft bgs on 3/15/2007 | Water level on 3/20/07 is about 3' below ground surface<br><br>Install and grout 4" schedule 40 PVC casing in boring<br>Bottom of casing tagged at 267.0' |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | I-09 SHEET 1 OF 14 |

# SOIL BORING LOG

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 bgs on 3/6/07 START : 3/11/2007 END : 3/12/2007 LOGGER : C. Sump, L. Prochaska

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.4 | 0.0 | | | | **Sandy Organic Topsoil**<br>0.0-1.0' - dark brown | | Water level above ground surface due to pressure head from sonic tooling<br>"Water level is based on Ground Water Monitoring at LNP site (FSAR Table 2.4.12.08)" |
| | | 6.0 | R1-SN | | **Poorly Graded Sand (SP)**<br>1.0-4.0' - grayish yellow, (5Y 5/4), fine grained, no HCl reaction, silica sand<br>4.0-6.0' - Same as 1.0-4.0' except yellowish gray, (5Y 8/1) | | |
| 5<br>37.4 | 6.0 | | | | | | Coring run times not recorded for I-09 |
| | | 10.0 | R2-SN | | 6.0-16.0' - Same as 1.0-4.0' except yellowish gray, (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' | | |
| 10<br>32.4 | | | | | | | |
| 15<br>27.4 | 16.0 | | | | 16.0-20.4' - Same as 4.0-6.0' except very poorly graded | | |
| 20 | | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: I-09 | SHEET 2 OF 14 |
|---|---|---|

# SOIL BORING LOG

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 bgs on 3/6/07 START : 3/11/2007 END : 3/12/2007 LOGGER : C. Sump, L. Prochaska

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.4 | | | | | | | |
| | | 10.0 | R3-SN | | **Poorly Graded Sand (SP)**<br>20.4-26.0' - pale yellowish brown to pale brown, (10YR 6/2 to 5YR 5/2), silica sand | | |
| 25<br>17.4 | | | | | | | |
| | 26.0 | | | | | | |
| | | | | | 26.0-31.5' - Same as 20.0-26.0' except mottled dusky yellowish brown, (10YR 2/2), moist, fine grained | | |
| 30<br>12.4 | | | | | | | |
| | | 5.5 | R4-SN | | **No Recovery 31.5-36.0'** | | |
| 35<br>7.4 | | | | | | | |
| | | | | | Begin Rock Coring at 36.0 ft bgs<br>See the next sheet for the rock core log | | |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | I-09 SHEET 3 OF 14 |

# ROCK CORE LOG

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 : 4.41 bgs on 3/6/07 START : 3/11/2007 END : 3/12/2007 LOGGER : C. Sump, L. Prochaska

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 36.0 | | | 36.0-46.0' - NA | | **Sand (SP)**<br>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)**<br>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 | |
| 40<br>2.4 | | | | | | **Limestone**<br>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' | |
| | R5-SN<br>10 ft<br>100% | NA | NA | | | | NA = Not Applicable<br>NR = No Recovery |
| 45<br>-2.6 | | | | | | | |
| | 46.0 | | | 46.0-56.0' - NA | | **Silty Sand (SM)**<br>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)**<br>47.1-51.0' - pale yellowish brown, (10YR 6/2), moist, nonplastic, slow dilatancy, strong HCl reaction, <10% poorly graded sand, all carbonate | |
| 50<br>-7.6 | | | | | | | |
| | R6-SN<br>10 ft<br>100% | NA | NA | | | **Silt With Sand (ML)**<br>51.0-52.5' - pale yellowish brown, (10YR 6/2), wet, nonplastic, rapid dilatancy, moderate HCl reaction, 10-20% medium grained sand, all carbonate<br>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 | |
| 55<br>-12.6 | | | | | | | |
| | 56.0 | | | | | | |

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

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 : 4.41 bgs on 3/6/07 START : 3/11/2007 END : 3/12/2007 LOGGER : C. Sump, L. Prochaska

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 56.0-66.0' - NA | | **Limestone**<br>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<br>**Disaggregated Limestone**<br>56.3-57.9' - dark yellowish brown, (10YR 4/2), strong HCl reaction, staining, organics, moderate dilatancy, carbonate<br>57.9-65.6' - dark yellowish brown, (10YR 4/2), strong HCl reaction, 20-30% poorly graded sand-sized, all carbonate | |
| 60<br>-17.6 | R7-SN<br>10 ft<br>100% | NA | NA | | | | |
| 65<br>-22.6 | | | | | | | |
| | 66.0 | | | 66.0-76.0' - NA | | **Limestone**<br>65.6-66.0' - pale yellowish brown, (10YR 6/2), moderate HCl reaction, extremely weak (R0), clay interbeds up to 1"<br>**Disaggregated Limestone**<br>66.0-66.5' - dark yellowish brown, (10YR 4/2), moderate HCl reaction, 10-20% poorly graded fine to medium grain sand, calcareous<br>**Limestone**<br>66.5-67.5' - Same as 56.0-56.3' except fragments up to 4" in diameter<br>**Disaggregated Limestone**<br>67.5-69.5' - Same as 56.3-57.9'<br>**Limestone**<br>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" | |
| 70<br>-27.6 | R8-SN<br>10 ft<br>100% | NA | NA | | | | |
| 75<br>-32.6 | | | | | | | |
| | 76.0 | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: I-09 | SHEET 5 OF 14 |
|---|---|---|

# ROCK CORE LOG

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 : 4.41 bgs on 3/6/07 START : 3/11/2007 END : 3/12/2007 LOGGER : C. Sump, L. Prochaska

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 76.0-86.0' - NA | | **Disaggregated Limestone**<br>76.0-76.8' - Same as 66.0-66.5' except limestone fragments up to 1" in diameter<br>76.8-79.0' - Same as 56.3-57.9'<br>79.0-83.2' - Same as 66.0-66.5' except few extremely weak (R0) limestone fragments, up to 4" in diameter<br>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) | |
| 80<br>-37.6 | R9-SN<br>10 ft<br>100% | NA | NA | | | | |
| 85<br>-42.6 | | | | | | | |
| | 86.0 | | | 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)<br>**Limestone**<br>87.5-88.0' - subangular rock fragments 2"-4" in diameter<br>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<br>**Disaggregated Limestone**<br>88.4-90.7' - gravel-sized limestone fragments, >50%, ranging in size from 1/4"-1"<br>**Limestone With Clayey Silt**<br>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 |
| 90<br>-47.6 | R10-SN<br>10 ft<br>100% | NA | NA | | | | |
| 95<br>-52.6 | | | | | | | |
| | 96.0 | | | | | | |

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

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 : 4.41 bgs on 3/6/07 START : 3/11/2007 END : 3/12/2007 LOGGER : C. Sump, L. Prochaska

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 96.0-106.0' - NA | | **Disaggregated Limestone**<br>94.0-96.0' - Same as 86.0-87.5' except 10% fewer gravel-sized limestone clasts<br>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"<br>**Limestone**<br>97.6-98.4' - Same as 69.5-76.0' except subangular rock fragments up to 3" in diameter<br>**Disaggregated Limestone**<br>98.4-99.3' - Same as 56.3-57.9'<br>99.3-100.0' - Same as 66.0-66.5' except 10% gravel-size calcareous fragments up to 1/2" in diameter<br>**Limestone With Clayey Silt**<br>100.0-102.8' - Same as 90.7-94.0' except no black inclusions<br>**Disaggregated Limestone**<br>102.8-103.5' - Same as 99.3-100.0'<br>103.5-104.5' - Same as 56.3-57.9'<br>**Limestone With Clayey Silt**<br>104.5-106.0' - Same as 90.7-94.0' except no black inclusions | |
| 100<br>-57.6 | R11-SN<br>10 ft<br>100% | NA | NA | | | | |
| 105<br>-62.6 | | | | | | | |
| | 106.0 | | | 106.0-116.0' - NA | | **Limestone**<br>106.0-108.0' - Same as 87.5-87.8' except with some silt 20-30%, up to 3" in diameter<br>**Disaggregated Limestone**<br>108.0-108.6' - Same as 99.3-100.0' except 30-50% gravel-sized rock fragments up to 1-1/2"<br>**Limestone With Clay And Silt**<br>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' | |
| 110<br>-67.6 | R12-SN<br>10 ft<br>87% | NA | NA | | | | |
| 115<br>-72.6 | | | NR | | | **No Recovery 114.7-116.0'** | |
| | 116.0 | | | | | | |

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|---|---|
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# ROCK CORE LOG

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 : 4.41 bgs on 3/6/07 START : 3/11/2007 END : 3/12/2007 LOGGER : C. Sump, L. Prochaska

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | NA | 116.0-126.0' - NA | | **Disaggregated Limestone**<br>116.0-117.0' - dark yellowish brown, (10YR 4/2), coarse grained, calcareous<br>**Limestone With Clay And Silt**<br>117.0-120.0' - Same as 108.6-114.7' except fine to medium grained, moderate HCl 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 | |
| 120<br>-77.6 | | | | | | **No Recovery 120.0-126.0'** | |
| | R13-SN<br>10 ft<br>40% | NA | NR | | | | |
| 125<br>-82.6 | | | | | | | |
| | 126.0 | | | 126.0-136.0' - NA | | **Limestone**<br>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<br>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<br>**Disaggregated Limestone**<br>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 | |
| 130<br>-87.6 | | | | | | | |
| | R14-SN<br>10 ft<br>95% | NA | NA | | | | |
| 135<br>-92.6 | | | | | | **No Recovery 135.5-136.0'** | |
| | 136.0 | | NR | | | | |

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|---|---|---|

# ROCK CORE LOG

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 : 4.41 bgs on 3/6/07 START : 3/11/2007 END : 3/12/2007 LOGGER : C. Sump, L. Prochaska

