MACTEC

BECHTEL NO.: 25352	MACTEC NO.: 6468-07-1777	COUNTY: Victoria, TX	GEOLOGIST: S. Woodham
SITE DESCRIPTION: Exelon Texas COL Project - Supplemental Investigation, Including UHS			GROUND WATER (ft)
BORING NO.: B-3288	DRILL METHOD: Mud Rotary	SAMPLE METHODS: SPT	0 HR. ND
GROUND SURFACE ELEV.: 80.2 ft (NAVD88)	NORTHING: 13,413,286 US ft (NAD83)	EASTING: 2,601,039 US ft (NAD83)	24 HR. ND
TOTAL DEPTH: 151.0 ft	DRILL MACHINE: CME 550 X	DRILLER: R. Landeros (MACTEC ATL)	HAMMER (ID): 140 lb. Auto (MEC 22)
DATE STARTED: 3/7/09	COMPLETED: 3/8/09	CASING DEPTH: N/A	BITS USED: 2 15/16" Roller Cone Bit

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-32.0					Continued from previous page				
									-34.8 / 115.0 FAT CLAY (CH), light gray (5Y 7/2) and brownish yellow (10YR 6/6), very stiff, moist, few fine grained sand, no HCl reaction on clay, little calcium carbonate nodules, strong HCl reaction on calcium carbonate nodules
-39.6	119.8	9	12	11	23	SS-25			
-49.3	129.5	5	8	12	20	SS-26			129.5 ft: strong HCl reaction, calcium carbonate nodules not observed
									-54.8 / 135.0 POORLY GRADED SAND (SP), very pale brown (10YR 7/4), very dense, wet, fine to medium grained, trace fines, strong HCl reaction
-59.3	139.5	16	28	33	61	SS-27			
									-65.8 / 146.0 SANDY FAT CLAY (CH), light gray (2.5Y 7/2), very stiff, moist, some fine grained sand, no HCl reaction on clay, few calcium carbonate nodules, strong HCl reaction on calcium carbonate nodules
-69.3	149.5	5	9	18	27	SS-28			-70.8 / 151.0 Boring Terminated at Elevation -70.8 ft

EXELON COL BORE VICTORIA PHASE III.GPJ EXELON COL.GDT 10/20/09

MACTEC

GEOTECHNICAL BORING LOG

Prepared By WBD Date 8-10-09

Checked By KAW Date 8-10-09

SHEET 1 OF 3

BECHTEL NO.: 25352	MACTEC NO.: 6468-07-1777	COUNTY: Victoria, TX	GEOLOGIST: R. Clark
SITE DESCRIPTION: Exelon Texas COL Project - Supplemental Investigation, Including UHS			GROUND WATER (ft)
BORING NO.: B-3289	DRILL METHOD: Mud Rotary	SAMPLE METHODS: SPT	0 HR. ND
GROUND SURFACE ELEV.: 80.4 ft (NAVD88)	NORTHING: 13,413,160 US ft (NAD83)	EASTING: 2,600,933 US ft (NAD83)	24 HR. ND
TOTAL DEPTH: 150.0 ft	DRILL MACHINE: CME 45 C Track	DRILLER: D. Rhodes (MACTEC RAL)	HAMMER (ID): 140 lb. Auto (MEC 12)
DATE STARTED: 3/6/09	COMPLETED: 3/7/09	CASING DEPTH: 10.0 ft	BITS USED: 2 7/8" Drag Bit

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT (0 20 40 60 80 100)	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
80.4					Ground Surface				
80.4	0.0	4	5	4	9	SS-1			FAT CLAY with sand (CH), dark grayish brown (10YR 4/2), stiff, dry, few fine grained sand, no HCl reaction, few organics
76.7	3.7								76.7 — 3.7
74.8	5.6	2	3	2	5	SS-2			FAT CLAY (CH), light gray (2.5Y 7/2), firm, moist, few fine grained sand, weak HCl reaction, trace organics
72.0	8.4	3	4	7	11	SS-3			5.6 ft: stiff, trace calcium carbonate nodules
69.4	11.0	3	6	9	15	SS-4			8.4 ft: brownish yellow (10YR 6/6) mottled light gray (2.5Y 7/2)
66.9	13.5	4	6	10	16	SS-5			11.0 ft: very stiff
61.9	18.5	5	8	11	19	SS-6			
56.9	23.5	4	5	7	12	SS-7			18.5 ft: stiff, no calcium carbonate nodules observed
51.9	28.5	3	4	5	9	SS-8			23.5 ft: trace calcium carbonate nodules
46.9	33.5	4	7	11	18	SS-9			51.9 — 28.5 SANDY FAT CLAY (CH), pale yellow (2.5Y 7/3), very stiff, moist, some fine grained sand, weak HCl reaction, trace calcium carbonate nodules, trace ferrous staining
41.9	38.5	11	15	18	33	SS-10			33.5 ft: hard, no HCl reaction, no calcium carbonate nodules observed
36.9	43.5	5	7	12	19	SS-11			41.9 — 38.5 FAT CLAY with sand (CH), pale yellow (2.5Y 7/3) mottled brownish yellow (10YR 6/6), very stiff, moist, little fine grained sand, weak HCl reaction, trace calcium carbonate nodules, trace organics, ferrous staining
31.9	48.5	7	11	11	22	SS-12			43.5 ft: no calcium carbonate nodules observed
26.9	53.5	8	10	14	24	SS-13			31.9 — 48.5 SANDY FAT CLAY (CH), pale yellow (2.5Y 7/3), very stiff, moist, some fine grained sand, weak HCl reaction, trace calcium carbonate nodules 30.4 — 50.0 CLAYEY SAND (SC), pale yellow (2.5Y 7/3), dense, moist, fine grained, some fines, weak HCl reaction
		9	18	27	45	SS-14			

EXELON COL BORE VICTORIA PHASE III.GPJ EXELON COL.GDT 8/10/09

MACTEC

BECHTEL NO.: 25352	MACTEC NO.: 6468-07-1777	COUNTY: Victoria, TX	GEOLOGIST: R. Clark
SITE DESCRIPTION: Exelon Texas COL Project - Supplemental Investigation, Including UHS			GROUND WATER (ft)
BORING NO.: B-3289	DRILL METHOD: Mud Rotary	SAMPLE METHODS: SPT	0 HR. ND
GROUND SURFACE ELEV.: 80.4 ft (NAVD88)	NORTHING: 13,413,160 US ft (NAD83)	EASTING: 2,600,933 US ft (NAD83)	24 HR. ND
TOTAL DEPTH: 150.0 ft	DRILL MACHINE: CME 45 C Track	DRILLER: D. Rhodes (MACTEC RAL)	HAMMER (ID): 140 lb. Auto (MEC 12)
DATE STARTED: 3/6/09	COMPLETED: 3/7/09	CASING DEPTH: 10.0 ft	BITS USED: 2 7/8" Drag Bit

