



SHEET 7 OF 8

BECHTEL PROJECT NO.: 25352				COUNTY Victoria				GEOLOGIST A. Osorio					
SITE DESCRIPTION Exelon COL Project						MACTEC PROJECT NO.: 6468-07-1777				GROUND WATER (ft)			
BORING NO. B-2282A		DRILL METHOD: Mud Rotary				SAMPLE METHODS: SPT				0 HR. ND			
GROUND SURFACE ELEV. 80.3 ft (NAVD88)		NORTHING 13,412,971		US ft (NAD83)		EASTING 2,600,758		US ft (NAD83)		24 HR. ND			
TOTAL DEPTH 400.0 ft		DRILL MACHINE CME-75				DRILLER: D. Nalls/B. Turner/T. Ellerson				HAMMER (ID) 140 lb. Auto (MEC 11)			
DATE STARTED 1/5/08		COMPLETED 1/9/08				CASING DEPTH: 33.0 ft				BITS USED: 4" Drag Bit			
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT						SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100			
-256.3					Continued from previous page								
-258.2	338.5												POORLY GRADED SAND (SP), very pale brown (10YR8/2), very dense, moist, fine grained, trace fines, some brownish yellow stains, strong HCl reaction, clay intermixed with sand from 339' to 339.4' (continued)
		41	32	32									
-278.2	358.5												358.5ft: SPT over-driven to collect sample .
		285/0.5											
													370ft: easier drilling below 370'
-289.7													FAT CLAY (CH), greenish gray (10Y6/1), mottled yellowish brown (10YR5/8), hard, moist, trace sand, carbonate nodules, black stains, strong HCl reaction
-298.2	378.5												
		8	15	20									



SHEET 8 OF 8

BECHTEL PROJECT NO.: 25352				COUNTY Victoria				GEOLOGIST A. Osorio							
SITE DESCRIPTION Exelon COL Project				MACTEC PROJECT NO.: 6468-07-1777				GROUND WATER (ft)							
BORING NO. B-2282A		DRILL METHOD: Mud Rotary		SAMPLE METHODS: SPT		0 HR.		ND							
GROUND SURFACE ELEV. 80.3 ft (NAVD88)		NORTHING 13,412,971		US ft (NAD83)		EASTING 2,600,758		US ft (NAD83)		24 HR. ND					
TOTAL DEPTH 400.0 ft		DRILL MACHINE CME-75		DRILLER: D. Nalls/B. Turner/T. Ellerson		HAMMER (ID) 140 lb. Auto (MEC 11)									
DATE STARTED 1/5/08		COMPLETED 1/9/08		CASING DEPTH: 33.0 ft		BITS USED: 4" Drag Bit									
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT						SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100					
-312.4					Continued from previous page										
-318.2	398.5	7	13	23	●36						SS-43			FAT CLAY (CH), greenish gray (10Y6/1), mottled yellowish brown (10YR5/8), hard, moist, trace sand, carbonate nodules, black stains, strong HCl reaction (continued)	
														-319.7	400.0
Boring Terminated at Elevation -319.7 ft															

EXELON COL BORE EXELON-2.GPJ EXELON COL.GDT 6/12/08



GEOTECHNICAL BORING LOG

Prepared By 2226 Date 6-12-07Checked By KAW Date 7-10-08

SHEET 1 OF 3

BECHTEL PROJECT NO.: 25352					COUNTY Victoria					GEOLOGIST L. Bisson				
SITE DESCRIPTION Exelon COL Project					MACTEC PROJECT NO.: 6468-07-1777					GROUND WATER (ft)				
BORING NO. B-2283		DRILL METHOD: Mud Rotary			SAMPLE METHODS: SPT					0 HR. ND				
GROUND SURFACE ELEV. 80.4 ft (NAVD88)		NORTHING 13,413,032		US ft (NAD83)		EASTING 2,600,809		US ft (NAD83)		24 HR. ND				
TOTAL DEPTH 151.2 ft		DRILL MACHINE CME-550			DRILLER: L. Carter/J. Landeros					HAMMER (ID) 140 lb. Auto (MEC 03)				
DATE STARTED 12/5/07		COMPLETED 12/6/07			CASING DEPTH: N/A					BITS USED: 2 15/16" Drag Bit				
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION		
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100	
80.4					Ground Surface							80.4	0.0	
80.4	0.0	2	3	4						SS-1		LEAN CLAY (CL), very dark grayish brown (10YR3/2), firm, moist, trace sand, no HCl reaction, trace roots		
76.9	3.5	7	8	8						SS-2		FAT CLAY (CH), light brownish gray (10YR6/2), to light gray (2.5Y7/2), very stiff, moist, few sand, strong HCl reaction, trace carbonate nodules	3.5	
74.4	6.0	3	4	4						SS-3		6.0ft: firm		
71.9	8.5	5	8	10						SS-4		LEAN CLAY with sand (CL), light brownish gray (10YR6/2), very stiff, moist, little sand, strong HCl reaction, trace carbonate nodules	8.5	
69.4	11.0	5	7	8						SS-5		FAT CLAY (CH) yellowish brown (10YR5/8), to brownish yellow (10YR6/6), mottled light greenish gray (10Y7/1), stiff, moist, few to trace sand, strong HCl reaction	11.0	
66.9	13.5	5	8	8						SS-6		13.5ft: very stiff		
60.7	19.7	3	4	5						SS-7		19.7ft: stiff		
55.7	24.7	2	5	7						SS-8				
50.7	29.7	5	7	11						SS-9		29.7ft: light brownish gray (2.5YR6/2), very stiff, some sand, no HCl reaction, increased sand content with depth		
45.7	34.7	7	8	10						SS-10		34.7ft: greenish gray (10Y6/1), trace black and orange staining		
40.7	39.7	7	10	12						SS-11		39.7ft: yellowish brown (10YR5/8), to greenish gray (10Y6/1), little sand, weak HCl reaction, trace carbonate nodules		
35.7	44.7	7	9	9						SS-12		44.7ft: mottled yellowish brown (10YR5/6), strong HCl reaction		
30.7	49.7	5	6	7						SS-13		49.7ft: stiff, weak to no HCl reaction, trace orange staining		
25.7	54.7	9	13	16						SS-14		Sandy FAT CLAY (CH), light olive gray (5Y6/2), very stiff, moist, some sand, strong HCl reaction	54.7	