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 136.0-146.0' - NA | | **Disaggregated Limestone**<br>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<br>-97.6 | | | | | | | |
| | R15-SN<br>10 ft<br>100% | NA | NA | | | 140.5-142.1' - Same as 136.0-140.5' except increasing percentage of silt- and sand-sized material<br>142.1-145.5' - mild to strong HCl 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 | |
| 145<br>-102.6 | | | | | | | |
| | 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 HCl reaction, sharp contact, mottled appearance, 5-10% very fine grained silica sand<br>**Interbedded Limestone**<br>146.0-148.5' - yellowish gray to grayish orange, (5Y 7/2 to 10YR 7/4), 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 | |
| 150<br>-107.6 | | | | | | | |
| | R16-SN<br>10 ft<br>100% | NA | NA | | | **Disaggregated Limestone**<br>148.5-150.5' - moderate yellowish brown and dark yellowish brown, (10YR 5/4 and 10YR 4/2), very fine silty sand-sized<br>**Disaggregated Interbedded Limestone**<br>150.5-155.3' - moderate yellowish brown, (10YR 5/4), with thin beds of gravel-sized limestone fragments, 6" limestone bed at 152.0-152.6', large limestone fragments every 6"-8" with clayey gravel (<2") | |
| 155<br>-112.6 | | | | | | | |
| | 156.0 | | | | | **Disaggregated Limestone**<br>155.3-156.0' - Same as 148.5-150.5' | |

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

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 : 4.41 bgs on 3/6/07 START : 3/11/2007 END : 3/12/2007 LOGGER : C. Sump, L. Prochaska

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 156.0-166.0' - NA | | **Disaggregated Interbedded Limestone**<br>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 | |
| 160<br>-117.6 | | | | | | | |
| | R17-SN<br>10 ft<br>100% | NA | NA | | | **Limestone**<br>157.5-158.5' - yellowish gray, (5Y 8/2), fine grained, mild to moderate HCl reaction, weak (R2), few fossils or voids | |
| | | | | | | **Disaggregated Interbedded Limestone**<br>158.5-162.0' - limestone fragments less than 2", increasing silt and clay-sized content with depth | |
| | | | | | | **Disaggregated Limestone**<br>162.0-162.4' - dark yellowish brown, (10YR 4/2), poorly graded | |
| 165<br>-122.6 | | | | | | **Disaggregated Interbedded Limestone**<br>162.4-166.0' - Same as 150.5-155.3' | |
| | 166.0 | | | 166.0-176.0' - NA | | **Limestone**<br>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 | |
| 170<br>-127.6 | | | | | | **Disaggregated Interbedded Limestone**<br>169.9-171.3' - light gray, (N7), with large (>3") fragments separated by silty to clayey gravel (<1-1/2" pieces), suggestive of interbeds<br>171.3-174.5' - with large limestone fragments (3"-4") | |
| | R18-SN<br>10 ft<br>100% | NA | NA | | | | |
| 175<br>-132.6 | | | | | | | |
| | 176.0 | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: I-09 | SHEET 10 OF 14 |
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# ROCK CORE LOG

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 : 4.41 bgs on 3/6/07 START : 3/11/2007 END : 3/12/2007 LOGGER : C. Sump, L. Prochaska

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 176.0-186.0' - NA | | **Disaggregated Limestone**<br>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'<br>**Limestone Fragments**<br>176.0-178.3' - fine to coarse grained limestone fragments, trace fine silica sand, subangular with 20% subrounded fragments 1"-2" in diameter | |
| 180<br>-137.6 | | | | | | **Limestone**<br>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 | |
| | R19-SN<br>10 ft<br>100% | NA | NA | | | | |
| | | | | | | **Limestone Fragments**<br>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 | |
| 185<br>-142.6 | | | | | | | |
| | 186.0 | | | 186.0-196.0' - NA | | **Disaggregated Interbedded Limestone**<br>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 | |
| 190<br>-147.6 | | | | | | | |
| | R20-SN<br>10 ft<br>100% | NA | NA | | | | |
| 195<br>-152.6 | | | | | | | |
| | 196.0 | | | | | | |

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|---|---|---|

# ROCK CORE LOG

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 : 4.41 bgs on 3/6/07 START : 3/11/2007 END : 3/12/2007 LOGGER : C. Sump, L. Prochaska

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 196.0-206.0' - NA | | **Disaggregated Interbedded Limestone**<br>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 | |
| 200<br>-157.6 | | | | | | | |
| | R21-SN<br>10 ft<br>100% | NA | NA | | | | |
| 205<br>-162.6 | | | | | | | |
| | 206.0 | | | 206.0-216.0' - NA | | **Limestone Fragments**<br>206.0-209.5' - coarse grained, all carbonate derived, more coarse with depth to poorly graded gravel-sized limestone fragments <1/2", angular | |
| 210<br>-167.6 | | | | | | 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) | |
| | R22-SN<br>10 ft<br>100% | NA | NA | | | | |
| 215<br>-172.6 | | | | | | | |
| | 216.0 | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: I-09 | SHEET 12 OF 14 |
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# ROCK CORE LOG

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 : 4.41 bgs on 3/6/07 START : 3/11/2007 END : 3/12/2007 LOGGER : C. Sump, L. Prochaska

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 216.0-226.0' - NA | | **Disaggregated Interbedded Limestone**<br>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 | |
| 220<br>-177.6 | | | | | | | |
| | R23-SN<br>10 ft<br>100% | NA | NA | | | | |
| 225<br>-182.6 | | | | | | | |
| | 226.0 | | | | | | |
| | | | | 226.0-236.0' - NA | | **Limestone Fragments**<br>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 | |
| 230<br>-187.6 | | | | | | | |
| | R24-SN<br>10 ft<br>100% | NA | NA | | | 231.0-235.7' - coarse grained, less than 10% subangular to subrounded fragments 2" or greater | |
| 235<br>-192.6 | | | | | | | |
| | 236.0 | | | | | | |

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# ROCK CORE LOG

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 : 4.41 bgs on 3/6/07 START : 3/11/2007 END : 3/12/2007 LOGGER : C. Sump, L. Prochaska

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 236.0-246.0' - NA | | **Disaggregated Limestone**<br>235.7-236.0' - moderate yellowish brown, (10YR 5/4), <10% gravel<br>**Limestone Fragments**<br>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' | |
| 240<br>-197.6 | R25-SN<br>10 ft<br>90% | NA | NA | | | | |
| 245<br>-202.6 | | | NR | | | **No Recovery 245.0-246.0'** | |
| | 246.0 | | | 246.0-256.0' - NA | | **Limestone Fragments**<br>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'. |
| 250<br>-207.6 | R26-SN<br>10 ft<br>85% | NA | NA | | | | |
| 255<br>-212.6 | | | NR | | | **No Recovery 254.5-256.0'** | |
| | 256.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | I-09 SHEET 14 OF 14 |

# ROCK CORE LOG

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 : 4.41 bgs on 3/6/07 START : 3/11/2007 END : 3/12/2007 LOGGER : C. Sump, L. Prochaska

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 256.0-266.0' - NA | | **Limestone Fragments**<br>256.0-266.0' - Same as 246.0-254.5' | 6" casing advanced to 256.0' after retrieving 4" core sample (246.0-256.0'). Driller cleaned borehole and advanced 4" case from 256.0-266.0'. Sample fell out during retrieval. Used 20.0' core barrel with flapper bit to retrieve disturbed material. Bottom 10.0' logged as material from 256.0-266.0'. |
| 260<br>-217.6 | | | | | | | |
| | R27-SN<br>10 ft<br>100% | NA | NA | | | | |
| 265<br>-222.6 | | | | | | | |
| | 266.0 | | | | | Bottom of Boring at 266.0 ft bgs on 3/12/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

DRILLING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 03/25/07 START : 3/25/2007 END : 3/26/2007 LOGGER : J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 42.0 | 0.0 | | | | **Poorly Graded Sand (SP)**<br>0.0-5.0' - grayish brown to moderate yellowish brown, (5Y 3/2 to 10YR 5/4), moist, fine grained, no HCl reaction, silica sand, one very pale orange (10YR 8/2), round limestone fragment 3" diameter at 4.6' with strong HCl reaction | | Water level is 1.0' below ground surface |
| | | 5.0 | R1-SN | | | | Core run times not recorded for I-10 |
| 5<br>37.0 | | | | | **No Recovery 5.0-6.0'** | | |
| | 6.0 | | | | **Poorly Graded Sand (SP)**<br>6.0-11.0' - moderate yellowish brown to very pale orange, (10YR 5/4 to 10YR 8/2), moist, fine grained, strong HCl reaction, silica sand, with carbonate fines in orange material near bottom of interval | | |
| 10<br>32.0 | | | | | | | |
| | | 9.0 | R2-SN | | **Limestone Fragments**<br>11.0-13.0' - moderate yellowish brown transitioning to yellowish gray, (10YR 5/4 to 5Y 7/2), strong HCl reaction, very fine grained to microcrystalline, contains numerous voids surfaces, colors vary depending on voids, visible calcite crystals with visible cleavage planes<br>13.0-14.4' - yellowish gray, (5Y 7/2), mild HCl reaction, voids (<1/16") on 20-40% of surface | | |
| 15<br>27.0 | | | | | **Silt (ML)**<br>14.4-15.0' - very pale orange, (10YR 8/2), strong HCl reaction, carbonate material<br>**No Recovery 15.0-16.0'** | | |
| | 16.0 | | | | **Silt (ML)**<br>16.0-16.5' - very pale orange, (10YR 8/2), strong HCl reaction, carbonate material<br>**Limestone Fragments**<br>16.5-19.6' - very pale orange, (10YR 8/2), strong HCl reaction, limestone fragments up to 4" in diameter with sections of pulverized rock less than 1" in diameter, voids (<1/16") on 20-40% of surface, poorly fossiliferous | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
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# SOIL BORING 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