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT (0 20 40 60 80 100)	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
24.3					Continued from previous page				
21.9	58.5								CLAYEY SAND (SC), pale yellow (2.5Y 7/3), dense, moist, fine grained, some fines, weak HCl reaction *(continued)*
		27	31	42	73	SS-15			21.9 — 58.5 SILTY SAND (SM), pale yellow (2.5Y 7/3), very dense, wet, fine grained, little fines, weak HCl reaction
16.9	63.5								18.4 — 62.0 FAT CLAY with sand (CH), pale yellow (2.5Y 7/3), very stiff, moist, little fine grained sand, weak HCl reaction, trace calcium carbonate nodules
		5	7	11	18	SS-16			
11.9	68.5								11.9 — 68.5 FAT CLAY (CH), pale brown (10YR 6/3), stiff, moist, few fine grained sand, weak HCl reaction, trace calcium carbonate nodules
		4	6	8	14	SS-17			
6.9	73.5								73.5 ft: light brownish gray (10YR 6/2) mottled brownish yellow (10YR 6/6), very stiff
		7	7	11	18	SS-18			
1.9	78.5								1.9 — 78.5 FAT CLAY with sand (CH), pale yellow (2.5Y 7/3), very stiff, moist, little fine grained sand, weak HCl reaction
		6	8	12	20	SS-19			
-3.1	83.5								-3.1 — 83.5 SILTY SAND (SM), light gray (10YR 7/2), very firm, wet, fine grained, little fines, no to weak HCl reaction 85.0 ft: bit chatter
		8	9	13	22	SS-20			
-8.1	88.5								-8.1 — 88.5 SANDY FAT CLAY (CH), pale yellow (2.5Y 7/3), hard, moist, some fine grained sand, weak HCl reaction, trace calcium carbonate nodules
		10	16	23	39	SS-21			
-13.1	93.5								-11.6 — 92.0 ft: bit chatter 92.0 — SILTY SAND (SM), pale brown (2.5Y 7/3), very dense, wet, fine grained, little fines, weak to strong HCl reaction, few calcium carbonate nodules and caliche 94.8 - 95.5 ft: bit chatter
		17	46	50/0.2	96/0.2	SS-22			
-18.1	98.5								98.5 ft: light yellowish brown (2.5Y 6/3), weak HCl reaction, calcium carbonate nodules and caliche not observed
		38	33	49	82	SS-23			
-28.1	108.5								108.5 ft: pale yellow (2.5Y 7/3), fine to coarse grained, subangular
		30	46	48	94	SS-24			

EXELON COL BORE VICTORIA PHASE III.GPJ EXELON COL.GDT 8/10/09

MACTEC

BECHTEL NO.: 25352	MACTEC NO.: 6468-07-1777	COUNTY: Victoria, TX	GEOLOGIST: R. Clark
SITE DESCRIPTION: Exelon Texas COL Project - Supplemental Investigation, Including UHS			GROUND WATER (ft)
BORING NO.: B-3289	DRILL METHOD: Mud Rotary	SAMPLE METHODS: SPT	0 HR. ND
GROUND SURFACE ELEV.: 80.4 ft (NAVD88)	NORTHING: 13,413,160 US ft (NAD83)	EASTING: 2,600,933 US ft (NAD83)	24 HR. ND
TOTAL DEPTH: 150.0 ft	DRILL MACHINE: CME 45 C Track	DRILLER: D. Rhodes (MACTEC RAL)	HAMMER (ID): 140 lb. Auto (MEC 12)
DATE STARTED: 3/6/09	COMPLETED: 3/7/09	CASING DEPTH: 10.0 ft	BITS USED: 2 7/8" Drag Bit

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT (0 20 40 60 80 100)	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-31.8					Continued from previous page				
									112.0 ft: bit chatter SILTY SAND (SM), pale brown (2.5Y 7/3), very dense, wet, fine grained, little fines, weak to strong HCl reaction, few calcium carbonate nodules and caliche *(continued)*
-35.6									116.0
									FAT CLAY (CH), light gray (2.5Y 7/2), stiff, moist, few fine grained sand, trace calcium carbonate nodules, trace ferrous staining
-38.1	118.5	5	5	10	15	SS-25			
-48.1	128.5	7	9	11	20	SS-26			128.5 ft: pale yellow (2.5Y 7/3) mottled brownish yellow (10YR 6/6), very stiff, weak HCl reaction
-54.6									135.0 ft: bit chatter SILTY SAND (SM), pale yellow (2.5Y 7/3), very dense, wet, fine to coarse grained, little fines, weak HCl reaction
									135.0
-58.1	138.5	6	21	30	51	SS-27			
-60.6									141.0
									FAT CLAY (CH), pale yellow (2.5Y 7/3), stiff, moist, few fine grained sand, weak HCl reaction, trace calcium carbonate nodules
-68.1	148.5	5	7	8	15	SS-28			
-69.6									150.0
									Boring Terminated at Elevation -69.6 ft

EXELON COL BORE VICTORIA PHASE III.GPJ EXELON COL.GDT 8/10/09

MACTEC

GEOTECHNICAL BORING LOG

Prepared By PAC Date 8/10/09

Checked By KAW Date 8-10-09

SHEET 1 OF 6

BECHTEL NO.: 25352	MACTEC NO.: 6468-07-1777	COUNTY: Victoria, TX	GEOLOGIST: B. Mabie
SITE DESCRIPTION: Exelon Texas COL Project - Supplemental Investigation, Including UHS			GROUND WATER (ft)
BORING NO.: B-3290	DRILL METHOD: Mud Rotary	SAMPLE METHODS: SPT	0 HR. ND
GROUND SURFACE ELEV.: 80.5 ft (NAVD88)	NORTHING: 13,413,567 US ft (NAD83)	EASTING: 2,601,256 US ft (NAD83)	24 HR. ND
TOTAL DEPTH: 300.0 ft	DRILL MACHINE: CME 550	DRILLER: L. Carter (MACTEC ATL)	HAMMER (ID): 140 lb. Auto (CME-08)
DATE STARTED: 2/21/09	COMPLETED: 2/24/09	CASING DEPTH: 5.0 ft	BITS USED: 4" Drag Bit

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT (0 20 40 60 80 100)	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
80.5					Ground Surface				80.5 / 0.0
80.5	0.0	2	3	3	6	SS-1			CLAYEY SAND (SC), black (10YR 2/1), loose, moist, fine grained, little fines, no HCl reaction, organics, roots and grass
77.0	3.5	8	11	14	25	SS-2			77.0 / 3.5 FAT CLAY with sand (CH), grayish brown (10YR 5/2), very stiff, moist, little fine grained sand, strong HCl reaction, calcium carbonate nodules, black staining
74.5	6.0	8	10	10	20	SS-3			74.5 / 6.0 FAT CLAY (CH), grayish brown (10YR 5/2), very stiff, moist, few fine grained sand, strong HCl reaction, calcium carbonate nodules, black and orange staining
72.0	8.5	12	15	15	30	SS-4			72.0 / 8.5 CLAYEY SAND (SC), light yellowish brown (10YR 6/4), very firm, moist, fine grained, little fines, strong HCl reaction, calcium carbonate nodules, black and orange staining
69.5	11.0	8	10	11	21	SS-5			69.5 / 11.0 FAT CLAY (CH), light gray (10YR 7/2) mottled reddish yellow (7.5YR 6/6), very stiff, moist, strong HCl reaction, calcium carbonate nodules, black and orange staining
67.0	13.5	5	6	8	14	SS-6			13.5 ft: stiff, caliche
62.0	18.5	7	9	12	21	SS-7			18.5 ft: very stiff, few fine grained sand, caliche not observed
57.0	23.5	4	6	7	13	SS-8			23.5 ft: stiff, weak HCl reaction
52.0	28.5	5	6	10	16	SS-9			28.5 ft: very stiff, trace calcium carbonate nodules
47.0	33.5	8	7	10	17	SS-10			
42.0	38.5	5	6	13	19	SS-11			38.5 ft: no calcium carbonate nodules observed
37.0	43.5	10	14	13	27	SS-12			37.0 / 43.5 POORLY GRADED SAND with clay (SP-SC), light gray (10YR 7/2), reddish yellow (7.5YR 6/6), very firm, moist, fine to medium grained, few fines, weak HCl reaction, orange staining
32.0	48.5	10	16	16	32	SS-13			48.5 ft: very pale brown (10YR 7/3), dense, wet, fine grained, no HCl reaction
27.0	53.5	13	16	22	38	SS-14			27.0 / 53.5 SILTY SAND (SM), yellow (10YR 7/6), dense, wet, fine grained, little fines, weak HCl reaction, orange staining