EXELON COL BORE EXELON-2.GPJ EXELON COL.GDT 6/12/08



SHEET 2 OF 3

BECHTEL PROJECT NO.: 25352				COUNTY Victoria				GEOLOGIST L. Bisson						
SITE DESCRIPTION Exelon COL Project				MACTEC PROJECT NO.: 6468-07-1777				GROUND WATER (ft)						
BORING NO. B-2283		DRILL METHOD: Mud Rotary		SAMPLE METHODS: SPT				0 HR.		ND				
GROUND SURFACE ELEV. 80.4 ft (NAVD88)		NORTHING 13,413,032		US ft (NAD83)		EASTING 2,600,809		US ft (NAD83)		24 HR. ND				
TOTAL DEPTH 151.2 ft		DRILL MACHINE CME-550		DRILLER: L. Carter/J. Landeros				HAMMER (ID) 140 lb. Auto (MEC 03)						
DATE STARTED 12/5/07		COMPLETED 12/6/07		CASING DEPTH: N/A				BITS USED: 2 15/16" Drag Bit						
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION		
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100	MOI			
24.3					Continued from previous page									
20.7	59.7	8	15	27							SS-15A/B	19.7	Sandy FAT CLAY (CH), light olive gray (5Y6/2), very stiff, moist, some sand, strong HCl reaction (continued)	60.7
													59.7ft: greenish gray (10Y6/1), few sand, interbedded clayey sand	
15.7	64.7	11	8	8							SS-16A/B	15.2	POORLY GRADED SAND with clay (SP-SC), gray (2.5Y6/1), dense, wet, fine grained, few fines, trace organic staining	65.2
													FAT CLAY (CH), greenish gray (10YR6/1), very stiff, moist, few sand, weak HCl reaction, trace orange and carbonate nodules	
10.7	69.7	7	7	9							SS-17		69.7ft: greenish gray (10Y6/1), mottled strong brown (7.5YR5/8)	
5.7	74.7	5	9	12							SS-18		74.7ft: gray (5Y6/1), little sand	
0.7	79.7	9	10	14							SS-19		79.7ft: greenish gray (10Y6/1)	
-4.3	84.7	10	14	10							SS-20	-4.3	POORLY GRADED SAND with clay (SP-SC), light yellowish brown (10YR6/4), very firm, wet, fine grained, few fines, no HCl reaction	84.7
-9.3	89.7	12	13	23							SS-21		89.7ft: light gray (2.5Y7/2), dense, strong HCl reaction, few carbonate nodules	
-14.3	94.7	29	43	41							SS-22		94.7ft: very dense	
-19.3	99.7	50/0.3									SS-23			
-29.3	109.7	21	31	38							SS-24	-29.3		109.7

EXELON COL BORE EXELON-2.GPJ EXELON COL.GDT 6/12/08



SHEET 3 OF 3

BECHTEL PROJECT NO.: 25352				COUNTY Victoria				GEOLOGIST L. Bisson					
SITE DESCRIPTION Exelon COL Project				MACTEC PROJECT NO.: 6468-07-1777				GROUND WATER (ft)					
BORING NO. B-2283		DRILL METHOD: Mud Rotary		SAMPLE METHODS: SPT		0 HR.		ND					
GROUND SURFACE ELEV. 80.4 ft (NAVD88)		NORTHING 13,413,032		US ft (NAD83)		EASTING 2,600,809		US ft (NAD83)		24 HR. ND			
TOTAL DEPTH 151.2 ft		DRILL MACHINE CME-550		DRILLER: L. Carter/J. Landeros		HAMMER (ID) 140 lb. Auto (MEC 03)							
DATE STARTED 12/5/07		COMPLETED 12/6/07		CASING DEPTH: N/A		BITS USED: 2 15/16" Drag Bit							
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100
-31.8					Continued from previous page								
-39.3	119.7	5	7	8	●15					SS-25		POORLY GRADED SAND (SP), pale brown (10YR6/3), very dense, wet, fine to coarse grained, trace fines, strong HCl reaction, trace chert and carbonate nodules (continued)	
-49.3	129.7	8	10	16	●26					SS-26		129.7ft: gray (5Y6/1), very stiff, some sand, strong HCl reaction, trace orange staining	
-59.3	139.7	34	26	26	●52					SS-27		POORLY GRADED SAND with clay (SP-SC), light yellowish brown (10YR6/4), very dense, wet, fine grained, few fines, strong HCl reaction	
-69.3	149.7	6	6	15	●21					SS-28		FAT CLAY (CH), greenish gray (10Y6/1), very stiff, moist, trace sand, strong HCl reaction, and interbedded clayey sand lenses, brownish gray (10YR6/2), weak HCl reaction	
												Boring Terminated at Elevation -70.8 ft	