DRILLING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 03/25/07 START : 3/25/2007 END : 3/26/2007 LOGGER : J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 22.0 | | 10.0 | R3-SN | | **Limestone Fragments**<br>19.6-26.0' - grayish orange, (10YR 7/4), mild HCl reaction, fine sand-sized to fine gravel-sized (up to 1") limestone fragments, highly fossiliferous, limestone has immediate mild HCl reaction, carbonate materials | | |
| 25<br>17.0 | 26.0 | | | | | | |
| | | 10.0 | R4-SN | | 26.0-29.5' - Same as 19.6-26.0' except mild to no HCl reaction | | Driller's Remark: Drill rod dropped quickly between 28.0-31.0' in depth, possible void (however, 100% recovery achieved) |
| 30<br>12.0 | | | | | 29.5-31.4' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, fragments up to 7" with interbedded clays, poorly fossiliferous, voids (<1/16") on 50-75% of surface<br>31.4-36.0' - light olive gray, (5Y 5/2), mild to moderate HCl reaction, fragments up to 3" with surface voids, moderately fossiliferous | | |
| 35<br>7.0 | 36.0 | | | | | | |
| | | | | | **Disaggregated Interbedded Limestone**<br>36.0-41.4' - dark yellowish brown, (10YR 4/2), mild to moderate HCl reaction, carbonate material, part of repeating alternating sequences of silt and broken limestone fragments and core segments | | |
| 40 | | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: I-10 | SHEET 3 OF 14 |
|---|---|---|

# SOIL BORING 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

DRILLING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 03/25/07 START : 3/25/2007 END : 3/26/2007 LOGGER : J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 2.0 | | 10.0 | R5-SN | | **Limestone Fragments**<br>41.4-42.7' - moderate yellowish brown, (10YR 5/4), mild HCl reaction, fragments up to 2", voids (<1/16") on 15-30% of surface, poorly fossiliferous<br>**Disaggregated Interbedded Limestone**<br>42.7-44.2' - Same as 36.0-41.4'<br><br>**Limestone Fragments**<br>44.2-44.9' - Same as 41.4-42.7'<br>44.9-46.0' - dark yellowish brown, (10YR 4/2), moderate to strong HCl reaction, carbonate materials, coarse sand-sized to gravel-sized limestone fragments<br>46.0-56.6' - pale yellowish brown to moderate yellowish brown, (10YR 6/2 to 10YR 5/4), moderate to strong HCl reaction, fine to coarse sand-sized and fine to coarse gravel-sized limestone fragments in varying amounts throughout interval, isolated limestone core segment (1" long) at 47.4' with strong HCl reaction and voids (<1/16") covering 50-75% of surface, black (N1) organic staining at 53.9-54.3' | | |
| 45<br>-3.0 | 46.0 | | | | | | |
| 50<br>-8.0 | | 10.0 | R6-SN | | | | |
| 55<br>-13.0 | | | | | | | |
| | | | | | Begin Rock Coring at 56.0 ft bgs<br>See the next sheet for the rock core log | | |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: | |
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# 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 03/25/07 START : 3/25/2007 END : 3/26/2007 LOGGER : J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (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 | | **Limestone Fragments With Silt**<br>56.6-64.0' - moderate yellowish brown, (10YR 5/4), strong HCl reaction | |
| 60<br>-18.0 | R7-SN<br>10 ft<br>100% | NA | NA | | | | NA = Not Applicable<br>NR = No Recovery |
| 65<br>-23.0 | | | | | | **Limestone Fragments**<br>64.0-66.0' - moderate yellowish brown, (10YR 5/4), moderate to strong HCl reaction, limestone fragments up to 3", voids (<1/16") on 50-75% of surface of fragments<br>66.0-66.5' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, fragments up to 3", trace voids on surface of fragments<br>66.5-76.0' - moderate yellowish brown, (10YR 5/4), moderate to strong HCl reaction, fragments and core segments (up to 3") with pulverized rock, poorly fossiliferous, voids (<1/16") on 50-75% of surface of fragments | |
| | 66.0 | | | 66.0-76.0' - NA | | | Rock fragments are most likely pulverized due to drilling method |
| 70<br>-28.0 | R8-SN<br>10 ft<br>100% | NA | NA | | | | |
| 75<br>-33.0 | | | | | | | |
| | 76.0 | | | | | | |

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# 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 03/25/07 START : 3/25/2007 END : 3/26/2007 LOGGER : J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 76.0-86.0' - NA | | **Limestone Fragments**<br>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 |
| 80<br>-38.0 | | | | | | | |
| | R9-SN<br>10 ft<br>100% | NA | NA | | | | |
| 85<br>-43.0 | | | | | | | |
| | 86.0 | | | | | | |
| | | | | 86.0-96.0' - NA | | 86.0-88.6' - Same as 76.0-86.0' | |
| | | | | | | **Disaggregated Limestone**<br>88.6-89.2' - dusky yellowish brown, (10YR 2/2), strong HCl reaction, carbonate material<br>**Limestone Fragments**<br>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 |
| 90<br>-48.0 | | | | | | | |
| | R10-SN<br>10 ft<br>100% | NA | NA | | | | |
| 95<br>-53.0 | | | | | | | |
| | 96.0 | | | | | | |

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# 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 03/25/07 START : 3/25/2007 END : 3/26/2007 LOGGER : J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 96.0-106.0' - NA | | **Limestone Fragments**<br>96.0-106.0' - Same as 89.2-96.0' | Lost circulation during run at 96.0-106.0' |
| 100<br>-58.0 | | | | | | | |
| | R11-SN<br>10 ft<br>100% | NA | NA | | | | |
| 105<br>-63.0 | | | | | | | |
| | 106.0 | | | | | | |
| | | | | 106.0-116.0' - NA | | 106.0-116.0' - dark yellowish orange, (10YR 6/6), moderate to strong HCl 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 |
| 110<br>-68.0 | | | | | | | |
| | R12-SN<br>10 ft<br>100% | NA | NA | | | | |
| 115<br>-73.0 | | | | | | | |
| | 116.0 | | | | | | |

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|---|---|---|

# 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 03/25/07 START : 3/25/2007 END : 3/26/2007 LOGGER : J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 116.0-126.0' - NA | | **Limestone Fragments**<br>116.0-116.8' - dark yellowish orange, (10YR 6/6), mild to no HCl reaction, pulverized limestone fragments, coarse to medium sand-sized particles<br>116.8-119.5' - light olive gray, (5Y 5/2), fine grained, mild HCl reaction, trace voids on surface, fragments are up to 4"<br>119.5-124.8' - yellowish gray, (5Y 7/2), mild HCl 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 | End coring for the day 3/25/07 at 116.0' |
| 120<br>-78.0 | R13-SN<br>10 ft<br>100% | NA | NA | | | | |
| 125<br>-83.0 | | | | | | **Silt (ML)**<br>124.8-126.0' - yellowish gray to pale greenish yellow, (5Y 7/2 to 10YR 8/2), strong HCl reaction, carbonate material | |
| | 126.0 | | | 126.0-136.0' - NA | | **Limestone Fragments**<br>126.0-134.0' - dusky yellow and yellowish gray, (5Y 6/4 and 5Y 7/2), mild HCl 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' |
| 130<br>-88.0 | R14-SN<br>10 ft<br>95% | NA | NA | | | | |
| 135<br>-93.0 | | | | | | | |
| | 136.0 | | NR | | | | |

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# 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 03/25/07 START : 3/25/2007 END : 3/26/2007 LOGGER : J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 136.0-146.0' - NA | | **Limestone Fragments**<br>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'<br>**No Recovery 135.5-136.0'**<br>**Limestone Fragments**<br>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)<br>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<br>140.2-144.5' - dusky yellow, (5Y 6/4), mild HCl reaction, pulverized limestone in medium to fine sand-size particles and rock fragments up to 3" in diameter<br>144.5-146.0' - light olive gray, (5Y 6/1), moderate HCl reaction, core segments up to 4" in length, trace voids on surface | |
| 140<br>-98.0 | R15-SN<br>10 ft<br>100% | NA | NA | | | | |
| 145<br>-103.0 | | | | | | | |
| | 146.0 | | | 146.0-156.0' - NA | | 146.0-147.9' - light olive gray, (5Y 6/1), mild to moderate HCl reaction, trace voids on surface<br>147.9-152.0' - dusky yellow, (5Y 6/4), moderate HCl reaction, gravel-sized limestone fragments with pulverized limestone (silt-sized particles) | Repeating alternating sequences from 147.9-156.0' |
| 150<br>-108.0 | R16-SN<br>10 ft<br>100% | NA | NA | | | 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<br>153.3-154.5' - Same as 147.9-152.0' except contains a core segment up to 4" in length<br>154.5-156.0' - Same as 152.0-153.3' | |
| 155<br>-113.0 | | | | | | | |
| | 156.0 | | | | | | |

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# 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 03/25/07 START : 3/25/2007 END : 3/26/2007 LOGGER : J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 156.0-166.0' - NA | | **Limestone Fragments**<br>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 | |
| 160<br>-118.0 | | | | | | | |
| | R17-SN<br>10 ft<br>100% | NA | NA | | | 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 | |
| 165<br>-123.0 | | | | | | | |
| | 166.0 | | | | | | |
| | | | | 166.0-176.0' - NA | | **Limestone**<br>166.0-168.8' - dusky yellow, (5Y 6/4), coarse to medium grained, mild HCl reaction, cavities (1/4" in diameter) present on surface, fragments up to 8" in length | |
| 170<br>-128.0 | | | | | | **Limestone Fragments**<br>168.8-175.7' - dusky yellow, (5Y 6/4), fine grained, mild HCl reaction, gravel-size particles and core fragments up to 6" long, trace voids on surface | |
| | R18-SN<br>10 ft<br>100% | NA | NA | | | | |
| 175<br>-133.0 | | | | | | | |
| | 176.0 | | | | | | |