EXELON COL BORE VICTORIA PHASE III.GPJ EXELON COL.GDT 8/10/09

MACTEC

BECHTEL NO.: 25352	MACTEC NO.: 6468-07-1777	COUNTY: Victoria, TX	GEOLOGIST: B. Mabie
SITE DESCRIPTION: Exelon Texas COL Project - Supplemental Investigation, Including UHS			GROUND WATER (ft)
BORING NO.: B-3290	DRILL METHOD: Mud Rotary	SAMPLE METHODS: SPT	0 HR. ND
GROUND SURFACE ELEV.: 80.5 ft (NAVD88)	NORTHING: 13,413,567 US ft (NAD83)	EASTING: 2,601,256 US ft (NAD83)	24 HR. ND
TOTAL DEPTH: 300.0 ft	DRILL MACHINE: CME 550	DRILLER: L. Carter (MACTEC ATL)	HAMMER (ID): 140 lb. Auto (CME-08)
DATE STARTED: 2/21/09	COMPLETED: 2/24/09	CASING DEPTH: 5.0 ft	BITS USED: 4" Drag Bit

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT (0 20 40 60 80 100)	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
24.4					Continued from previous page				
22.0	58.5								SILTY SAND (SM), yellow (10YR 7/6), dense, wet, fine grained, little fines, weak HCl reaction, orange staining *(continued)*
		21	27	41	68	SS-15			CLAYEY SAND (SC), very pale brown (10YR 7/3), very dense, wet, fine grained, little fines, weak HCl reaction, orange staining
17.0	63.5								22.0 — 58.5
		7	10	10	20	SS-16			FAT CLAY (CH), light gray (10YR 7/2), very stiff, moist, few fine grained sand, weak HCl reaction, trace calcium carbonate nodules, black and orange staining
12.0	68.5								17.0 — 63.5
		6	8	11	19	SS-17			68.5 ft: gray (10YR 5/1), strong HCl reaction
7.0	73.5								
		7	11	14	25	SS-18			73.5 ft: light gray (10YR 7/2), some calcium carbonate nodules
2.0	78.5								
		7	7	10	17	SS-19			78.5 ft: very pale brown (10YR 7/3)
-3.0	83.5								-3.0 — 83.5
		16	22	25	47	SS-20			POORLY GRADED SAND (SP), very pale brown (10YR 7/3), dense, wet, fine to medium grained, no HCl reaction
-8.0	88.5								-8.0 — 88.5
		7	10	12	22	SS-21			FAT CLAY (CH), light gray (10YR 7/2) and reddish yellow (7.5Y 6/6), very stiff, moist, strong HCl reaction, carbonate nodules, trace black staining
-13.0	93.5								-13.0 — 93.5
		15	20	25	45	SS-22			POORLY GRADED SAND (SP), very pale brown (10YR 7/3), dense, wet, fine to medium grained, no HCl reaction
-18.0	98.5								-18.0 — 98.5
		18	34	36	70	SS-23			CLAYEY SAND (SC), light gray (10YR 7/2), very dense, moist, fine grained, some fines, strong HCl reaction, calcium carbonate nodules, black and orange staining
-28.0	108.5								-28.0 — 108.5
		48	50/0.4		98/0.9	SS-24			POORLY GRADED SAND (SP), very pale brown (10YR 7/3), very dense, wet, fine to coarse grained, weak HCl reaction, calcium carbonate nodules

EXELON COL BORE VICTORIA PHASE III.GPJ EXELON COL.GDT 8/10/09

MACTEC

BECHTEL NO.: 25352	MACTEC NO.: 6468-07-1777	COUNTY: Victoria, TX	GEOLOGIST: B. Mabie
SITE DESCRIPTION: Exelon Texas COL Project - Supplemental Investigation, Including UHS			GROUND WATER (ft)
BORING NO.: B-3290	DRILL METHOD: Mud Rotary	SAMPLE METHODS: SPT	0 HR. ND
GROUND SURFACE ELEV.: 80.5 ft (NAVD88)	NORTHING: 13,413,567 US ft (NAD83)	EASTING: 2,601,256 US ft (NAD83)	24 HR. ND
TOTAL DEPTH: 300.0 ft	DRILL MACHINE: CME 550	DRILLER: L. Carter (MACTEC ATL)	HAMMER (ID): 140 lb. Auto (CME-08)
DATE STARTED: 2/21/09	COMPLETED: 2/24/09	CASING DEPTH: 5.0 ft	BITS USED: 4" Drag Bit

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT (0 20 40 60 80 100)	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-31.7					Continued from previous page				
									POORLY GRADED SAND (SP), very pale brown (10YR 7/3), very dense, wet, fine to coarse grained, weak HCl reaction, calcium carbonate nodules *(continued)*
-38.0	118.5								-38.0 — 118.5
		7	9	16	25	SS-25			FAT CLAY (CH), light gray (10YR 7/2), very stiff, moist, weak HCl reaction, calcium carbonate nodules, caliche, black and orange staining
-48.0	128.5								
		7	11	16	27	SS-26			128.5 ft: caliche not observed
-58.0	138.5								-58.0 — 138.5
		8	46	43	89	SS-27A/B			-59.2 — 139.7 SANDY FAT CLAY (CH), light gray (10YR 7/2), hard, moist, some fine grained sand, strong HCl reaction, calcium carbonate nodules, orange and black staining
									POORLY GRADED SAND (SP), very dense, moist, fine to medium grained, no HCl reaction, trace orange staining
-68.0	148.5								-68.0 — 148.5
		8	10	13	23	SS-28			FAT CLAY (CH), light gray (10YR 7/2) mottled reddish yellow (7.5YR 6/6), very stiff, moist, weak HCl reaction, trace calcium carbonate fragments, black staining
-78.0	158.5								-78.0 — 158.5
		6	6	12	18	SS-29			CLAYEY SAND (SC), very pale brown (10YR 7/3), firm, wet, fine grained, little fines, weak HCl reaction, trace calcium carbonate nodules, trace orange staining

EXELON COL BORE VICTORIA PHASE III.GPJ EXELON COL.GDT 8/10/09

MACTEC

BECHTEL NO.: 25352	MACTEC NO.: 6468-07-1777	COUNTY: Victoria, TX	GEOLOGIST: B. Mabie
SITE DESCRIPTION: Exelon Texas COL Project - Supplemental Investigation, Including UHS			GROUND WATER (ft)
BORING NO.: B-3290	DRILL METHOD: Mud Rotary	SAMPLE METHODS: SPT	0 HR. ND
GROUND SURFACE ELEV.: 80.5 ft (NAVD88)	NORTHING: 13,413,567 US ft (NAD83)	EASTING: 2,601,256 US ft (NAD83)	24 HR. ND
TOTAL DEPTH: 300.0 ft	DRILL MACHINE: CME 550	DRILLER: L. Carter (MACTEC ATL)	HAMMER (ID): 140 lb. Auto (CME-08)
DATE STARTED: 2/21/09	COMPLETED: 2/24/09	CASING DEPTH: 5.0 ft	BITS USED: 4" Drag Bit