EXELON COL BORE EXELON-2.GPJ EXELON COL.CDT 6/12/08



GEOTECHNICAL BORING LOG

Prepared By JPK Date 6-12-07Checked By KAW Date 7-10-08

SHEET 1 OF 3

BECHTEL PROJECT NO.: 25352				COUNTY Victoria				GEOLOGIST J. Moore							
SITE DESCRIPTION Exelon COL Project (Victoria Site)				MACTEC PROJECT NO.: 6468-07-1777				GROUND WATER (ft)							
BORING NO. B-2284		DRILL METHOD: Mud Rotary		SAMPLE METHODS: SPT				0 HR. ND							
GROUND SURFACE ELEV. 80.4 ft (NAVD88)		NORTHING 13,413,061		US ft (NAD83)		EASTING 2,600,948		US ft (NAD83)		24 HR. ND					
TOTAL DEPTH 150.0 ft		DRILL MACHINE CME-550-X		DRILLER: R. Landaros/J. Landaros		HAMMER (ID) 140 lb. Auto (MEC 05)									
DATE STARTED 11/8/07		COMPLETED 11/8/07		CASING DEPTH: 4.1 ft		BITS USED: 2 15/16" Roller Cone									
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		
		0.5ft	0.5ft	0.5ft	0	20	40	60	80					100	
80.4					Ground Surface										
80.4	0.0	2	3	3									80.4	0.0	LEAN CLAY (CL), black (10YR2/1), firm, moist, trace fine sand, grass and roots at surface
76.9	3.5	2	3	3									76.9	3.5	FAT CLAY (CH), gray (10YR5/1), firm, moist, trace carbonate nodules, weak HCl reaction
74.4	6.0	2	4	3									71.9	8.5	LEAN CLAY (CL), very pale brown (10YR7/3), firm, moist, trace sand, strong HCl reaction
71.9	8.5	2	3	3									69.4	11.0	FAT CLAY (CH), light yellowish brown (10YR6/4), mottled gray (10YR6/1), very stiff, moist, trace sand, strong HCl reaction, black streaks
69.4	11.0	3	7	9											13.5ft: stiff
66.9	13.5	4	6	6											
61.9	18.5	3	3	5											
56.9	23.5	3	4	4											23.5ft: very pale brown (10YR7/3), mottled gray, weak to strong HCl reaction, black streaks
51.9	28.5	5	7	7											
46.9	33.5	6	8	8											33.5ft: light gray (10YR7/2), very stiff, little sand, no HCl reaction
41.9	38.5	7	9	8											38.5ft: light gray (10YR7/1), mottled brown (10YR/3)
36.9	43.5	6	8	10											43.5ft: brownish yellow (10YR6/6), mottled gray (10YR6/1), trace sand, weak to strong HCl reaction
31.9	48.5	6	7	10											
26.9	53.5	2	4	6											53.5ft: pale brown (10YR6/3), stiff, weak HCl reaction

EXELON COL BORE EXELON-2.GPJ EXELON COL.GDT 6/12/08



SHEET 2 OF 3

BECHTEL PROJECT NO.: 25352				COUNTY Victoria				GEOLOGIST J. Moore					
SITE DESCRIPTION Exelon COL Project (Victoria Site)						MACTEC PROJECT NO.: 6468-07-1777				GROUND WATER (ft)			
BORING NO. B-2284		DRILL METHOD: Mud Rotary				SAMPLE METHODS: SPT				0 HR.	ND		
GROUND SURFACE ELEV. 80.4 ft (NAVD88)		NORTHING 13,413,061		US ft (NAD83)		EASTING 2,600,948		US ft (NAD83)		24 HR.	ND		
TOTAL DEPTH 150.0 ft		DRILL MACHINE CME-550-X				DRILLER: R. Landaros/J. Landaros				HAMMER (ID) 140 lb. Auto (MEC 05)			
DATE STARTED 11/8/07		COMPLETED 11/8/07				CASING DEPTH: 4.1 ft				BITS USED: 2 15/16" Roller Cone			
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT						SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100			
24.3					Continued from previous page								
21.9	58.5	4	10	20							SS-15		FAT CLAY (CH), light yellowish brown (10YR6/4), mottled gray (10YR6/1), very stiff, moist, trace sand, strong HCl reaction, black streaks (continued) 58.5ft: very pale brown (10YR7/3), mottled dark brown (10YR3/3), very stiff, little sand, trace carbonate nodules
16.9	63.5	4	16	29							SS-16		POORLY GRADED SAND with clay (SP-SC), brown (10YR5/3), dense, moist, few fines, strong HCl reaction
11.9	68.5	4	7	6							SS-17		FAT CLAY (CH), light brownish gray (10YR6/2), stiff, moist, trace carbonate nodules, black manganese nodules, no HCl reaction on clay
6.9	73.5	10	14	19							SS-18		73.5ft: light yellowish brown (10YR6/4), hard, little sand, few carbonate nodules, strong HCl reaction
1.9	78.5	5	9	10							SS-19		78.5ft: light gray (10YR7/2), very stiff, trace carbonate nodules
-3.1	83.5	8	13	13							SS-20		POORLY GRADED SAND with clay (SP-SC), pale brown (10YR6/3), very firm, moist, few fines, no HCl reaction
-8.1	88.5	8	22	26							SS-21		Clayey SAND (SC), light gray (10YR7/2), dense, moist, little fines, few carbonate nodules
-13.1	93.5	20	30	50/0.3							SS-22		FAT CLAY (CH), very pale brown (10YR8/2), hard, moist, few carbonate gravel-sized nodules, strong HCl reaction Drilled through possible carbonate-cemented layers 94.75' to 95.2, and 97' to 98'
-18.1	98.5	26	50/0.3								SS-23		POORLY GRADED SAND (SP), very pale brown (10YR8/2), very dense, wet, few fines, strong HCl reaction
-28.1	108.5	20	41	34							SS-24		POORLY GRADED SAND (SP), dark yellowish brown (10YR4/6), to light gray (10YR7/2), very dense, moist, strong HCl reaction

EXELON COL BORE EXELON-2.GPJ EXELON COL.GDT 6/12/08



SHEET 3 OF 3

BECHTEL PROJECT NO.: 25352				COUNTY Victoria				GEOLOGIST J. Moore					
SITE DESCRIPTION Exelon COL Project (Victoria Site)								MACTEC PROJECT NO.: 6468-07-1777				GROUND WATER (ft)	
BORING NO. B-2284		DRILL METHOD: Mud Rotary				SAMPLE METHODS: SPT				0 HR. ND			
GROUND SURFACE ELEV. 80.4 ft (NAVD88)		NORTHING 13,413,061		US ft (NAD83)		EASTING 2,600,948		US ft (NAD83)		24 HR. ND			
TOTAL DEPTH 150.0 ft		DRILL MACHINE CME-550-X				DRILLER: R. Landaros/J. Landaros				HAMMER (ID) 140 lb. Auto (MEC 05)			
DATE STARTED 11/8/07		COMPLETED 11/8/07		CASING DEPTH: 4.1 ft				BITS USED: 2 15/16" Roller Cone					
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100	MOI		
-31.8					Continued from previous page								
-38.1	118.5	5	9	9						SS-25		POORLY GRADED SAND (SP), dark yellowish brown (10YR4/6), to light gray (10YR7/2), very dense, moist, strong HCl reaction (continued)	
-48.1	128.5	7	9	9						SS-26		FAT CLAY (CH), light gray (5Y7/2), very stiff, moist, trace carbonate nodules, black organic and iron staining, strong HCl reaction	
-58.1	138.5	7	14	14						SS-27		128.5ft: mottled reddish brown	
-68.1	148.5	5	8	9						SS-28		148.5ft: mottled light brown	
												Boring Terminated at Elevation -69.6 ft	