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# 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 03/25/07 START : 3/25/2007 END : 3/26/2007 LOGGER : J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 176.0-186.0' - NA | | **Disaggregated Limestone**<br>175.7-176.0' - moderate yellowish brown, (10YR 5/4), strong HCl reaction, carbonate sand with 10-20% silica content<br>**Limestone Fragments**<br>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 | |
| 180<br>-138.0 | | | | | | 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' | |
| | R19-SN<br>10 ft<br>100% | NA | NA | | | | |
| 185<br>-143.0 | | | | | | 185.0-186.0' - light olive gray, (5Y 6/1), fine grained, mild HCl reaction, core segments up to 3" in length | |
| | 186.0 | | | 186.0-196.0' - NA | | **Disaggregated Limestone**<br>186.0-186.5' - light olive gray, (5Y 6/1), strong HCl reaction, silt-sized with coarse sand-sized particles, possibly slough material, all carbonate material<br>**Limestone Fragments**<br>186.5-187.5' - light olive gray, (5Y 6/1), dense, fine grained, mild HCl reaction, core segments up to 2" in length, fragments 1/4"-1" in diameter | |
| 190<br>-148.0 | | | | | | 187.5-194.7' - yellowish gray, (5Y 7/2), mild to moderate HCl reaction, core segments up to 3" in length, fragments 1/2"-2" in diameter, moderate to highly fossiliferous, numerous surface cavities present on limestone | |
| | R20-SN<br>10 ft<br>87% | NA | NA | | | | |
| 195<br>-153.0 | | | NR | | | **No Recovery 194.7-196.0'** | |
| | 196.0 | | | | | | |

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# 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 03/25/07 START : 3/25/2007 END : 3/26/2007 LOGGER : J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 196.0-206.0' - NA | | **Limestone Fragments**<br>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<br><br>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<br>-158.0 | | | | | | 200.0-205.0' - fragments range from 1/4"-3", possible breccia zone, matrix appears as for material from 196.0-198.0', clasts appear as for material from 198.0-200.0' | |
| | R21-SN<br>10 ft<br>100% | NA | NA | | | | |
| 205<br>-163.0 | | | | | | 205.0-206.0' - light olive gray, (5Y 6/1), very fine grained, moderate HCl reaction, fragments and core segments up to 4" in diameter | |
| | 206.0 | | | 206.0-216.0' - NA | | 206.0-216.0' - light olive gray, (5Y 6/1), strong HCl reaction, coarse sand-sized particles and rock fragments up to 4", highly fossiliferous, voids (<1/16") over 25-50% of surface, with isolated sections of fine grained, dense, yellowish gray (5Y 7/2) core segments and fragments, with strong HCl reaction, at 210.0-210.4', 211.3-211.4' and 214.6-215.0' | |
| 210<br>-168.0 | | | | | | | |
| | R22-SN<br>10 ft<br>100% | NA | NA | | | | |
| 215<br>-173.0 | | | | | | | |
| | 216.0 | | | | | | |

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# 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 03/25/07 START : 3/25/2007 END : 3/26/2007 LOGGER : J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 216.0-226.0' - NA | | **Limestone Fragments**<br>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<br>217.5-219.2' - yellowish gray, (5Y 7/2), dense, fine grained, moderate HCl reaction, fragments up to 4" in diameter, poorly fossiliferous<br>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' |
| 220<br>-178.0 | | | | | | | |
| | R23-SN<br>10 ft<br>100% | NA | NA | | | 221.4-222.2' - Same as 217.5-219.2'<br>222.2-225.0' - Same as 219.2-221.4' | |
| 225<br>-183.0 | | | | | | **Disaggregated Limestone**<br>225.0-226.0' - yellowish gray, (5Y 7/2), moderate HCl reaction, carbonate material | |
| | 226.0 | | | 226.0-236.0' - NA | | **Limestone Fragments**<br>226.0-236.0' - dark yellowish orange, (10YR 6/6), sand-sized particles to gravel-sized limestone fragments, strong HCl reaction for the silt and sand-sized particles, mild to moderate HCl 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 HCl reaction, or as void rich, yellowish gray (5Y 7/2), poorly fossiliferous, with mild to moderate HCl reaction | Silt and limestone fragments are most likely cohesive rock that has been broken up by the sonic drilling method |
| 230<br>-188.0 | | | | | | | |
| | R24-SN<br>10 ft<br>100% | NA | NA | | | | |
| 235<br>-193.0 | | | | | | | |
| | 236.0 | | | | | | |

| PROJECT NUMBER: 338884.FL | BORING NUMBER: I-10 | SHEET 13 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 03/25/07 START : 3/25/2007 END : 3/26/2007 LOGGER : J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 236.0-246.0' - NA | | **Limestone Fragments**<br>236.0-246.0' - Same as 226.0-236.0' except with isolated sections of fine grained and void-rich limestone | |
| 240<br>-198.0 | | | | | | | |
| | R25-SN<br>10 ft<br>100% | NA | NA | | | | |
| 245<br>-203.0 | | | | | | | |
| | 246.0 | | | | | | |
| | | | | 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 |
| 250<br>-208.0 | | | | | | | |
| | R26-SN<br>10 ft<br>100% | NA | NA | | | | |
| 255<br>-213.0 | | | | | | | |
| | 256.0 | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | I-10 SHEET 14 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

CORING METHOD AND EQUIPMENT : Rotosonic S/N SR-116, sonic, 6" outer casing and 4" core barrel ORIENTATION : Vertical

WATER LEVELS : 1.0 ft bgs on 03/25/07 START : 3/25/2007 END : 3/26/2007 LOGGER : J. Burkard

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | | | | 256.0-266.0' - NA | | **Limestone Fragments**<br>256.0-266.0' - Same as 226.0-236.0' | |
| 260<br>-218.0 | | | | | | | |
| | R27-SN<br>10 ft<br>100% | NA | NA | | | | |
| 265<br>-223.0 | | | | | | | 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 |
| | 266.0 | | | | | Bottom of Boring at 266.0 ft bgs on 3/26/2007 | |
| | | | | | | | 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 |

# SOIL BORING 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

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

WATER LEVELS : 42.0 ft bgs on 6/28/07 START : 6/27/2007 END : 6/29/2007 LOGGER : J. Schaeffer, D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 20.9 | 0.0 – 1.5 | 1.2 | SS-1 | 1-5-10 (15) | **Topsoil** 0.0-0.2' - roots<br>**Sandy Silt With Limestone Fragments (ML)** 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 | | SS-1 looks like fill, mixed chunks of material<br>Driller's Remark: Sand at 3.0-3.5' |
| 5 | 5.0 – 6.5 | 0.6 | SS-2 | 2-3-4 (7) | **Poorly Graded Sand With Silt (SP-SM)** 5.0-5.6' - moderate yellowish brown, (10YR 5/4), moist to wet, loose, no to moderate HCl reaction, fine silica sand, trace medium grained carbonate sand, trace nonplastic fines | | |
| 10 | 10.0 – 11.5 | 0.6 | SS-3 | 3-3-3 (6) | **Poorly Graded Sand With Silt (SP-SM)** 10.0-10.3' - Same as 5.0-5.6' except dark yellowish brown, (10YR 4/2), mottled, 5-10% nonplastic fines, trace medium sand-sized carbonate sand<br>**Poorly Graded Sand With Silt And Organics (SP-SM)** 10.3-10.6' - grayish brown, (5YR 3/2), moist, loose, no HCl reaction, fine silica sand, 15-20% fines that appear to be very fine grained organics, nonplastic fines | | |
| 15 | 15.0 – 16.5 | 0.8 | SS-4 | 5-7-11 (18) | **Poorly Graded Sand (SP)** 15.0-15.8' - dark yellowish brown, (10YR 4/2), white, moist, medium dense, nonplastic, no HCl reaction, fine silica sand | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | IT-01 SHEET 2 OF 8 |

# SOIL BORING 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

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

WATER LEVELS : 42.0 ft bgs on 6/28/07 START : 6/27/2007 END : 6/29/2007 LOGGER : J. Schaeffer, D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 0.9 | 20.0 – 21.5 | 0.9 | SS-5 | 11-10-13 (23) | **Poorly Graded Sand With Silt (SP-SM)** 20.0-20.9' - pale yellowish brown, (10YR 6/2), dark yellowish brown (10yr 4/2), moist, medium dense, fine silica sand, trace carbonate sand in first 0.2', trace nonplastic fines, no HCl reaction in silica, mild in carbonate | | |
| 25 -4.1 | 25.0 – 26.5 | 0.8 | SS-6 | 4-5-5 (10) | **Poorly Graded Sand (SP)** 25.0-25.8' - dark yellowish brown, (10YR 4/2), mottled, wet, loose, no HCl reaction, fine silica sand, trace nonplastic fines | | |
| 30 -9.1 | 30.0 – 31.5 | 0.9 | SS-7 | 2-3-4 (7) | **Poorly Graded Sand (SP)** 30.0-30.9' - Same as 25.0-25.8' except mottled and banded | | Driller's Remark: Very soft at 33.0', possible change of material in SS-8 |
| 35 -14.1 | 35.0 – 36.5 | 1.5 | SS-8 | 0-0-0 (0) | **Interbedded Organic Soil (SP)** 35.0-35.6' - dusky brown, (5YR 2/2), wet, 60% organic soil and 40% poorly graded sand; organic soil exhibits low to medium plasticity, slow dilatancy, no HCl reaction; poorly graded sand is fine grained, possible orange silica grains, 10-15% organic fines, no HCl reaction<br>**Poorly Graded Sand Grading To Silty Sand With Organics (SP)** 35.6-36.5' - dusky brown, (5YR 2/2), wet, very loose, no HCl reaction, fine sand, possible orange silica grains, trace coarse sand-sized pyrite grains, 10-25% low plastic fines, increasing with depth, appear to be organics | | Driller's Remark: Gravelly material at 38.0' (like SS-9) |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | IT-01 SHEET 3 OF 8 |