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT (0 20 40 60 80 100)	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-87.8					Continued from previous page				
-88.0	168.5	23	33	58	91	SS-30			POORLY GRADED SAND (SP), very pale brown (10YR 7/3), very dense, wet, fine to coarse grained, few gravel, weak HCl reaction, calcium carbonate nodules, orange staining
-98.0	178.5	25	36	36	72	SS-31			
-108.0	188.5	37	52	54/0.5	106/1.0	SS-32			SILTY SAND (SM), very pale brown (10YR 7/3), very dense, wet, fine grained, little fines, strong HCl reaction, trace orange staining
-118.0	198.5	70/0.1			70/0.1	SS-33			POORLY GRADED SAND (SP), white (10YR 8/1), very dense, moist, fine to medium grained, few cemented zones, strong HCl reaction
-128.0	208.5	19	21	35	56	SS-34			208.5 ft: yellow (10YR 7/8), wet, weak HCl reaction, calcium carbonate nodules
-138.0	218.5	31	34	52	86	SS-35			218.5 ft: light gray (10YR 7/1), no HCl reaction, no calcium carbonate nodules observed

EXELON COL BORE VICTORIA PHASE III.GPJ EXELON COL.GDT 8/10/09

MACTEC

BECHTEL NO.: 25352	MACTEC NO.: 6468-07-1777	COUNTY: Victoria, TX	GEOLOGIST: B. Mabie
SITE DESCRIPTION: Exelon Texas COL Project - Supplemental Investigation, Including UHS			GROUND WATER (ft)
BORING NO.: B-3290	DRILL METHOD: Mud Rotary	SAMPLE METHODS: SPT	0 HR. ND
GROUND SURFACE ELEV.: 80.5 ft (NAVD88)	NORTHING: 13,413,567 US ft (NAD83)	EASTING: 2,601,256 US ft (NAD83)	24 HR. ND
TOTAL DEPTH: 300.0 ft	DRILL MACHINE: CME 550	DRILLER: L. Carter (MACTEC ATL)	HAMMER (ID): 140 lb. Auto (CME-08)
DATE STARTED: 2/21/09	COMPLETED: 2/24/09	CASING DEPTH: 5.0 ft	BITS USED: 4" Drag Bit

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT (0 20 40 60 80 100)	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-143.9					Continued from previous page				
									POORLY GRADED SAND (SP), white (10YR 8/1), very dense, moist, fine to medium grained, few cemented zones, strong HCl reaction *(continued)*
-148.0	228.5								-148.0 — 228.5
		8	12	50/0.4	62/0.9	SS-36			FAT CLAY (CH), light gray (10YR 7/2), hard, moist, strong HCl reaction, little calcium carbonate nodules, orange and black staining
									-151.5 — 232.0 to 234.0 ft: hard drilling, bit chatter — 232.0
									POORLY GRADED SAND (SP), very pale brown (10YR 7/3), very dense, wet, fine grained, strong HCl reaction, trace calcium carbonate nodules
-158.0	238.5								
		28	50/0.3		78/0.8	SS-37			
-168.0	248.5								
		20	41	47	65	SS-38			-168.7 — 248.5 ft: fine to coarse grained, calcium carbonate nodules — 249.2
									CLAYEY SAND (SC), very pale brown (10YR 7/3), very dense, wet, fine grained, some fines, strong HCl reaction, calcium carbonate nodules, orange staining
-178.0	258.5								-178.0 — 258.5
		10	12	19	31	SS-39			FAT CLAY with sand (CH), light gray (10YR 7/2), hard, moist, little fine grained sand, strong HCl reaction, calcium carbonate nodules, orange staining
-188.0	268.5								-188.0 — 268.5
		14	23	30	53	SS-40			POORLY GRADED SAND (SP), very pale brown (10YR 7/3), very dense, wet, fine to medium grained, no HCl reaction, trace orange staining
-198.0	278.5								
		34	48	56/0.5	104/1.0	SS-41			

EXELON COL BORE VICTORIA PHASE III.GPJ EXELON COL.GDT 8/10/09

MACTEC

BECHTEL NO.: 25352	MACTEC NO.: 6468-07-1777	COUNTY: Victoria, TX	GEOLOGIST: B. Mabie
SITE DESCRIPTION: Exelon Texas COL Project - Supplemental Investigation, Including UHS			GROUND WATER (ft)
BORING NO.: B-3290	DRILL METHOD: Mud Rotary	SAMPLE METHODS: SPT	0 HR. ND
GROUND SURFACE ELEV.: 80.5 ft (NAVD88)	NORTHING: 13,413,567 US ft (NAD83)	EASTING: 2,601,256 US ft (NAD83)	24 HR. ND
TOTAL DEPTH: 300.0 ft	DRILL MACHINE: CME 550	DRILLER: L. Carter (MACTEC ATL)	HAMMER (ID): 140 lb. Auto (CME-08)
DATE STARTED: 2/21/09	COMPLETED: 2/24/09	CASING DEPTH: 5.0 ft	BITS USED: 4" Drag Bit

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-200.0					Continued from previous page				
									POORLY GRADED SAND (SP), very pale brown (10YR 7/3), very dense, wet, fine to medium grained, no HCl reaction, trace orange staining *(continued)*
-208.0	288.5								
		15	26	30	56	SS-42			288.5 ft: light gray (10YR 7/2), weak HCl reaction
-218.0	298.5								-218.0 298.5
		11	16	23	39	SS-43			FAT CLAY (CH), light gray (10YR7/2), hard, moist, few fine grained sand, strong HCl reaction, calcium carbonate nodules, black and orange staining
									-219.5 300.0
									Boring Terminated at Elevation -219.5 ft

EXELON COL BORE VICTORIA PHASE III.GPJ EXELON COL.GDT 8/10/09

MACTEC

GEOTECHNICAL BORING LOG

Prepared By PAK Date 8/10/09

Checked By KAW Date 8-10-09

SHEET 1 OF 3

BECHTEL NO.: 25352	MACTEC NO.: 6468-07-1777	COUNTY: Victoria, TX	GEOLOGIST: R. Harwell
SITE DESCRIPTION: Exelon Texas COL Project - Supplemental Investigation, Including UHS			GROUND WATER (ft)
BORING NO.: B-3291	DRILL METHOD: Mud Rotary	SAMPLE METHODS: SPT	0 HR. ND
GROUND SURFACE ELEV.: 80.2 ft (NAVD88)	NORTHING: 13,412,951 US ft (NAD83)	EASTING: 2,600,556 US ft (NAD83)	24 HR. ND
TOTAL DEPTH: 150.1 ft	DRILL MACHINE: CME 55 Track	DRILLER: T. Hahn (MACTEC RAL)	HAMMER (ID): 140 lb. Auto (MEC 21)
DATE STARTED: 3/7/09	COMPLETED: 3/9/09	CASING DEPTH: 15.0 ft	BITS USED: 3" Drag Bit