EXELON COL BORE EXELON-2.GPJ EXELON COL.DDT 6/12/08



GEOTECHNICAL BORING LOG

Prepared By DDK Date 6-12-08Checked By KAW Date 7-16-08

SHEET 1 OF 3

BECHTEL PROJECT NO.: 25352				COUNTY Victoria				GEOLOGIST L. Bisson					
SITE DESCRIPTION Exelon COL Project (Victoria Site)						MACTEC PROJECT NO.: 6468-07-1777						GROUND WATER (ft)	
BORING NO. B-2285		DRILL METHOD: Mud Rotary				SAMPLE METHODS: SPT						0 HR.	ND
GROUND SURFACE ELEV. 80.4 ft (NAVD88)		NORTHING 13,412,683		US ft (NAD83)		EASTING 2,600,322		US ft (NAD83)		24 HR.	ND		
TOTAL DEPTH 151.2 ft		DRILL MACHINE CME-550				DRILLER: L. Carter/D. Juhan				HAMMER (ID) 140 lb. Auto (MEC 03)			
DATE STARTED 11/14/07		COMPLETED 11/15/07				CASING DEPTH: N/A				BITS USED: 2 15/16" Drag Bit			
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100	MOI		
80.4					Ground Surface							80.4	0.0
80.4	0.0	3	5	6	11						SS-1	FAT CLAY (CH), black (5YR2.5/1), stiff, moist, trace sand, no HCl reaction, organics	
76.9	3.5	8	8	8	16						SS-2	LEAN CLAY with sand (CL), gray (5Y5/1), very stiff, moist, few sand, weak HCl reaction, trace carbonate nodules	3.5
74.4	6.0	5	7	8	15						SS-3	6.0ft: greenish gray (10YR6/1), stiff	
71.9	8.5	6	9	9	18						SS-4	8.5ft: light greenish gray (10Y7/1), mottled strong brown (7.5YR5/8), very stiff, some sand, strong HCl reaction	
69.4	11.0	6	9	11	20						SS-5	11.0ft: few sand	
66.9	13.5	5	6	7	13						SS-6	FAT CLAY (CH) strong brown (7.5YR5/6), mottled greenish gray (10Y6/1), stiff, moist, few sand, strong HCl reaction, trace manganese staining	13.5
60.7	19.7	4	4	7	11						SS-7	19.7ft: brownish yellow (10YR6/8), veined with light greenish gray (10Y7/1)	
55.7	24.7	4	5	6	11						SS-8		
50.7	29.7	5	6	7	13						SS-9	29.7ft: strong brown (7.5YR5/8)	
45.7	34.7	3	5	6	11						SS-10	34.7ft: reddish yellow (7.5YR6/8), veined light greenish gray (10Y7/1), trace sand	
40.7	39.7	4	5	8	13						SS-11	39.7ft: yellowish brown (10YR5/8), few sand, weak HCl reaction	
35.7	44.7	6	12	13	25						SS-12	44.7ft: greenish gray (10Y6/1), mottled reddish yellow (7.5YR6/8), very stiff, little sand, weak HCl reaction,	
30.7	49.7	10	14	14	28						SS-13	31.4 Clayey SAND (SC), light yellowish brown (10YR6/4), mottled brownish yellow (10YR6/8), very firm, moist, little fines, no HCl reaction, trace carbonate nodules	49.0
25.7	54.7	4	7	7	14						SS-14		54.7

EXELON COL BORE EXELON-2.GPJ EXELON COL.GDT 6/12/08



SHEET 2 OF 3

BECHTEL PROJECT NO.: 25352					COUNTY Victoria					GEOLOGIST L. Bisson						
SITE DESCRIPTION Exelon COL Project (Victoria Site)										MACTEC PROJECT NO.: 6468-07-1777					GROUND WATER (ft)	
BORING NO. B-2285			DRILL METHOD: Mud Rotary					SAMPLE METHODS: SPT					0 HR.	ND		
GROUND SURFACE ELEV. 80.4 ft (NAVD88)			NORTHING 13,412,683		US ft (NAD83)		EASTING 2,600,322		US ft (NAD83)		24 HR.	ND				
TOTAL DEPTH 151.2 ft		DRILL MACHINE CME-550					DRILLER: L. Carter/D. Juhan					HAMMER (ID) 140 lb. Auto (MEC 03)				
DATE STARTED 11/14/07		COMPLETED 11/15/07			CASING DEPTH: N/A					BITS USED: 2 15/16" Drag Bit						
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION				
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100	MOI					
24.2					Continued from previous page											
20.7	59.7	6	11	11								22.4	POORLY GRADED SAND with clay (SP-SC), light gray (10YR7/1), firm, moist, fine grained, little fines, no HCl reaction (continued)	58.0		
15.7	64.7	15	16	13									FAT CLAY (CH), light olive gray (5Y6/2), very stiff, moist, few sand, no HCl reaction, trace carbonate nodules			
10.7	69.7	13	25	24									64.7ft: interbedded poorly graded sand with clay, light brownish gray (2.5Y6/2)			
5.6	74.7	6	12	11									10.7	POORLY GRADED SAND with clay (SP-SC), light brownish gray (10YR6/2), dense, wet, few fines, no HCl reaction	69.7	
0.6	79.7	5	7	10									5.1	FAT CLAY (CH), light olive gray (5Y6/2), very stiff, moist, few sand, trace carbonate nodules	75.2	
-4.4	84.7	11	13	12										79.7ft: greenish gray (10Y6/1), no HCl reaction, trace manganese nodules		
-9.4	89.7	9	17	16										84.7ft: light gray (5Y7/2), little sand, little subangular gravel		
-14.4	94.7	13	19	21										-9.4	POORLY GRADED SAND with clay (SP-SC), greenish gray (10Y6/1), dense, wet to moist, fine grained, little fines, interbedded with fat clay, few sand, little to no HCl reaction, trace carbonate nodules	89.7
-19.4	99.7	26	36	42										-14.4	POORLY GRADED SAND (SP), strong brown (7.5YR5/8), to light yellowish brown (10YR6/4), dense, wet, trace fines, no HCl reaction	94.7
-29.4	109.7	6	8	9											98.0ft: very pale brown (10YR7/3), to brownish yellow (10YR6/8), very dense, trace fines, fine to coarse grained, weak HCl reaction	
														-22.7	FAT CLAY (CH), light greenish gray (10Y7/1), mottled strong brown (7.5YR5/8), very stiff, moist, few sand, trace carbonate nodules	103.0