# SOIL BORING 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

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

WATER LEVELS : 42.0 ft bgs on 6/28/07 START : 6/27/2007 END : 6/29/2007 LOGGER : J. Schaeffer, D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -19.1 | 40.0 – 41.5 | 1.3 | SS-9 | 3-5-8 (13) | **Silty Sand (SM)** 40.0-41.3' - mixed yellowish gray, medium light gray, light bluish gray, (5Y 8/1, N6, 5B 7/1), wet, medium dense, strong HCl reaction, fine to coarse sand-sized shells and limestone | | Driller's Remark: 100% loss of circulation at 44.0-44.5' |
| 45 | 45.0 | | | | | | |
| -24.1 | 46.5 | 0.8 | SS-10 | 12-41-40 (81) | **Silty Gravels (GM)** 45.0-45.8' - 50/50 split in sample; lenses alternates, 1"-2-1/2" thick limestone fragments are medium gray (N5), strong HCl reaction, same as SS-9, angular fine to coarse gravel-sized, silt with sand (ML) is pale yellowish brown, wet, very soft, nonplastic, very rapid dilatancy, 10-20% very fine sand-sized particles, mild to moderate HCl reaction, carbonate materials | | Finished drilling at 45.0' at end of 6/27/07 at 18:00<br>Driller set HW casing<br>Driller's Remark: Caving at 16.0-17' (possible water table); casing is dry up to 43.5'.<br><br>On 6/28/07 water table is at 42.0'; resume drilling at 07:30 AM<br>Driller's Remark: Alternating layers of soft and hard material between 45.0-50.0'; lost circulation at 45.0' |
| 50 | 50.0 | | | | | | |
| -29.1 | 51.5 | 1.4 | SS-11 | 31-27-17 (44) | **Silty Gravels (GM)** 50.0-51.4' - Same as 45.0-45.8' except limestone in gravel-sized particles, one 1" fragment in middle of sample, fine to coarse angular gravel-sized limestone from 51.0-51.4'; silt is same as SS-10 | | |
| 55 | 55.0 | | | | | | |
| -34.1 | 55.6 | 0.5 | SS-12 | 50-50/1.5 (100/7.5") | **Well Graded Limestone Gravel With Silt And Sand (GW)** 55.0-55.5' - Same as 45.0-45.8' except medium gray to moderate yellowish brown, (N5, 10YR 5/4), wet, very dense, gravel is in both colors and fines are in brown color, fine to coarse angular gravel-sized limestone, 30% fine to coarse angular sand-sized material, 15% nonplastic fines, gray material has strong HCl reaction, brown material has mild to moderate HCl reaction, all carbonate materials | | Driller's Remark: Change to SS-13 material at 58.0'; Install casing to 60.0' |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | IT-01 SHEET 4 OF 8 |

# SOIL BORING 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

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

WATER LEVELS : 42.0 ft bgs on 6/28/07 START : 6/27/2007 END : 6/29/2007 LOGGER : J. Schaeffer, D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -39.1 | 60.0 – 61.5 | 1.2 | SS-13 | 16-19-25 (44) | **Silty Sand With Limestone Fragments (SM)** 60.0-61.2' - moderate yellowish brown, (10YR 5/4), wet, dense, fine to coarse grained, nonplastic, mild HCl reaction, 20-25% silt, 15% fine gravel, carbonate materials | | Driller's Remark: Circulation lost after spoon<br>Driller's Remark: Hard at 62.0'<br>Driller's Remark: Softer at 64.0', circulation returns, installed 10' more casing (to 65.0') |
| 65 | 65.0 | | | | | | |
| -44.1 | 65.3 | 0.3 | SS-14 | 50/3.0 (50/3.0") | **Sandy Silt (ML)** 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 | | Driller's Remark: 65.0-70.0' drilling hard, a little chatter at 69.5' |
| 70 | 70.0 | | | | | | |
| -49.1 | 70.1 | 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 |
| 75 | 74.9 | | | | | | |
| -54.1 | | 0.0 | SS-16 | 50/1.5 (50/1.5") | **No Recovery 75.0-75.1'** Begin Rock Coring at 75.0 ft bgs See the next sheet for the rock core log | | |
| 80 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | IT-01 SHEET 5 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 ORIENTATION : Vertical

WATER LEVELS : 42.0 ft bgs on 6/28/07 START : 6/27/2007 END : 6/29/2007 LOGGER : J. Schaeffer, D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -54.1 | 75.0 R1-HQ 1 ft 100% 76.0 | 100 | 0 | | | **Limestone** 75.0-76.0' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, weak (R2), 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 | Switch to coring; finished soil drilling at 15:30 on 6/28/07 R1: 3 minutes |
| | R2-HQ 5 ft 100% | 97 | 0 | | | 76.0-77.55' - Same as 75.0-76.0' except moderate yellowish brown to dark yellowish orange, (10YR 5/4, 10YR 6/6), weak to very weak (R2 to R1), voids (up to 1/16") cover 5-25% of the surface area, voids coverage decreases with depth | |
| | | | 2 | 76.95, 79.85, 80.55' - Fracture (3), 25 deg and 45 deg, rough, planar to undulating, tight nearly healed | | | |
| | | | 1 | 77.4' - Fracture, 30 deg, rough, undulating, healed 77.75' - Fracture, horizontal, rough, planar, tight | | | SC-1 collected at 78.5-79.5' |
| | | | 1 | 78.3' - Fracture, horizontal, rough, planar to undulating, tight | | | Drilled twice as fast from 79.5-81.0' |
| 80 -59.1 | | | 1 | | | 77.55-79.5' - light olive gray, (5Y 5/2), fine to coarse grained, moderate HCl 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 | R2: 17 minutes |
| | 81.0 | | | | | | |
| | R3-HQ 5 ft 100% | 63 | 1 | | | 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 | |
| | | | 1 | 81.9' - Fracture, horizontal, rough, planar | | | |
| | | | 1 | 82.35' - Fracture (2), 30 deg, rough, planar, with a 1" fragment wedge between 2 fractures | | | |
| | | | 1 | | | | |
| | | | 2 | 83.95' - Fracture, 50 deg, rough, stepped, tight 84.55' - Fracture, 10 deg, rough, planar | | | |
| 85 -64.1 | | | >10 | 84.85' - Fracture, 60 deg, rough, undulating, leading to fracture zone at 85.0' 85.0-85.15' - Fracture zone, small 1/4 and smaller | | | R3: 8 minutes |
| | 86.0 | | | | | | |
| | R4-HQ 5 ft 88% | 35 | 3 | 85.15, 85.4, 85.75' - Fracture (3), 10 deg, rough, undulating to stepped | | 81.0-86.0' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl 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 | |
| | | | 3 | 85.5' - Fracture, 80 deg, rough, undulating to stepped, from 85.15 to 85.75 | | | |
| | | | 3 | 85.85' - Fracture, 70 deg, rough, undulating, from 85.75 to 86.0 continuation of overlying fracture | | | |
| | | | >10 | 86.2' - Fracture, 75 deg, rough, undulating, tight to open 86.55' - Fractures, horizontal, rough, stepped, very open fracture with significant fragmentation and debris, nearly fracture zone infill | | 86.0-86.55' - Same as 81.0-86.0' except medium strong (R3), 25-30% void coverage | |
| 90 -69.1 | | | 5 | | | 86.55-87.65' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, very weak (R1), voids (<1/16") cover 0-5% of the surface, 1/4"-1/2" thick trace planar bedding | Driller's Remark: 50% circulation loss R4: 9 minutes |
| | 91.0 | | NR | 87.0, 87.2' - Fracture (2), 10 deg, rough, planar, open, rounded | | | |
| | R5-HQ 5 ft 68% | 28 | 8 | 87.65' - Fracture, 10 deg and 30 deg, rough, undulating, open | | 87.65-88.6' - Same as 86.0-86.55' 88.6-88.7' - light olive gray, (5Y 5/2), very fine grained, moderate HCl reaction, strong (R4), 20% sub angular coarse sand-sized particles (possible shell fragments), voids (up to 1/16") cover 3% of the rock surface, cavities (up to 1/2") | Driller's Remark: 100% circulation loss as soon as drilling starts at 91.0'; 100% loss through to 96.0' |
| | | | 3 | 88.45' - Fracture, horizontal, rough, undulating to stepped, tight to healed | | | |
| | | | 7 | 88.75' - Fracture, 75 deg, rough, stepped, tight, bounded by fractures at 88.15 and 89.15' 89.15' - Fracture, 20 deg, rough, stepped, very open with fragmentation | | 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) | |
| | | | 0 | 89.5-89.8' - Fracture zone | | | |
| 95 | | | | | | **No Recovery 90.4-91.0'** | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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 ORIENTATION : Vertical