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT (0 20 40 60 80 100)	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
80.2					Ground Surface				80.2 / 0.0
80.2	0.0	2	3	4	7	SS-1			LEAN CLAY (CL), black (2.5Y 2.5/1), firm, dry, few fine grained sand, weak HCl reaction on clay, trace roots
76.6	3.6	2	8	9	17	SS-2			3.6 ft: grayish brown (2.5Y 5/2), very stiff, moist, few calcium carbonate nodules, strong HCl reaction
73.8	6.4	2	9	10	19	SS-3			73.8 / 6.4 FAT CLAY (CH), light yellowish brown (2.5Y 6/3), very stiff, moist, few fine grained sand, weak HCl reaction, trace calcium carbonate nodules
71.5	8.7	2	7	8	15	SS-4			71.5 / 8.7 LEAN CLAY (CL), light gray (2.5Y 7/2) mottled olive yellow (2.5Y 6/8), stiff, moist, few fine grained sand, weak HCl reaction on clay, few calcium carbonate nodules, strong HCl reaction on calcium carbonate nodules
68.7	11.5	6	6	6	12	SS-5			11.5 ft: mottled brownish yellow (10YR 6/6), trace fine grained sand
66.4	13.8	3	3	5	8	SS-6			13.8 ft: firm, black staining, weak HCl reaction, calcium carbonate nodules not observed
61.5	18.7	2	3	4	7	SS-7			18.7 ft: mottled pale yellow (2.5Y 8/2)
56.5	23.7	2	4	9	13	SS-8			23.7 ft: stiff
51.5	28.7	10	13	18	31	SS-9			51.5 / 28.7 SILTY SAND (SM), pale yellow (2.5Y 8/2), dense, moist, fine grained, some fines, no HCl reaction
46.5	33.7	11	8	9	17	SS-10			46.5 / 33.7 SANDY FAT CLAY (CH), pale yellow (2.5Y 8/2), very stiff, moist, some fine grained sand, weak HCl reaction
41.5	38.7	6	7	10	17	SS-11			41.5 / 38.7 FAT CLAY (CH), brownish yellow (10YR 6/8) mottled pale yellow (2.5Y 8/2), very stiff, moist, trace fine grained sand, weak HCl reaction, black staining
36.5	43.7	5	5	8	13	SS-12			43.7 ft: stiff
31.6	48.6	4	4	7	11	SS-13			
26.6	53.6	3	5	9	14	SS-14			53.6 ft: reddish yellow (7.5YR 6/6) mottled light gray (2.5Y 7/2)

EXELON COL BORE VICTORIA PHASE III.GPJ EXELON COL.GDT 8/10/09

MACTEC

BECHTEL NO.: 25352	MACTEC NO.: 6468-07-1777	COUNTY: Victoria, TX	GEOLOGIST: R. Harwell
SITE DESCRIPTION: Exelon Texas COL Project - Supplemental Investigation, Including UHS			GROUND WATER (ft)
BORING NO.: B-3291	DRILL METHOD: Mud Rotary	SAMPLE METHODS: SPT	0 HR. ND
GROUND SURFACE ELEV.: 80.2 ft (NAVD88)	NORTHING: 13,412,951 US ft (NAD83)	EASTING: 2,600,556 US ft (NAD83)	24 HR. ND
TOTAL DEPTH: 150.1 ft	DRILL MACHINE: CME 55 Track	DRILLER: T. Hahn (MACTEC RAL)	HAMMER (ID): 140 lb. Auto (MEC 21)
DATE STARTED: 3/7/09	COMPLETED: 3/9/09	CASING DEPTH: 15.0 ft	BITS USED: 3" Drag Bit

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT (0 20 40 60 80 100)	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
24.1					Continued from previous page				
21.6	58.6								FAT CLAY (CH), brownish yellow (10YR 6/8) mottled pale yellow (2.5Y 8/2), very stiff, moist, trace fine grained sand, weak HCl reaction, black staining *(continued)* 58.6 ft: light gray (2.5Y 7/2), few fine grained sand, no HCl reaction
		3	5	9	14	SS-15			
16.6	63.6								63.6 ft: very stiff
		4	6	11	17	SS-16			
11.6	68.6								68.6 ft: light brownish gray (2.5Y 6/2), stiff, trace fine grained sand, weak HCl reaction on clay, trace calcium carbonate nodules, strong HCl reaction on calcium carbonate nodules
		3	4	5	9	SS-17			
6.6	73.6								73.6 ft: pale yellow (2.5Y 7/3)
		3	5	8	13	SS-18			
1.6	78.6								78.6 ft: light gray (2.5Y 7/2), few fine grained sand, no HCl reaction, calcium carbonate nodules not observed, black staining
		4	6	7	13	SS-19			
-3.4	83.6								-3.4 — 83.6 FAT CLAY with sand (CH), light gray (5Y 7/2), firm, moist, little fine grained sand, weak HCl reaction
		3	4	4	8	SS-20			
-8.4	88.6								-8.4 — 88.6 FAT CLAY (CH), pale yellow (2.5Y 8/2), very stiff, moist, few fine grained sand, weak HCl reaction on clay, few calcium carbonate nodules, strong HCl reaction on calcium carbonate nodules
		4	8	8	16	SS-21			
-13.4	93.6								-13.4 — 93.6 POORLY GRADED SAND (SP), pale yellow (2.5Y 8/2), very dense, wet, fine grained, trace fines, weak HCl reaction
		12	23	34	57	SS-22			
-18.4	98.6								-18.6 — 98.6 ft: yellow (2.5Y 7/6), dense — 98.8
		26	19	21	40	SS-23A/B			FAT CLAY (CH), pale yellow (2.5Y 8/2) mottled brownish yellow (10YR 6/6), hard, moist, few fine grained sand, weak HCl reaction on clay, few calcium carbonate nodules, strong HCl reaction on calcium carbonate nodules
-28.4	108.6								-28.4 — 108.6
		7	27	100/0.3	127/0.3	SS-24A/B			-29.4 — 109.6 SILTY SAND (SM), light gray (2.5Y 7/2), very dense, moist, fine grained, some fines, no HCl reaction; POORLY GRADED SAND (SP), pale yellow (2.5Y 8/3), very dense, wet, fine to medium grained, weak HCl reaction

EXELON COL BORE VICTORIA PHASE III.GPJ EXELON COL.GDT 8/10/09

MACTEC

BECHTEL NO.: 25352	MACTEC NO.: 6468-07-1777	COUNTY: Victoria, TX	GEOLOGIST: R. Harwell
SITE DESCRIPTION: Exelon Texas COL Project - Supplemental Investigation, Including UHS			GROUND WATER (ft)
BORING NO.: B-3291	DRILL METHOD: Mud Rotary	SAMPLE METHODS: SPT	0 HR. ND
GROUND SURFACE ELEV.: 80.2 ft (NAVD88)	NORTHING: 13,412,951 US ft (NAD83)	EASTING: 2,600,556 US ft (NAD83)	24 HR. ND
TOTAL DEPTH: 150.1 ft	DRILL MACHINE: CME 55 Track	DRILLER: T. Hahn (MACTEC RAL)	HAMMER (ID): 140 lb. Auto (MEC 21)
DATE STARTED: 3/7/09	COMPLETED: 3/9/09	CASING DEPTH: 15.0 ft	BITS USED: 3" Drag Bit