EXELON COL BORE EXELON-2.GPJ EXELON COL.GDT 6/12/08



SHEET 3 OF 3

BECHTEL PROJECT NO.: 25352				COUNTY Victoria				GEOLOGIST L. Bisson					
SITE DESCRIPTION Exelon COL Project (Victoria Site)				MACTEC PROJECT NO.: 6468-07-1777				GROUND WATER (ft)					
BORING NO. B-2285		DRILL METHOD: Mud Rotary		SAMPLE METHODS: SPT		0 HR. ND		24 HR. ND					
GROUND SURFACE ELEV. 80.4 ft (NAVD88)		NORTHING 13,412,683		US ft (NAD83)		EASTING 2,600,322		US ft (NAD83)					
TOTAL DEPTH 151.2 ft		DRILL MACHINE CME-550		DRILLER: L. Carter/D. Juhan		HAMMER (ID) 140 lb. Auto (MEC 03)							
DATE STARTED 11/14/07		COMPLETED 11/15/07		CASING DEPTH: N/A		BITS USED: 2 15/16" Drag Bit							
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100
-31.9					Continued from previous page								
-39.4	119.7	6	7	9	●16					SS-25		FAT CLAY (CH), light greenish gray (10Y7/1), mottled strong brown (7.5YR5/6), very stiff, moist, few sand, trace carbonate nodules (continued)	
-49.4	129.7	9	13	13	●26					SS-26			
-59.4	139.7	6	13	24	●37					SS-27		POORLY GRADED SAND with clay (SP-SC), light brownish gray (10YR6/2), dense, wet, few fines, no HCl reaction	
-69.4	149.7	17	34	46	●80					SS-28		POORLY GRADED SAND (SP), light gray (10YR7/2), very dense, weak HCl reaction	
												Boring Terminated at Elevation -70.9 ft	

EXELON COL BORE EXELON-2.GPJ EXELON COL.GDT 6/12/08

Test Pits Logs



GEOTECHNICAL BORING LOG

Prepared By JPX Date 6-12-08Checked By KAW Date 6-12-08

SHEET 1 OF 1

BECHTEL PROJECT NO.: 25352				COUNTY Victoria				GEOLOGIST M. Harvey					
SITE DESCRIPTION Exelon COL Project (Victoria Site)				MACTEC PROJECT NO.: 6468-07-1777				GROUND WATER (ft)					
BORING NO. TP-2101		DRILL METHOD: Back Hoe		SAMPLE METHODS: Hand				0 HR. ND					
GROUND SURFACE ELEV. 80.4 ft (NAVD88)		NORTHING 13,412,437		US ft (NAD83)		EASTING 2,599,756		US ft (NAD83)		24 HR. ND			
TOTAL DEPTH 10.0 ft		DRILL MACHINE John Deere		DRILLER: D. Rhodes				HAMMER (ID) NA					
DATE STARTED 1/17/08		COMPLETED 1/17/08		CASING DEPTH: N/A				BITS USED: N/A					
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100	MOI		
80.4					Ground Surface								80.4 0.0
													78.4 2.0
													75.4 5.0
72.4	8.0									J1			
										B1A/ B1B/J2 J3			70.4 10.0
												Note: Bulk samples are composites of soil collected from the approximate sample-depth(s) listed below: 5.0ft: J1 8.0ft: Bulk (B1A/B1B)/J2 10.0ft: J3 Boring Terminated at Elevation 70.4 ft	

EXELON COL BORE EXELON-2.GPJ EXELON COL.GDT 6/12/08



GEOTECHNICAL BORING LOG

Prepared By J. D. 24 Date 6-12-08Checked By KAW Date 6-12-08

SHEET 1 OF 1

BECHTEL PROJECT NO.: 25352				COUNTY Victoria				GEOLOGIST M. Harvey						
SITE DESCRIPTION Exelon COL Project (Victoria Site)				MACTEC PROJECT NO.: 6468-07-1777				GROUND WATER (ft)						
BORING NO. TP-2102		DRILL METHOD: Back Hoe		SAMPLE METHODS: Hand		0 HR. ND		24 HR. ND						
GROUND SURFACE ELEV. 80.4 ft (NAVD88)		NORTHING 13,412,124		US ft (NAD83)		EASTING 2,599,819		US ft (NAD83)						
TOTAL DEPTH 10.0 ft		DRILL MACHINE John Deere		DRILLER: D. Rhodes		HAMMER (ID) NA								
DATE STARTED 1/18/08		COMPLETED 1/18/08		CASING DEPTH: N/A		BITS USED: N/A								
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION		
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100	MOI			
80.4					Ground Surface								80.4	0.0
										J1			FAT CLAY with sand (CH), very dark gray (10YR4/1 and 10YR3/1), moist, organics, no HCl reaction	
										J2			5.5ft: gray (2.5Y5/1), carbonate nodules	
										J3			8.0ft: light gray (2.5Y7/2), weak HCl reaction	
72.4	8.0									B1A/ B1B/J4 J5			10.0ft: strong HCl reaction	
													Note: Bulk samples are composites of soil collected from the approximate sample-depth(s) listed below: 1.0ft: J1 3.0ft: J2 5.5ft: J3 8.0ft: Bulk (B1A/B1B)/J4 10.0ft: J5 Boring Terminated at Elevation 70.4 ft	