WATER LEVELS : 42.0 ft bgs on 6/28/07 START : 6/27/2007 END : 6/29/2007 LOGGER : J. Schaeffer, D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| -74.1 | | | NR | 89.8' - Fracture, 30 deg, rough, undulating, open to fracture zone | | **Limestone** | R5: 15 minutes |
| | 96.0 | | | 90.05' - Fracture, 20 deg, rough, stepped, very open | | 91.0-91.65' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, weak (R2), voids cover 25% of the surface, 3% gray voids, same as 88.6-88.7' | Added EZ-Mud, still 100% water loss |
| | | | 0 | 90.2' - Fracture, 70 deg, rough, undulating, fracture to fragmentation | | | |
| | | | 0 | 91.25' - Fracture, 30 deg, smooth, undulating | | 91.65-93.0' - light olive gray, (5Y 5/2), fine grained, moderate HCl reaction, strong (R4), transition to moderate yellowish brown particularly at the top and bottom, voids (up to 1/16") cover 15-20% of the surface, 1/2" cavities and fossil casts | |
| | R6-HQ 5 ft 100% | 62 | 2 | 91.45, 91.5, 91.6, 91.65' - Fracture (4), horizontal, rough, planar, open fragmentation (sub angular) from 91.6-91.65' | | | |
| | | | 3 | 92.2' - Fracture, 40 deg, rough, planar, healed with trace fragmentation (sharp angular) | | | |
| 100 | | | | 92.35' - Fracture, 20 deg, rough, planar, fragments, joins with 92.2 fracture | | 93.0-94.4' - dusky yellow, (5Y 6/4), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), 5% rounded coarse fragments, voids (up to 1/16") cover 10% of the surface | |
| -79.1 | | | >10 | 92.55' - Fracture, horizontal, smooth, planar | | | R6: 5 minutes |
| | 101.0 | | | 93.0' - Fracture, 70 deg, rough, undulating, tight | | | |
| | | | 0 | 93.2' - Fracture, 20 deg, rough, undulating, tight | | **No Recovery 94.4-96.0'** | |
| | | | | 93.65' - Fracture, 70 deg, rough, undulating, tight | | **Limestone** | |
| | | | 1 | 93.8-93.95' - Fracture zone | | 96.0-98.1' - dusky yellow, (5Y 6/4), fine grained, moderate HCl reaction, weak to medium strong (R2 to R3), voids (up to 1/16") cover 30-40% of the surface, trace elongate cavities up to 3/4"X1/4", trace organics (up to 1/4") | |
| | | | | 93.95' - Fracture, 10 deg, rough, stepped, open | | | |
| | R7-HQ 5 ft 96% | 77 | 1 | 98.3' - Fracture, 25 deg, rough, undulating, tight | | | |
| | | | 1 | 98.55' - Fracture, 80 deg, rough, undulating, that starts at 98.3 and ends as unbroken fracture at 98.8, | | | 100 % water loss from 101.0-106.0' |
| 105 | | | | | | 98.1-101.0' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, weak to very weak (R2 to R1), voids (up to 1/16") cover 5-15% of the rock surface, organics (up to 1/8" long) | |
| -84.1 | | | 2 | 99.45' - Fracture, 50 deg, rough, planar, tight | | | R7: 14 minutes |
| | 106.0 | | NR | 99.6' - Fracture, 70 deg, rough, undulating to planar, tight extends from 99.45 to 99.65' | | | |
| | | | >10 | 99.65' - Fracture, 30 deg, rough, planar, tight | | | |
| | | | | 100.1' - Fracture, horizontal, rough, stepped, open to fracture zone below | | 101.0-103.5' - Same as 96.0-98.1' except very weak to weak (R1 to R2), the rock is gray where it is stronger, voids (up to 1/16") cover 10-25% of the surface, cavities (up to 1/4") and trace 3/4"-1" cavities with molds and casts, more voids in 103.2-103.5' | |
| | | | >10 | 100.1-100.7' - Fracture zone, with several large 3" subangular fragments and several 0 to 70 degree fractures | | | |
| | R8-HQ 5 ft 100% | 0 | >10 | 100.7' - Fracture, horizontal, rough, stepped, very weak (R1) rock and rounded core with faded color | | | |
| | | | >10 | 102.85' - Fracture, 60 deg, rough, undulating, healed | | 103.5-105.15' - light olive gray, (5Y 5/2), fine to very fine grained, moderate HCl reaction, medium strong to strong (R3 to R4), voids (up to 1/16") cover 10-15% of the surface, cavities (up to 1/4") cover 5% of the surface and frequency decreases with depth, rare larger cavities also decreasing with depth | |
| | | | | 103.45' - Fracture, 25 deg, rough, undulating, open | | | |
| 110 | | | | | | | |
| -89.1 | | | >10 | 103.65' - Fracture, horizontal, rough, stepped, very open | | | R8: 7 minutes |
| | 111.0 | | | 104.25' - Fracture, 10 deg, rough, stepped, very open fracture with some fragments | | | 100% circulation loss from 111.0-116.0' |
| | | | >10 | 105.15' - Fracture, 50 deg, rough, undulating, healed | | | |
| | | | >10 | 105.35-105.45' - Fracture zone, rough, planar | | 105.15-105.8' - Same as 101.0-103.5' except steep increase in voids, more brownish | |
| | | | | 106.3' - Fracture, 20 deg, rough, undulating, open | | | |
| | R9-HQ 5 ft 84% | 25 | 2 | 106.55' - Fracture, 20 deg, rough, undulating to stepped, very open fracture | | **No Recovery 105.8-106.0'** | |
| | | | 0 | 106.7-106.85' - Fracture zone, 30 deg and 60 deg, subrounded | | | |
| 115 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | IT-01 SHEET 7 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 ORIENTATION : Vertical

WATER LEVELS : 42.0 ft bgs on 6/28/07 START : 6/27/2007 END : 6/29/2007 LOGGER : J. Schaeffer, D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | R Q D (%) | FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (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, with fragmentation transition abruptly to different material | | **Limestone** 106.0-106.7' - moderate to dark yellowish brown, (10YR 5/4, 10YR 5/6), fine grained, moderate HCl reaction, medium strong (R3), voids (up to 1/16") cover 30% of the surface, 1" long elongated fossil molds and casts, slightly stronger where mottled as 105.15-105.8' 106.7-107.75' - light olive gray, (5Y 5/2), fine to very fine grained, mild to moderate HCl reaction, medium strong to strong (R3 to R4), voids (up to 1/16") cover 0-5% 107.75-109.85' - Same as 106.0-106.7' except extremely weak (R0), transitioning gradually from 108.5-109.5' as very weak rock (R1) with voids (up to 1/16") cover 20% of the surface, trace fine organics 109.85-111.0' - Same as 106.7-107.75' except increased voids to 10% and trace 1/4" cavities, trace organics, almost transition to rock similar to 105.15-105.8' 111.0-115.2' - moderate yellowish brown, (10YR 5/4, 10YR 6/6), fine grained, moderate HCl reaction, weak to very weak (R2 to R1), gradual transition throughout the core, voids (up to 1/16") cover 10-25% of the rock surface, trace 1/4" molds, molds (up to 1/2") over less than 2% of the surface, fewer voids and cavities where the rock strength is very weak (R1); 111.0-112.5', rock is weak (R2) and voids cover 15% of the surface with some cavities; 112.5-113.5', rock is very weak (R1) and voids cover 10% of the surface with few cavities; 113.5-115.2', rock is weak (R2), voids cover 25% of the surface, some cavities, ends with rock fragments that are sub-angular to sub-rounded **No Recovery 115.2-116.0'** **Limestone** 116.0-116.75' - dark yellowish orange to moderate yellowish brown, (10YR 6/6, 10YR 5/4), fine grained, 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 voids and cavities | R9: 4 minutes 100% circulation loss from 116.0-121.0' R10: 5 minutes 100% circulation loss from 121.0-126.0' SC-2 collected at 122.9-124.0' R11: 5 minutes Driller's Remark: Used 1200 gallons of water at hole; water 25.0' below ground surface before grouting at 6/29/07 at 14:00 |
| | 116.0 | | NR | | | | |
| | | | >10 | 106.95' - Fracture, 45 deg, rough, stepped, very fine steps | | | |
| | | | 0 | 107.15, 107.5' - Fracture (2), 80 deg, rough, undulating, stained 107.65' - Fracture, 10 deg and vertical, break, angular | | | |
| | R10-HQ 5 ft 100% | 63 | >10 | 107.75' - Fracture, 10 deg, rough, stepped, open, abrupt transition to material below | | | |
| | | | 2 | 107.75-108.75' - Fracture zone, horizontal and vertical, present significant 1/4" fragments | | | |
| 120 -99.1 | | | >10 | 108.75-109.85' - Fracture zone, angular fragments 109.85' - Fracture, vertical, rough, undulating, 10" long fracture | | | |
| | 121.0 | | | | | | |
| | | | 4 | 110.6-111.0' - Fracture, horizontal, rough, undulating, fracture zone, sub angular, 1-2" fragments to end of core | | | |
| | | | 0 | 111.0-111.95' - Fracture zone, vertical, 1-4" subangular fragments | | | |
| | R11-HQ 5 ft 98% | 63 | 0 | 111.95, 112.35' - Fracture, horizontal, rough, undulating, open to fracture zone at 112.35 112.9' - Fracture, horizontal, rough, planar | | | |
| | | | 3 | 113.5' - Fracture, 45 deg, rough, planar, fragmentation along plane, closely spaced fractures, tight to open | | | |
| 125 -104.1 | | | >10 | 113.9' - Fracture, 20 deg, rough, undulating, open 115.0-115.2' - Fracture zone, sand and sub angular fragments | | | |
| | 126.0 | | NR | 116.0-116.4' - Fracture zone, sub angular fragments, sand to 1" fragments 116.4' - Fracture, horizontal, rough, stepped, very open 116.85' - Fracture, 60 deg, smooth, undulating, tight 118.05' - Fracture, 60 deg, rough, undulating, similar to fracture above in size and orientation but followed at depth by crush 118.2-118.45' - Fracture zone, sand to 1" subangular fragments 118.45, 118.65' - Fractures (2), horizontal, rough, stepped, tight to open, fracture at 118.65 also splits off at 60 degree near one side 119.15' - Fracture, 10 deg, rough, planar, tight to healed 119.8' - Fracture, 15 deg, rough, undulating, tight 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 orthogonal fractures at same depth | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | IT-01 SHEET 8 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 ORIENTATION : Vertical