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT (0 20 40 60 80 100)	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-32.0					Continued from previous page				
									POORLY GRADED SAND (SP), pale yellow (2.5Y 8/3), very dense, wet, fine to medium grained, weak HCl reaction *(continued)*
-38.4	118.6								-38.4 118.6
		8	20	14	34	SS-25			FAT CLAY (CH), light gray (2.5Y 7/2), hard, moist, trace fine grained sand, weak HCl reaction, black staining
-48.4	128.6								
		6	9	13	22	SS-26			128.6 ft: pale yellow (2.5Y 8/2), very stiff, weak HCl reaction on clay, trace calcium carbonate nodules, strong HCl reaction on calcium carbonate nodules
-58.4	138.6								-58.4 138.6
		21	23	26	49	SS-27			POORLY GRADED SAND (SP), pale yellow (2.5Y 8/2), dense, wet, fine grained, weak HCl reaction
-68.4	148.6								-68.4 148.6
		17	15	14	29	SS-28			SANDY FAT CLAY (CH), pale yellow (2.5Y 8/2), very stiff, moist, some fine to medium grained sand, weak HCl reaction
									-69.9 150.1
									Boring Terminated at Elevation -69.9 ft

EXELON COL BORE VICTORIA PHASE III.GPJ EXELON COL.GDT 8/10/09

MACTEC

GEOTECHNICAL BORING LOG

Prepared By WFD Date 11-10-09
Checked By PAR Date 4/10/09
SHEET 1 OF 4

BECHTEL NO.: 25352	MACTEC NO.: 6468-07-1777	COUNTY: Victoria, TX	GEOLOGIST: S. Woodham
SITE DESCRIPTION: Exelon Texas COL Project - Supplemental Investigation, Including UHS			GROUND WATER (ft)
BORING NO.: B-3292	DRILL METHOD: Mud Rotary	SAMPLE METHODS: SPT	0 HR. ND
GROUND SURFACE ELEV.: 80.5 ft (NAVD88)	NORTHING: 13,413,352 US ft (NAD83)	EASTING: 2,601,080 US ft (NAD83)	24 HR. ND
TOTAL DEPTH: 174.9 ft	DRILL MACHINE: CME 550 X	DRILLER: R. Landeros (MACTEC ATL)	HAMMER (ID): 140 lb. Auto (MEC 22)
DATE STARTED: 3/5/09	COMPLETED: 3/6/09	CASING DEPTH: 9.0 ft	BITS USED: 2 15/16" Roller Cone Bit

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT (0 20 40 60 80 100)	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
80.5					Ground Surface				80.5 / 0.0
80.5	0.0	13	10	11	21	SS-1			FAT CLAY with sand (CH), dark gray (10YR 4/1), very stiff, dry, little fine grained sand
78.0	2.5	5	8	8	16	SS-2			78.0 / 2.5 FAT CLAY (CH), dark gray (10YR 4/1), very stiff, moist, few fine grained sand, no HCl reaction on clay, trace calcium carbonate nodules, strong HCl reaction on calcium carbonate nodules
75.5	5.0	6	9	8	17	SS-3			75.5 / 5.0 FAT CLAY with sand (CH), light gray (5Y 7/1), very stiff, dry, little fine grained sand, no HCl reaction on clay, few calcium carbonate nodules, strong HCl reaction on calcium carbonate nodules
73.0	7.5	5	8	9	17	SS-4			73.0 / 7.5 FAT CLAY (CH), light gray (5Y 7/2), very stiff, moist, few fine grained sand, no HCl reaction on clay, few calcium carbonate nodules, strong HCl reaction on calcium carbonate nodules
70.5	10.0	6	8	9	17	SS-5			10.0 ft: and brownish yellow (10YR 6/6), little calcium carbonate nodules, strong HCl reaction
68.0	12.5	5	8	9	17	SS-6			12.5 ft: few calcium carbonate nodules, strong HCl reaction
61.0	19.5	4	5	8	13	SS-7			19.5 ft: stiff
56.0	24.5	4	6	8	14	SS-8			24.5 ft: trace calcium carbonate nodules, strong HCl reaction
51.0	29.5	5	8	8	16	SS-9			51.0 / 29.5 FAT CLAY with sand (CH), light gray (5Y 7/2), very stiff, moist, little fine grained sand, no HCl reaction on clay, few calcium carbonate nodules, strong HCl reaction on calcium carbonate nodules
46.0	34.5	7	10	14	24	SS-10			34.5 ft: and brownish yellow (10YR 6/6)
41.0	39.5	5	5	9	14	SS-11			41.0 / 39.5 FAT CLAY (CH), light gray (5Y 7/2) and brownish yellow (10YR 6/6), stiff, moist, few fine grained sand, weak HCl reaction on clay, trace calcium carbonate nodules, strong HCl reaction on calcium carbonate nodules, black staining
36.0	44.5	3	5	7	12	SS-12			44.5 ft: weak HCl reaction, no calcium carbonate nodules observed
31.0	49.5	5	6	9	15	SS-13			49.5 ft: no HCl reaction on clay, trace calcium carbonate nodules, strong HCl reaction on calcium carbonate nodules
26.0	54.5	5	7	10	17	SS-14			26.0 / 54.5

EXELON COL BORE VICTORIA PHASE III.GPJ EXELON COL.GDT 10/20/09

MACTEC

BECHTEL NO.: 25352	MACTEC NO.: 6468-07-1777	COUNTY: Victoria, TX	GEOLOGIST: S. Woodham
SITE DESCRIPTION: Exelon Texas COL Project - Supplemental Investigation, Including UHS			GROUND WATER (ft)
BORING NO.: B-3292	DRILL METHOD: Mud Rotary	SAMPLE METHODS: SPT	0 HR. ND
GROUND SURFACE ELEV.: 80.5 ft (NAVD88)	NORTHING: 13,413,352 US ft (NAD83)	EASTING: 2,601,080 US ft (NAD83)	24 HR. ND
TOTAL DEPTH: 174.9 ft	DRILL MACHINE: CME 550 X	DRILLER: R. Landeros (MACTEC ATL)	HAMMER (ID): 140 lb. Auto (MEC 22)
DATE STARTED: 3/5/09	COMPLETED: 3/6/09	CASING DEPTH: 9.0 ft	BITS USED: 2 15/16" Roller Cone Bit

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT (0 20 40 60 80 100)	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
24.4					Continued from previous page				
21.0	59.5								FAT CLAY with sand (CH), light gray (5Y 7/2), brownish yellow (10YR 6/6), very stiff, moist, little fine grained sand, no HCl reaction on clay, few calcium carbonate nodules, strong HCl reaction on calcium carbonate nodules *(continued)*
		7	14	18	32	SS-15			POORLY GRADED SAND with silt (SP-SM), very pale brown (10YR 7/3), dense, wet, fine grained, few fines, no HCl reaction
16.0	64.5								FAT CLAY (CH), light brownish gray (2.5Y 6/2), brownish yellow (10YR 6/6), stiff, moist, no HCl reaction
		4	6	6	12	SS-16			
11.0	69.5								69.5 ft: light olive gray (5Y 6/2), trace calcium carbonate nodules, strong HCl reaction
		4	7	8	15	SS-17			
6.0	74.5								74.5 ft: light gray (2.5Y 7/2), very stiff, few fine grained sand
		6	8	10	18	SS-18			
1.0	79.5								
		8	9	10	19	SS-19			
-4.0	84.5								CLAYEY SAND (SC), light gray (2.5Y 7/2), very firm, wet, fine grained, little fines, no HCl reaction
		6	9	13	22	SS-20			
-9.0	89.5								89.5 ft: dense, few calcium carbonate nodules, strong HCl reaction
		14	19	28	47	SS-21			
-14.0	94.5								POORLY GRADED SAND with silt (SP-SM), pale yellow (2.5Y 7/3), very dense, wet, fine to medium grained, few fines, no HCl reaction on sand, few calcium carbonate nodules, strong HCl reaction on calcium carbonate nodules
		11	70/0.5		81/1.0	SS-22			
-19.0	99.5								CLAYEY SAND (SC), very pale brown (10YR 7/3), very dense, wet, fine grained, little fines, no HCl reaction on sand, trace calcium carbonate nodules, strong HCl reaction on calcium carbonate nodules
		17	24	27	51	SS-23			
-29.0	109.5								
		23	33	36	69	SS-24			