EXELON COL BORE EXELON-2.GPJ EXELON COL.GDT 6/12/08



GEOTECHNICAL BORING LOG

Prepared By JPZ Date 6-12-08Checked By KAW Date 6-12-08

SHEET 1 OF 1

BECHTEL PROJECT NO.: 25352					COUNTY Victoria					GEOLOGIST M. Harvey				
SITE DESCRIPTION Exelon COL Project (Victoria Site)					MACTEC PROJECT NO.: 6468-07-1777					GROUND WATER (ft)				
BORING NO. TP-2104		DRILL METHOD: Back Hoe			SAMPLE METHODS: Hand					0 HR. ND				
GROUND SURFACE ELEV. 80.2 ft (NAVD88)		NORTHING 13,412,451			US ft (NAD83)		EASTING 2,600,288		US ft (NAD83)		24 HR. ND			
TOTAL DEPTH 10.0 ft		DRILL MACHINE John Deere			DRILLER: D. Rhodes			HAMMER (ID) NA						
DATE STARTED 1/17/08		COMPLETED 1/17/08			CASING DEPTH: N/A			BITS USED: N/A						
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION		
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100	
80.2					Ground Surface							80.2	0.0	
					.....					J1		LEAN CLAY with sand (CH), very dark gray (10YR3/1), moist, organics, no HCl reaction		
					.....					J2		3.0ft: dark grayish brown (2.5Y4/2), carbonate nodules		
					.....					J3		4.5ft: grayish brown (2.5Y5/2), trace organics		
72.2	8.0				.....					B1A/B1B/J4		7.5ft: light gray (2.5Y7/2), strong HCl reaction		
					.....							70.2	10.0	
												Note: Bulk samples are composites of soil collected from the approximate sample-depth(s) listed below: 1.0ft: J1 3.0ft: J2 5.0ft: J3 8.0ft: Bulk (B1A/B1B)/J4 Boring Terminated at Elevation 70.2 ft		

EXELON COL BORE EXELON-2.GPJ EXELON COL.GDT 6/12/08



GEOTECHNICAL BORING LOG

Prepared By JPK Date 6-12-08Checked By KAW Date 6-12-08

SHEET 1 OF 1

BECHTEL PROJECT NO.: 25352					COUNTY Victoria					GEOLOGIST M. Harvey/A. Shaw				
SITE DESCRIPTION Exelon COL Project (Victoria Site)					MACTEC PROJECT NO.: 6468-07-1777					GROUND WATER (ft)				
BORING NO. TP-2201		DRILL METHOD: Back Hoe			SAMPLE METHODS: Hand					0 HR. ND				
GROUND SURFACE ELEV. 79.9 ft (NAVD88)		NORTHING 13,413,199			US ft (NAD83)		EASTING 2,600,399		US ft (NAD83)		24 HR. ND			
TOTAL DEPTH 10.0 ft		DRILL MACHINE John Deere			DRILLER: D. Rhodes			HAMMER (ID) NA						
DATE STARTED 1/17/08		COMPLETED 1/17/08			CASING DEPTH: N/A			BITS USED: N/A						
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100				
79.9					Ground Surface								79.9 0.0	
										J1			78.4 1.5	
74.9	5.0									B1A/B1B/ B1J			LEAN CLAY with sand (CL), gray green, moist, little sand	
													8.0ft: gray green, increased HCl reaction with depth	
													10.0ft: strong HCl reaction	
													69.9 10.0	
													Note: Bulk samples are composites of soil collected from the approximate sample-depth(s) listed below: 2.0ft: J1 5.0ft: B1J 5.0 to 10.0ft: Bulk (B1A/B1B) Boring Terminated at Elevation 69.9 ft	

EXELON COL BORE EXELON-2.GPJ EXELON COL.GDT 6/12/08



GEOTECHNICAL BORING LOG

Prepared By JTF Date 6-12-08Checked By KAW Date 6-12-08

SHEET 1 OF 1

BECHTEL PROJECT NO.: 25352				COUNTY Victoria				GEOLOGIST M. Harvey					
SITE DESCRIPTION Exelon COL Project (Victoria Site)				MACTEC PROJECT NO.: 6468-07-1777				GROUND WATER (ft)					
BORING NO. TP-2202		DRILL METHOD: Back Hoe		SAMPLE METHODS: Hand				0 HR. ND					
GROUND SURFACE ELEV. 80.6 ft (NAVD88)		NORTHING 13,412,890		US ft (NAD83)		EASTING 2,600,464		US ft (NAD83)		24 HR. ND			
TOTAL DEPTH 10.0 ft		DRILL MACHINE John Deere		DRILLER: D. Rhodes		HAMMER (ID) NA							
DATE STARTED 1/17/08		COMPLETED 1/17/08		CASING DEPTH: N/A		BITS USED: N/A							
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT			SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION			
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100			
80.6					Ground Surface							80.6	0.0
										J1		FAT CLAY with sand (CH), brownish gray, moist	
75.6	5.0									BJ1		5.0ft: light brownish gray, weak HCl reaction	
										B1A/B1B			
										J2			
												70.6	10.0
												Note: Bulk samples are composites of soil collected from the approximate sample-depth(s) listed below: 5.0ft: J1 5.0-10.0ft: BJ1 8.0ft: Bulk (B1A/ B1B) 10.0ft: J2 Boring Terminated at Elevation 70.6 ft	

EXELON COL BORE EXELON-2.GPJ EXELON COL.GDT 6/12/08



GEOTECHNICAL BORING LOG

Prepared By DDK Date 6-12-08Checked By KAW Date 6-12-08

SHEET 1 OF 1

BECHTEL PROJECT NO.: 25352				COUNTY Victoria				GEOLOGIST M. Harvey					
SITE DESCRIPTION Exelon COL Project (Victoria Site)				MACTEC PROJECT NO.: 6468-07-1777				GROUND WATER (ft)					
BORING NO. TP-2203		DRILL METHOD: Back Hoe		SAMPLE METHODS: Hand				0 HR. ND					
GROUND SURFACE ELEV. 80.3 ft (NAVD88)		NORTHING 13,412,718		US ft (NAD83)		EASTING 2,600,741		US ft (NAD83)		24 HR. ND			
TOTAL DEPTH 10.0 ft		DRILL MACHINE John Deere		DRILLER: D. Rhodes		HAMMER (ID) NA							
DATE STARTED 1/18/08		COMPLETED 1/18/08		CASING DEPTH: N/A		BITS USED: N/A							
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100	MOI		
80.3					Ground Surface							80.3	0.0
					.....					J1			
					.....					J2		77.5	2.8
					.....					J3			
													