WATER LEVELS : 42.0 ft bgs on 6/28/07 START : 6/27/2007 END : 6/29/2007 LOGGER : J. Schaeffer, D. Thomas

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES | | | SYMBOLIC LOG | LITHOLOGY | COMMENTS |
|---|---|---|---|---|---|---|---|
| | | R Q D (%) | FRACTURES PER FOOT | DESCRIPTION<br>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. |
| | | | | 121.75' - Fracture, 50 deg, smooth, undulating, tight to healed fracture with some orientation as 121.5 fracture<br>124.05' - Fracture, 25 deg, rough, undulating, some fragmentation<br>124.55' - Fracture, 60 deg, rough, undulating, open fracture with a near horizontal fracture and fragmentation<br>125.45' - Fracture, horizontal, smooth, undulating, open<br>125.45-125.9' - Fracture zone, fracture zone with sub angular fragments 1/2-2" in size | | 118.65-120.3' - Same as 116.75-118.15' except weak to medium strong (R2 to R3)<br>**Limestone**<br>120.3-121.0' - Same as 116.0-116.75' except extremely weak to very weak (R0 to R1)<br>121.0-125.9' - moderate yellowish brown to dark yellowish orange, (10YR 5/4, 10YR 6/6), fine grained, moderate HCl 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,<br>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,<br>124.0-125.9' increasing weakness, very weak (R1) at bottom<br>**No Recovery 125.9-126.0'**<br>Bottom of Boring at 126.0 ft bgs on 6/29/2007 | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | IT-02 SHEET 1 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 ORIENTATION : Vertical

WATER LEVELS : 30.0 ft bgs on 7/2/2007 START : 7/1/2007 END : 7/2/2007 LOGGER : J. Schaeffer, C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 29.6 | 0.0 – 1.5 | 1.0 | SS-1 | 0-2-3 (5) | **Poorly Graded Sand With Silt To Silty Sand (SP-SM/ SM)** 0.0-1.0' - pale yellowish brown to moderate brown, (10YR 6/2 to 5YR 4/4), moist, loose, fine to medium grained, moderate HCl reaction in carbonate materials, mixed carbonate and silica grains, 10-20% nonplastic fines, trace roots | | SS-1 appears to be fill |
| 5 | 5.0 – 6.5 | 1.0 | SS-2 | 11-12-13 (25) | **Poorly Graded Sand With Silt (SP-SM)** 5.0-6.0' - pale brown with grayish brown, (5YR 5/2 with 5YR 3/2), moist to wet, medium dense, fine grained, no HCl reaction, silica sand, 5-10% nonplastic fines | | |
| 24.6 | | | | | | | |
| 10 | 10.0 – 11.5 | 0.7 | SS-3 | 4-7-11 (18) | **Poorly Graded Sand (SP)** 10.0-10.7' - light brownish gray grading to yellowish gray, (5YR 6/1 to 5Y 8/1), moist, medium dense, fine grained, no HCl reaction, silica sand, 5-10% nonplastic fines grading to <5% | | |
| 19.6 | | | | | | | |
| 15 | 15.0 – 16.5 | 0.7 | SS-4 | 6-7-6 (13) | **Poorly Graded Sand (SP)** 15.0-15.7' - Same as 10.0-10.7' except trace, nonplastic fines, trace fine organics | | |
| 14.6 | | | | | | | |
| 20 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | IT-02 SHEET 2 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 ORIENTATION : Vertical

WATER LEVELS : 30.0 ft bgs on 7/2/2007 START : 7/1/2007 END : 7/2/2007 LOGGER : J. Schaeffer, C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| 9.6 | 20.0 – 21.5 | 0.9 | SS-5 | 4-6-9 (15) | **Poorly Graded Sand (SP)** 20.0-20.9' - brownish gray, (5YR 4/1), moist to wet, medium dense, fine to medium grained, no HCl reaction, silica sand, 5% nonplastic fines | | SS-5 is coarser grained than previous samples |
| | | | | | Cuttings from bit above SS-6 are **Fat Clay (CH)** - greenish gray (5G 6/1), wet, high plasticity, no dilatancy, no HCl reaction | | Driller's Remark: Hard at 24.5' |
| 25 / 4.6 | 25.0 – 25.1 | 0.0 | SS-6 | 50/1" (50/1") | **No Recovery 25.0-25.1'** 25.0' - a few coarse grained limestone fragments, very mild HCl reaction | | Driller's Remark: 100% circulation loss at 26.0'; grinding to 26.0-26.5'; then softer drilling (still hard) |
| 30 / -0.4 | 30.0 – 31.5 | 0.9 | SS-7 | 15-31-61 (92) | **Limestone And Silty Sand (SM)** 30.0-31.5' - medium gray, light olive gray and yellowish gray, (N5, 5Y 6/1 and 5Y 8/1), wet, dense, strong HCl reaction, fine to medium sand-sized, 3" lense of limestone, silty sand lenses 1/4" thick, 30% low to medium plastic fines, few carbonate material | | Driller's Remark: 30.0-35.0' medium hard, no circulation |
| 35 / -5.4 | 35.0 – 35.2 | 0.0 | SS-8 | 50/2" (50/2") | **No Recovery 35.0-35.2'** | | Driller's Remark: Softer at 34.5' |
| 40 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | 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 ORIENTATION : Vertical

WATER LEVELS : 30.0 ft bgs on 7/2/2007 START : 7/1/2007 END : 7/2/2007 LOGGER : J. Schaeffer, C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -10.4 | 40.0 – 41.5 | 1.5 | SS-9 | 30-43-31 (74) | **Silty Sand (SM)** 40.0-41.5' - light olive gray, (5Y 5/2), wet, very dense, mild HCl reaction, very fine to medium sand-sized, all carbonate materials, 40-45% nonplastic fines, white thread-like lenses from 41.3-41.5', 1" limestone piece at 41.5', fossiliferous, mild HCl reaction | | Driller's Remark: No circulation at 40'.0 (below casing) |
| | | | | | | | Driller's Remark: Harder at 42.5'; still no circulation. HW casing to 40.0'. Unclear if circulation loss is into formation at depth below casing or along the sides of the casing. |
| 45 -15.4 | 45.0 – 45.3 | 0.0 | SS-10 | 50/3" (50/3") | **No Recovery 45.0-45.3'** 45.0' - a few limestone fragments and cuttings, light olive gray (5Y 5/2), highly fossiliferous, mild to moderate HCl reaction | | Driller's Remark: Circulation regained after casing set to 45.0' Driller's Remark: 45.0-50.0' not as hard as above |
| 50 -20.4 | 50.0 – 51.5 | 0.9 | SS-11 | 21-14-9 (23) | **Silty Sand (SM)** 50.0-50.9' - mottled light olive gray, (5Y 5/2), wet, dense, mild to strong HCl reaction, fine to medium sand-sized, predominantly fine, 15-30% nonplastic to low plasticity fines varies throughout sample in lenses, 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 matrix surrounding fragments, HCl reaction varies from mild in limestone lense (50.0-50.5') to moderate to strong in fragments (50.5-50.9') | | Driller's Remark: 50.0-55.0' drills hard and soft (alternates), feels like lenses SS-11 does not have massive a appearance |
| 55 -25.4 | 55.0 – 56.5 | 1.3 | SS-12 | 12-19-13 (32) | **Silty Sand With Limestone Fragments (SM)** 55.0-56.3' - yellowish gray to light olive gray, (5Y 7/2 to 5Y 5/2), wet, dense, fine to coarse grained, mild to moderate HCl reaction, similar to SS-11, all carbonate, 30-40% nonplastic fines, 2" limestone fragment at top of sample, highly fossiliferous | | |
| 60 | | | | | | | |

| PROJECT NUMBER: | BORING NUMBER: |
|---|---|
| 338884.FL | IT-02 SHEET 4 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 ORIENTATION : Vertical

WATER LEVELS : 30.0 ft bgs on 7/2/2007 START : 7/1/2007 END : 7/2/2007 LOGGER : J. Schaeffer, C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -30.4 | 60.0 – 61.5 | 1.1 | SS-13 | 24-8-7 (15) | **Limestone** 60.0-60.3' - mild HCl reaction, in 1/4" pieces, same as limestone fragment in SS-12 | | Finished drilling at 60.0' on 7/1/2007, HW casing to 45.0' Resume drilling at 7:30 7/2/2007 |
| | | | | | **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 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 | 65.0 | | | | | | |
| -35.4 | 66.5 | 1.0 | SS-14 | 24-55-48 (103) | **Silty Sand (SM)** 65.0-66.0' - mottled light olive gray to medium gray, (5Y 5/2 to N5), wet, very dense, predominantly fine to medium grained, mild to moderate HCl reaction, similar to above, all carbonate materials, 5-10% coarse sand, 20-40% fines (varies in lenses) | | SS-9 through SS-14: Darker gray colors more associated with coarser lenses |
| 70 | 70.0 | | | | | | |
| -40.4 | 71.5 | 1.1 | SS-15 | 18-27-31 (58) | **Silty Sand (SM)** 70.0-71.1' - pale to moderate yellowish brown with scattered medium gray lenses, (10Y 6/2 to 10YR 5/4 with N5), wet, very dense, fine to medium grained, mild to moderate HCl reaction, similar to above, 35% nonplastic fines | | Driller's Remark: Materials are not coreable (wash out of core barrel) SS-9 through SS-15 appear to be interbedded carbonate silts, sands with some gravels and limestone lenses are irregularly shaped and sized. |
| 75 | 75.0 | | | | | | |
| -45.4 | 75.1 | 0.0 | SS-16 | 50/1.5" (50/1.5") | **No Recovery 75.0-75.1'** | | Driller's Remark: Still in and out of harder and softer lenses |
| 80 | | | | | | | |