Layer boundaries: 22.0 (58.5); 16.0 (64.5); -4.0 (84.5); -14.0 (94.5); -19.0 (99.5); -29.0 (109.5)

EXELON COL BORE VICTORIA PHASE III.GPJ EXELON COL.GDT 10/20/09

MACTEC

BECHTEL NO.: 25352	MACTEC NO.: 6468-07-1777	COUNTY: Victoria, TX	GEOLOGIST: S. Woodham
SITE DESCRIPTION: Exelon Texas COL Project - Supplemental Investigation, Including UHS			GROUND WATER (ft)
BORING NO.: B-3292	DRILL METHOD: Mud Rotary	SAMPLE METHODS: SPT	0 HR. ND
GROUND SURFACE ELEV.: 80.5 ft (NAVD88)	NORTHING: 13,413,352 US ft (NAD83)	EASTING: 2,601,080 US ft (NAD83)	24 HR. ND
TOTAL DEPTH: 174.9 ft	DRILL MACHINE: CME 550 X	DRILLER: R. Landeros (MACTEC ATL)	HAMMER (ID): 140 lb. Auto (MEC 22)
DATE STARTED: 3/5/09	COMPLETED: 3/6/09	CASING DEPTH: 9.0 ft	BITS USED: 2 15/16" Roller Cone Bit

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT (0 20 40 60 80 100)	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-31.7					Continued from previous page				
									-32.5 POORLY GRADED SAND with silt (SP-SM), yellow (10YR 7/6), very dense, wet, fine to coarse grained, few fines, strong HCl reaction, few calcium carbonate nodules *(continued)* 113.0
									FAT CLAY (CH), light gray (5Y 7/2), very stiff, moist, few fine grained sand, no HCl reaction on clay, few calcium carbonate nodules, strong HCl reaction on calcium carbonate nodules
-39.0	119.5	8	13	13	26	SS-25			
-49.0	129.5	6	12	14	26	SS-26			129.5 ft: strong HCl reaction
-59.0	139.5								-59.0 POORLY GRADED SAND with silt (SP-SM), very pale brown (10YR 7/4), dense, wet, medium grained, few fines, strong HCl reaction 139.5
-69.0	149.5	6	18	24	42	SS-27			
-79.0	159.5	14	13	16	29	SS-28			149.5 ft: very firm, moist, few fine grained sand, weak HCl reaction on sand, trace calcium carbonate nodules, strong HCl reaction on calcium carbonate nodules
		23	29	29	58	SS-29			-79.0 SILTY SAND (SM), pale yellow (2.5Y 7/4), very dense, wet, medium grained, little fines, strong HCl reaction 159.5

EXELON COL BORE VICTORIA PHASE III.GPJ EXELON COL.GDT 10/20/09

MACTEC

BECHTEL NO.: 25352	MACTEC NO.: 6468-07-1777	COUNTY: Victoria, TX	GEOLOGIST: S. Woodham
SITE DESCRIPTION: Exelon Texas COL Project - Supplemental Investigation, Including UHS			GROUND WATER (ft)
BORING NO.: B-3292	DRILL METHOD: Mud Rotary	SAMPLE METHODS: SPT	0 HR. ND
GROUND SURFACE ELEV.: 80.5 ft (NAVD88)	NORTHING: 13,413,352 US ft (NAD83)	EASTING: 2,601,080 US ft (NAD83)	24 HR. ND
TOTAL DEPTH: 174.9 ft	DRILL MACHINE: CME 550 X	DRILLER: R. Landeros (MACTEC ATL)	HAMMER (ID): 140 lb. Auto (MEC 22)
DATE STARTED: 3/5/09	COMPLETED: 3/6/09	CASING DEPTH: 9.0 ft	BITS USED: 2 15/16" Roller Cone Bit

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-87.8					Continued from previous page				
-89.0	169.5	27	49	45	94	SS-30			SILTY SAND (SM), pale yellow (2.5Y 7/4), very dense, wet, medium grained, little fines, strong HCl reaction *(continued)* 169.5 ft: very pale brown (10YR 8/2), medium to coarse grained
-93.0	173.5	40	65	50/0.4	115/0.9	SS-31			173.5 ft: trace carbonate nodules
-94.4	174.9								Boring Terminated at Elevation -94.4 ft

EXELON COL BORE VICTORIA PHASE III.GPJ EXELON COL.GDT 10/20/09

Test Pit Logs

Section Not Used

SPT Energy Reports

MACTEC

Engineering and constructing a better tomorrow

May 4, 2009

Memorandum to File

From: Jon Honeycutt, Staff Professional JNH

Reviewed By: Steve Kiser, Principal Professional SK

Subject: **Report of SPT Energy – MACTEC CME 55LC Track Hammer Serial No. MEC-02 Automatic Hammer**
WORK INSTRUCTION No. 311 (DCN: EXE-917)
Exelon Texas COL Project – Supplemental Investigation, Including UHS
Victoria, Texas
MACTEC Project No. 6468-07-1777

Jonathan Honeycutt, of MACTEC Engineering and Consulting, Inc. (MACTEC), performed energy measurements on the above referenced drill rig at the subject site per the referenced Work Instructions. This memorandum summarizes the field testing activities and presents the results of the energy measurements.

SPT Energy Field Measurements

SPT energy measurements were made on January 24, 2009, during drilling of Boring B3204 at the referenced site. The testing was performed by Jonathan Honeycutt from approximately 12:24 PM to 4:08 PM (ET) under cloudy skies with a temperature of about 60 degrees Fahrenheit. The boring was drilled with personnel and equipment from the MACTEC Raleigh office. The drilling equipment consisted of a CME 55LC model track-mounted drill rig with an SPT automatic hammer. The drilling tools consisted of NW-J-sized drilling rods and a 2-foot long split tube sampler. Mud rotary drilling techniques were used to advance the boring. The drill rig operator during sampling was Mr. David White. Energy measurements were recorded during sampling at the depth intervals shown in Table 1.

The energy measurements were performed with a Pile Driving Analyzer (PDA) model PAX (Serial No. 3622L), and calibrated accelerometers (Serial Nos. K990 and K1050) and strain gages (Serial Nos. NW#146/1 and NW#146/2). A steel drill rod, 2-feet long and instrumented with dedicated strain gages, was inserted at the top of the drill rod string immediately below the SPT hammer. The inserted rod was also instrumented with two piezoresistive accelerometers that were bolted to the outside of the rod. The instrumented rod insert had a cross-sectional area of approximately 1.43 square inches and an outside diameter of approximately 2.625 inches at the gage location. The drill rods included in the drill rod string were hollow rods in 5 to 10 foot long sections, with an outside and inside diameter of approximately 2.625 and 2.25 inches, respectively. The recommended operation rate of the hammer is not known. Due to the closed hammer system, the hammer lubrication condition and anvil dimensions could not be observed.