72.3	8.0				.....					B1A/B1B/J4			
					.....					J5		70.3	10.0
Note: Bulk samples are composites of soil collected from the approximate sample-depth(s) listed below: 1.0ft: J1 3.0ft: J2 5.0ft: J3 8.0ft: Bulk (B1A/B1B)/J4 10.0ft: J5 Boring Terminated at Elevation 70.3 ft													

EXELON COL BORE EXELON-2.GPJ EXELON COL.GDT 6/12/08



GEOTECHNICAL BORING LOG

Prepared By JPK Date 6.12.08Checked By KAW Date 6.12.08

SHEET 1 OF 1

BECHTEL PROJECT NO.: 25352				COUNTY Victoria				GEOLOGIST M. Harvey/A. Shaw					
SITE DESCRIPTION Exelon COL Project (Victoria Site)				MACTEC PROJECT NO.: 6468-07-1777				GROUND WATER (ft)					
BORING NO. TP-2204		DRILL METHOD: Back Hoe		SAMPLE METHODS: Hand		0 HR. ND		24 HR. ND					
GROUND SURFACE ELEV. 80.8 ft (NAVD88)		NORTHING 13,413,216		US ft (NAD83)		EASTING 2,600,932		US ft (NAD83)					
TOTAL DEPTH 10.0 ft		DRILL MACHINE John Deere		DRILLER: D. Rhodes		HAMMER (ID) NA							
DATE STARTED 1/17/08		COMPLETED 1/17/08		CASING DEPTH: N/A		BITS USED: N/A							
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100			
80.8					Ground Surface							80.8	0.0
75.8	5.0									J1			
										B1A/ B1B/B1J			
										J2		70.8	10.0
Note: Bulk samples are composites of soil collected from the approximate sample-depth(s) listed below: 1.0ft: J1 5.0-10.0ft: Bulk (B1A/ B1B)/B1J 10.0ft: J2 Boring Terminated at Elevation 70.8 ft													

EXELON COL BORE EXELON-2.GPJ EXELON COL.GDT 6/12/08

STANDARD PENETRATION TEST ENERGY REPORTS

MACTEC Engineering and Consulting, Inc.
Raleigh, NC

March 14, 2008

Memorandum to File

From: Steve Kiser *SK*

Reviewed By: Kathryn White *KAW* 3/14/08

Subject: Report of SPT Energy – MACTEC Raleigh CME 55LC Track
Hammer Serial No. MEC-02 Automatic Hammer
WORK INSTRUCTION 19
Exelon COL Project
Victoria County, Texas
MACTEC Project No. 6468-07-1777

Kyle Miller and Steve Kiser, of MACTEC Engineering and Consulting, Inc. (MACTEC), performed energy measurements on the 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 December 4 and 18, 2007, during drilling of Borings B-2180 and B-2301, respectively, at the referenced site. The testing was performed from approximately 10:15 to 11:10 AM under sunny skies and a temperature of about 60 degrees Fahrenheit on December 4, and from approximately 4:30 PM to 5:25 PM under cloudy skies and a temperature of about 70 degrees Fahrenheit on December 18. The borings were drilled with personnel and equipment from the Raleigh office of MACTEC. The drilling equipment consisted of a CME 55LC model track-mounted drill rig with an SPT automatic hammer. The drilling tools consisted of AW-J-sized drilling rods (December 4) and NW-J-sized drilling rods (December 18) and a 2-foot long split tube sampler. Mud rotary drilling techniques were used to advance the borings below the depth at which groundwater was encountered at the time of energy testing. 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. P5953 and P5992) and strain gages (Serial Nos. AW #75/1 and AW#75/2 on December 4; Serial Nos. NW#146/1 and NW146/2 on December 19). 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 used on December 4 had a cross-sectional area of approximately 1.19 square inches and an outside diameter of approximately 1.75 inches at the gage location. The drill rods included in the drill rod string on December 4 were hollow rods in 5 to 10 foot long sections, with an outside and inside diameter of approximately 1.75 and 1.375 inches, respectively. The instrumented rod insert used on December 19 had a cross-sectional area of approximately 1.49 square inches and an outside diameter of approximately 2.625 inches at the gage location. The drill rods included in the drill rod string on December 19 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

23 Pages Total

closed hammer system, the hammer lubrication condition and anvil dimensions could not be observed.

Calibration Records

The calibration records for all the above are filed in DCN EXE 315.

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 PDILOT tables and are also shown graphically in the PDILOT 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.
- The range of average energy transferred from the hammer to the drill rods for each individual depth interval using the EFV method is shown in Table 1 below for each rod size tested. The corresponding energy transfer ratio of the SPT hammer system is also shown.

Table 1: Average Energy Transfer Range for the Depth Intervals Tested

Rod Size	Range of Average Energy Transferred, Per Individual Sample (foot-pounds)	Range of Average Energy Transfer Ratio (ETR)
AW-J	293 to 301	84% to 86%
NW-J	284 to 292	81% to 83%

- 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) is shown in Table 2 below for each rod size tested.