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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

DRILLING METHOD AND EQUIPMENT : CME 75 S/N 252437, mud rotary, auto hammer, NW rods, 4-7/8" tri-cone bit ORIENTATION : Vertical

WATER LEVELS : 30.0 ft bgs on 7/2/2007 START : 7/1/2007 END : 7/2/2007 LOGGER : J. Schaeffer, C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | SAMPLE INTERVAL (ft) | RECOVERY (ft) | #TYPE | STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N) | SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY | SYMBOLIC LOG | COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION |
|---|---|---|---|---|---|---|---|
| -50.4 | 80.0<br>80.9 | 0.8 | SS-17 | 41-50/5"<br>(91/11") | **Silty Sand With Limestone Fragments (SM)**<br>80.0-80.7' - moderate yellowish brown, (10YR 5/4), wet, very dense, fine to coarse grained, mild to moderate HCl reaction, similar to SS-15, 25-30% nonplastic fines, 15-20% fine gravel-sized limestone<br>**Mixed Materials**<br>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 | | SS-17: Lenses of limestone pieces throughout sample, much more than previous samples.<br>Driller's Remark: 80-85 still drilling hard and soft, material is likely to wash out of core barrel |
| 85<br>-55.4 | 85.0<br>86.5 | 1.1 | SS-18 | 5-8-9<br>(17) | **Sandy Clay With Silt (CL-ML)**<br>85.0-86.1' - moderate yellowish brown, (10YR 5/4), wet, stiff, nonplastic, rapid dilatancy, mild to moderate HCl reaction, 5-10% very fine to fine sand, all carbonate | | Driller's Remark: 100% water loss at 88.0'<br>Driller's Remark: Extremely soft at 88.5', possibly cavity |
| 90<br>-60.4 | 90.5<br>90.9 | 0.4 | SS-19 | 50/5"<br>(50/5") | **Silty Gravels (GM)**<br>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<br>Begin Rock Coring at 91.0 ft bgs<br>See the next sheet for the rock core log | | Driller's Remark: For SS-19 rods dropped to 90.5', SPT taken at 90.5', potential cavity from 88.5-90.5' |
| 95<br>-65.4 | | | | | | | |
| 100 | | | | | | | |

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# 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 ORIENTATION : Vertical

WATER LEVELS : 30.0 ft bgs on 7/2/2007 START : 7/1/2007 END : 7/2/2007 LOGGER : J. Schaeffer, C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | 91.0 | | >10 | 91.0-91.6' - Fracture zone, rough, undulating, numerous small fragments 3/16"-1-1/2" in size | | **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 | |
| | | | >10 | 91.9' - Mechanical break<br>92.1-92.6' - Fracture zone, rough, undulating, numerous small fragments 3/16"-1" in size | | | Driller's Remark: Water at 30.0' below ground surface before extending casing from 45.0-90.0' |
| | R1-HQ 5 ft 72% | 33 | NR | | | **No Recovery 92.6-94.0'** | Driller's Remark: Only about 25% return on circulation |
| | | | >10 | 94.0-94.5' - Fracture zone, 0-45 deg, rough, undulating, several fragments up to 9/16", film of organic material on some faces | | **Limestone** 94.0-96.0' - Same as 91.0-92.6' | Driller's Remark: Core barrel hung up, barrel was pulled out, cleaned and put back in to finish run |
| 95 -65.4 | | | 0 | 94.8-95.1' - Fracture zone, 0-90 deg, rough, undulating, fragments up to 2"<br>95.4, 95.5, 96.5' - Mechanical break (3) | | | R1: 14 minutes |
| | 96.0 | | | | | | |
| | | | 0 | | | 96.0-98.5' - Same as 91.0-92.6' except light olive gray, (5Y 5/2), strong (R4) rock at 97.7-97.8' | |
| | | | >10 | 97.0-98.6' - Fracture zone, 0-90 deg, rough, undulating, fragments from <3/8" - 3" | | | Driller's Remark: Loss of circulation at about 97.0' |
| | R2-HQ 5 ft 100% | 50 | >10 | | | | |
| | | | 2 | 98.8' - Mechanical break, brown and gray staining on surfaces | | **Limestone** 98.5-101.0' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl reaction, medium strong (R3), small voids (<1/16") over about 30% of surface, larger voids (3/16"x3/8") over about 5% of 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' | |
| 100 -70.4 | | | 0 | 99.6-99.8' - Fracture, horizontal on lower face, 30 deg on upper face, crushed rock material and fragments up to 1/2"<br>99.8-100.2' - Fracture, <5 deg | | | R2: 6 minutes |
| | 101.0 | | | | | | |
| | | | >10 | 100.8' - Mechanical break<br>101.0-102.1' - Fracture zone, numerous fragments, film of carbonate derived silt in fractures | | | |
| | | | 0 | | | **Limestone** 101.0-105.2' - moderate yellowish brown, (10YR 5/4), fine grained, moderate HCl 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 | |
| | R3-HQ 5 ft 84% | 57 | 1 | 103.1' - Mechanical break | | | SC-1 collected at 103.1-103.9' |
| | | | 0 | 103.9' - Fracture, horizontal, film of carbonate derived silt infill | | | |
| 105 -75.4 | | | 0 | 104.8' - Mechanical break | | | R3: 8 minutes |
| | 106.0 | | NR | | | **No Recovery 105.2-106.0'** | |
| | | | 2 | 106.5, 106.6' - Fractures, horizontal, rough, undulating, tight to open up to 1/16" | | **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 | |
| | | | >10 | 107.0-107.2' - Fracture zone, rough, undulating, numerous small fragments (3/16" to 9/16") | | | |
| | R4-HQ 5 ft 68% | 47 | 1 | 107.7-107.8' - Fracture zone, same as for 107.0-107.2' | | | |
| | | | >10 | 107.8-108.1' - Fracture, vertical, rough, undulating, tight | | 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" | |
| 110 -80.4 | | | >10 | 108.3-108.7' - Fracture, 70 deg, closed | | | |
| | | | NR | 109.0-109.4' - Fracture zone | | 108.1' - a large cavity measuring about 1-3/16"x2-3/8" | |
| | 111.0 | | | | | **No Recovery 109.4-111.0'** | |

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# 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 ORIENTATION : Vertical

WATER LEVELS : 30.0 ft bgs on 7/2/2007 START : 7/1/2007 END : 7/2/2007 LOGGER : J. Schaeffer, C. Dougherty

| DEPTH BELOW SURFACE AND ELEVATION (ft) | CORE RUN, LENGTH, AND RECOVERY (%) | DISCONTINUITIES: R Q D (%) | DISCONTINUITIES: FRACTURES PER FOOT | DISCONTINUITIES: DESCRIPTION (DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS) | SYMBOLIC LOG | LITHOLOGY (ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS) | COMMENTS (SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.) |
|---|---|---|---|---|---|---|---|
| | R5-HQ 5 ft 8% | 0 | >10<br>NR | 111.0-111.4' - Fracture zone, rough, undulating, numerous fragments 3/8" to 1-3/16" in size | | **Limestone**<br>111.0-111.4' - moderate olive brown, (5YR 4/4), fine to coarse grained gravel-sized grained, moderate HCl reaction, weak to medium strong (R2 to R3), very fossiliferous, voids (<1/16") over 30% of surface, larger voids (up to 3/16"-3/8") and fossil molds over 5% of surface<br>**No Recovery 111.4-116.0'** | R4-HQ: 6 minutes<br>Driller's Remark: Apparent cavity beginning at about 110.0', little resistance to drilling |
| 115<br>-85.4 | | | | | | | R5: 1 minute |
| 116.0 | R6-HQ 5 ft 20% | 13 | 2<br>NR | 116.0-116.2' - Fracture zone, rough, undulating, several small fragments (0.5-1.5")<br>116.6' - Fracture, horizontal for lower face, 50 deg for upper face, open, film of silty fine sand on lower face | | **Limestone**<br>116.0-117.0' - yellowish gray transitions to light olive gray by 116.3', (5Y 7/2 to 5Y 6/1), fine grained, mild to moderate HCl reaction, strong (R4), voids (<1/16") over 5% of surface, trace larger voids (up to 3/16")<br>**No Recovery 117.0-121.0'** | |
| 120<br>-90.4 | | | | | | | R6: 2 minutes |
| 121.0 | R7-HQ 5 ft 92% | 0 | 0<br>0<br>0<br>0<br>0 | 121' - Unconsolidated material. No fractures. | | **Poorly Graded Sand With Silt (SP)**<br>121.0-125.6' - light gray to light olive gray, (N7 to 5Y 6/1), wet/saturated, medium dense, fine grained, silica sand, about 10% fines (carbonate derived), well rounded grains, 124.4' - a 1" limestone fragment, 124.8' - fines increasing to about 50%, color change to olive gray (5Y 3/2)<br>**No Recovery 125.6-126.0'** | |
| 125<br>-95.4 | | | | | | | R7: 1 minute |
| 126.0 | | | NR | | | Bottom of Boring at 126.0 ft bgs on 7/2/2007 | |