16 Pages Total

MACTEC Engineering and Consulting, Inc.
2801 Yorkmont Road, Suite 100 • Charlotte, NC 28208 • Phone: 704.357.8600

Calibration Records

The calibration records for all the above are filed in DCN EXE-918.

Calculations for EFV

The work was done in general accordance with ASTM D 4633-05. The strain and acceleration signals were converted to force and velocity by the PDA, and the data was interpreted by the PDA according to the Case Method equation. The maximum energy transmitted to the drill rod string (as measured at the location of the strain gages and accelerometers) was calculated by the PDA using the EFV method equation, as shown below:

$$EFV = \int F(t) * V(t) * dt$$

Where: EFV = Transferred energy (EFV equation), or Energy of FV
F(t) = Calculated force at time t
V(t) = Calculated velocity at time t

The EFV method of energy calculation is recommended in ASTM Standard D4633-05. The EFV equation, integrated over the complete wave event, measures the total energy content of the event using both force and velocity measurements. The EFV values associated with each blow analyzed are tabulated in the attached PDIPLOT tables and are also shown graphically in the PDIPLOT charts.

Calculations for ETR

The ratio of the measured transferred energy (EFV) to the theoretical potential energy of the SPT system (140 lb weight with the specified 30 inch fall) is the ETR. The ETR values (as percent of the theoretical value) are shown in Table 1.

Comparison of ETR to Typical Energy Transfer Ratio Range

Based on a research report published by the Florida Department of Transportation (FDOT) (Report WPI No. 0510859, 1999), the average ETR measured for automatic hammers is 79.6%. The standard deviation was 7.9%; therefore, the range of ETRs within one standard deviation of the average was reported to be 71.7% to 87.5%. This range of ETRs was also consistent with other research that was cited in the FDOT research paper; however, maximum and minimum ETR values of up to 98% and 56%, respectively, were reported in the literature. The ETR values shown in Table 1 are generally within the range of typical values for automatic hammers as reported in the literature.

Discussion

Based on the field testing results, observations from the SPT energy measurements are summarized below:

- The data obtained by the PDA are consistent between individual hammer blows and between the sample depths tested. In general, the first and last one (and sometimes two) hammer blow records recorded by the PDA produced poor quality data (which is relatively common) and, as such, the record(s) was(were) not used in the data reduction. This may result in more or less blows evaluated for ETR than what is shown on the boring logs.

- The average energy transferred from the hammer to the drill rods for each individual depth interval using the EFV method ranged from 265 foot-pounds to 290 foot-pounds. These average energy transfers correspond to energy transfer ratios (ETR) of 76% to 83% of the theoretical energy (350 foot-pounds) of the SPT hammer.

- The average at each depth interval was calculated as the transferred energy for each analyzed blow of the depth intervals divided by the total number of hammer blows analyzed. The overall average energy transfer of the SPT system (for all the depth intervals tested) was 281.2 foot-pounds, with an average ETR of 80.3%.

Attachments: Page 4 Table 1 - Summary of SPT Energy Measurements – 1 Page
Page 5 Work Instruction – DCN EXE-917 – 1 Page
Page 6 Record of SPT Energy Measurement – 1 Page
Pages 7 – 16 PDIPLOT Output – 10 Pages

TABLE 1
SUMMARY OF SPT ENERGY MEASUREMENTS (ASTM D4633-05)
Exelon Texas COL Project - Supplemental Investigation, Including UHS
Victoria, Texas
MACTEC Project No. 6468-07-1777

Automatic Hammer Serial Number and Rig Model	Rig Owner	Rig Operator	Boring No. Tested	Date Tested	Drill Rod Size	Sample Depth (feet)	SPT Blow Count (blows per six inches)	No. of Blows Analyzed	Average Measured Energy (Average EFV) (ft-lbs)[a]	Energy Transfer Ratio (%)[b] (Average ETR)
MEC-02 (CME 55 LC Track)	MACTEC Raleigh	David White	B3204	1/24/2009	NW-J	39.1 - 40.6	6 - 8 - 10	25	285	81.4%
						44.1 - 45.6	8 - 11 - 14	34	284	81.1%
						49.1 - 50.6	7 - 11 - 13	32	290	82.9%
						54.1 - 55.6	10 - 11 - 13	34	265	75.7%
						64.1 - 65.6	7 - 9 - 10	27	284	81.1%
								Average for Rig:	**281.2**	**80.3%**

[a]Measured Energy is energy based on the EFV method, as outlined in ASTM D4633-05, for each blow recorded by the PDA. In some cases, the initial and final one to two blows produced poor quality data, and were not used to calculate the Average Measured Energy. This may result in more or less blows evaluated for ETR than what is shown on the boring logs.

EFV = EMX * 1000 lbs/kip, where EMX equals the maximum transferred energy measured by the PDA (see attached PDA data).

[b]Energy Transfer Ratio is the Measured Energy divided by the theoretical SPT energy of 350 foot-pounds (140 pound hammer falling 2.5 feet).

The average EFV and ETR values may differ slightly and insignificantly from those in the PDIPLOT tables due to roundoff.

Prepared By:	Date: 5/4/09		Checked By:	Date: 5-4-09

Work Instruction No. 311
Exelon COL Victoria Site
MACTEC Engineering and Consulting, Inc.
MACTEC Project 6468-07-1777

DCN 1/12/09

Issued To: ~~Steve Kiser and~~ Jonathan Honeycutt

Issued By: Daniel E. Atkinson **Rev. No.** 0

Valid From: 1/12/09 **Date:** 1/12/09

To: 12/31/09

Task Description: Perform SPT Energy Measurements

Applicable Technical Procedures or Plans, or other reference:

1. Geotechnical Work Plan (current revision; available at Site Office), and
2. ASTM D 4633-05 (copy attached.).

Specific Instructions (note attachments where necessary): Perform energy measurements for each drill rig on site in accordance with ASTM D-4633-05. Consult with Site Manager as to schedule for performing the measurements. Hammer weights have been checked by site personnel, and records will be available on site. All rigs are using automatic hammer systems. Confirm that automatic hammer system is being operated within manufacturer's recommendations or in a typical operating fashion as observed from watching one or two SPT measurements prior to measuring energy. Check each drill rig using all hammer/rod combinations that it will be using. Depths for measurements should be coordinated with the Site Manager. See Site Manager for current boring logs of holes drilled and use these to plan most effective field measurement program. Submit copies of calibration records for equipment to Project Principal for review prior to beginning work on site.

Special Instructions (note attachments where necessary): Confirm with Site Manager that approval of equipment calibration records have been received prior to beginning field testing. If unexpected conditions are encountered that affect measurements, contact Site Manager or Project Principal immediately.

Report Format: Prepare standard report in accordance with ASTM D 4633 requirements.

Specific Quality Assurance Procedures Applicable: QAP 20-1; QAP 25-1; QAP for Reporting Nuclear-Related Defects, or Noncompliances, per Federal Regulation 10CFR21 and Section 306 of the Energy Reorganization Act of 1974. Current revisions apply.

Hold Points or Witness Points: None

Records: All records generated shall be considered QA Records.

Reviewed and Approved by: (Note: Only one signature is required for issuance)

Project Manager: _____

Project Principal Engineer: _____ Date: _____

Site Manager/Coordinator: _____ Date: _____

Pages: 1 plus attachment Date: 1/12/09

Attachments: ASTM D 4633-05 **DCN:** EXE917

DCN: EXE 917