Table 2: Overall Energy Testing Results for Each Rod Size

Rod Size	Overall Average Energy Transferred (foot-pounds)	Range of Overall Average Energy Transfer Ratio (ETR)
AW-J	297.3	84.9%
NW-J	288.8	82.5%

Attachments: Page 4 Table 3 - Summary of SPT Energy Measurements – 1 Page
Page 5 Work Instruction – DCN EXE 19 – 1 Page
Pages 6 – 7 Record of SPT Energy Measurement – 2 Pages
Pages 8 – 23 PDILOT Output – 16 Pages

TABLE 3
SUMMARY OF SPT ENERGY MEASUREMENTS (ASTM D4633-05)
 Exelon Victoria COL Project
 Victoria County, Texas
 MACTEC Project No. 6468-07-1777

Hammer Serial No.	Rig Owner	Rig Operator	Boring No. Tested	Rod Size	Date Tested	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)
MBC-02 (CME 55LC Track)	MACTEC Raleigh	David White	B-2180	AW-J	12/4/2007	83.5 - 85.0	6 - 11 - 12	29	294	84.0%
						88.5 - 90.0	12 - 16 - 26	54	293	83.7%
						93.5 - 95.0	21 - 24 - 26	71	301	86.0%
						98.5 - 98.7	50 / 0.2'	99	298	85.1%
						Average for AW-J Rods:			297.3	84.9%
			B-2301	NW-J	12/18/2007	18.5 - 20.0	6 - 6 - 9	21	284	81.1%
						23.5 - 25.0	5 - 5 - 8	18	288	82.3%
						28.5 - 30.0	9 - 12 - 15	36	292	83.4%
						Average for NW-J Rods:			288.8	82.5%
						Average for Rig:			295.4	84.4%

^aMeasured 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.

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

^bEnergy 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 ETR values may differ slightly and insignificantly from those in the PDILOT tables due to roundoff.

Prepared By: <u>SK</u> STEVE KISER	Date: 3-14-08	Checked By: KAW	Date: 3/14/08
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Work Instruction No. 19
Exelon COL Project
MACTEC Engineering and Consulting, Inc.
MACTEC Project 6468-07-1777

Issued To: <u>Stephen E. Kiser, Kyle B. Miller</u>	Rev. No. <u>0</u>
Issued By: <u>Kathryn A. White</u>	Date: <u>8-19-07</u>
Valid From: <u>8-19-07</u>	To: <u>8-19-08</u>

Task Description: Perform SPT Hammer Energy Measurements

Applicable Technical Procedures or Plans, or other reference: Geotechnical Work Plan (current revision), Bechtel Engineering Specification 25352-102-3PS-CY00-00001, Rev 000, and ASTM D 4633-05. Copies of the Work Plan and Bechtel Engineering Specification are provided in the Site Office. A copy of ASTM procedure are attached.

Specific Instructions (note attachments where necessary): Energy measurement will be performed in accordance with ASTM D 4633-05 at borings and depths selected by Bechtel. For drill rigs using both AW and NW drill rods, energy measurements must be made for both rod types as indicated in assignment sheet provided by Site Coordinator prior to start of work. Prepare and submit an energy measurement report containing information described in Section 8 of ASTM D 4633-05.

Special Instructions (note attachments where necessary): If changed conditions are encountered contact Project Manager and Project Principal Engineer immediately.

Report Format: Standard MACTEC forms provided by Project Manager and Project Principal Engineer.

Specific Quality Assurance Procedures Applicable: MACTEC QA Manual, QAPD, HASP and QAP-25-1; current revisions apply.

Hold Points or Witness Points:

- Calibration information is submitted to Bechtel
- Deviations from QAPD/HASP/Work Plan

Records: All records generated shall be considered QA Records.

Reviewed and Approved by: (Note: Only one signature is required for issuance)	
Project Manager: _____	Date: _____
Project Principal Engineer: _____	Date: _____
Site Manager/Coordinator: <u></u>	Date: <u>8-20-07</u>
Pages: <u>8</u>	DCN: <u>EXE</u>

2801 YORKMONT ROAD, SUITE 100 □ CHARLOTTE, NC 28208
Telephone: (704) 357-8600 / Facsimile: (704) 357-8638

RECORD OF SPT ENERGY MEASUREMENT

GENERAL INFORMATION		DRILL RIG DATA	
PROJECT:	Exelon 2 (Victoria) COL Site	MAKE:	CME
LOCATION:	Victoria, Texas	MODEL:	55 LC
PROJECT NO.:	6468-07-1777	SERIAL NO.:	MEC-02
DATE:	12/4/2007	HAMMER TYPE:	Auto
WEATHER:	Sunny 60°F	ROPE CONDITION:	N/A
INSPECTOR:	Kyle Miller	ROD SIZE:	AW-J
DRILLING COMPANY:	MACTEC	NO. OF SHEAVES:	N/A

BORING DATA	
BORING NUMBER:	B-2180
DEPTH DRILLED:	83.5' to 100'
TIME DRIVEN:	10:15 AM - 11:15 AM
RIG OPERATOR:	David White
HAMMER OPERATOR:	N/A
PDA PAK SERIAL NO.:	3622L
INSTR. ROD AREA:	1.19 in ²
ACCEL. SERIAL NOS.:	5953; 5992
STRAIN SERIAL NOS.:	75 AW-1; 75 AW-2

[illegible]

REMARKS:

none

NONE

NONE

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RECORD OF SPT ENERGY MEASUREMENT

GENERAL INFORMATION		DRILL RIG DATA	
PROJECT:	Exelon 2 (Victoria) COL Site	MAKE:	CME
LOCATION:	Victoria, Texas	MODEL:	55LL TRACK
PROJECT NO.:	6468-07-1777	SERIAL NO.:	MEC-02
DATE:	12-18-07	HAMMER TYPE:	AUTOMATIC
WEATHER:	CLOUDY 70°	ROPE CONDITION:	N/A
INSPECTOR:	Q1 Kyle Miller STEVE KISER	ROD SIZE:	NW-5
DRILLING COMPANY:	MACTEC CALBIGH	NO. OF SHEAVES:	N/A

BORING DATA	
BORING NUMBER:	B-2301
DEPTH DRILLED:	100' PLANNED
TIME DRIVEN:	VARIOUS
RIG OPERATOR:	DAVID WHITE
HAMMER OPERATOR:	N/A
PDA PAK SERIAL NO.:	3622L
INSTR. ROD AREA:	1.49 in ²
ACCEL. SERIAL NOS.:	P5953 P5992
STRAIN SERIAL NOS.:	146 NN # 1/2

[illegible]

REMARKS:

PDILOT Ver. 2008.1 - Printed: 28-Feb-2008

MACTEC Engineering and Consulting, Inc. - Case Method Results

Test date: 4-Dec-2007

EXCELON VICTORIA COL PROJECT - BORING B-2180; 83.5' - 85' SAMPLE

