GEOTECHNICAL CORING LOG

Prepared By: MBL Date: 3/5/14

Checked By: JCM Date: 3/5/14

BECHTEL PROJECT NO.: 25847	AMEC PROJECT NO.: 6468-13-1072	COUNTY: Roane, TN	GEOLOGIST: M. Flanik
SITE DESCRIPTION: Clinch River SMR Project, Roane County, Tennessee		DRILLER: J. Landeros/N. Molinalara	Boring Orientation
BORING NO.: MP-115	DRILL METHOD: Mud Rotary/Core	DRILL MACHINE: CME-550X (P)	Inclination: Vertical
GROUND ELEV.: 796.9 ft (NAVD88)	NORTHING: 570,095 US ft (NAD83)	EASTING: 2,448,562 US ft (NAD83)	Azimuth: NA
TOTAL DEPTH: 99.1 ft	SAMPLE METHODS: ASTM D 1586-11; 2488-09a; 2113-08; 6032-08		HAMMER (ID): 140-lb Auto (337153)
DATE STARTED: 6/23/13	COMPLETED: 6/24/13	CASING DEPTH: 16.7 ft	CORE BARREL TYPE: HQ3/Diamond Impregnated core bits

ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	LOG	ROCK DESCRIPTION AND REMARKS
								Begin Coring @ 17.5 ft
779.4	17.5	1.6	6:30	(1.6) 100%	(0.9) 56%	Run 1		779.4 LIMESTONE (MICRITE), gray (N 6/ to N 5/), strong, very thinly to moderately bedded, slightly weathered to fresh, interbedded with few to little, mostly laminated to thin, wavy and diffuse Calcareous SILTSTONE, very dark gray (N 3/); locally strongly bioturbated with vertical and horizontal burrows, trace to few calcite filled pits and burrows and sparry calcite "bird eyes", strong HCl reaction **(Benbolt Formation-Unit E)** 17.5
777.8	19.1		2:54/0.6					17.8,18.1,18.5ft: BJ, 10-25°, PS-US, PO-O, C, III-IV
		5.0	3:30	(5.0) 100%	(2.9) 58%	Run 2		19.3-19.5ft: FZ, 30-40°, PS-SR, O, D, IV
			2:49					20.0ft: J, 35°, SR, PO, C, III
			2:33					20.4,20.7,20.8,21.7,22.2,22.4,23.4,23.6ft: BJ, 30-35°, PR-PS, T-O, B-D, II-IV
			3:22					23.1ft: J, 45°, T, A, I (intact)
772.8	24.1		5:00					24.0,24.5,24.7,24.8ft: BJ, 25-30°, PR, PO-O, C, IV
		5.0	3:29	(5.0) 100%	(3.1) 62%	Run 3		25.1,25.2,25.4,25.5,27.0,28.0,28.7ft: BJ, 30°, PR, T-O,B-D, III-IV
			4:30					25.3,25.6,26.2,26.8,27.4ft: J, 40-60°, PR, T-PO, C, III
			3:58					
			5:10					
767.8	29.1		4:37					
		5.0	2:50	(5.0) 100%	(4.5) 90%	Run 4		29.1ft: As above, becomes fresh
			3:30					30.5ft: J, 60-85°, UR, T-PO, C, IV
			4:30					32.1ft: J, 80°, VT, A, I, healed with calcite
			4:55					33.1ft: BJ, 30°, PS, PO, B, III
762.8	34.1		4:33					33.6ft: FZ, 30°, PS, T-PO, B, II
		5.0	4:06	(5.0) 100%	(4.9) 98%	Run 5		37.3ft: J, 45°, PS, T, B, II
			3:57					38.8ft: BJ, 30°, PS, PO, B, III
			4:29					
			4:09					
757.8	39.1		3:04					
		5.0	2:54	(5.0) 100%	(5.0) 100%	Run 6		41.9,42.8ft: BJ, 30°, PS, T-PO, B, II
			2:35					42.4ft: 5 healed fractures, 75°, VT, A, I, intact with calcite; space <0.1'
			2:39					
			2:47					
752.8	44.1		2:53					
		5.0	3:33	(5.0) 100%	(4.7) 94%	Run 7		48.2,48.4ft: BJ, 30°, PR, T, C, III
			3:36					48.2ft: J, 60°, PR, T, C, III
			2:59					
			3:09					
747.8	49.1		2:59					
		5.0	4:59	(5.0) 100%	(5.0) 100%	Run 8		
			4:07					
			3:33					
			3:20					
742.8	54.1		3:02					
		5.0	2:20	(5.0) 100%	(4.7) 94%	Run 9		54.3,54.4,55.2,58.6ft: BJ, 25-30°, PS-PR, T-PO, B, II
			2:25					
			2:22					
			2:30					
737.8	59.1		2:45					
		1.2	2:20	(1.2) 100%	(1.2) 100%	Run 10		
736.6	60.3		0:24/0.2					
		3.8	3:36/0.8	(3.8) 100%	(3.8) 100%	Run 11 L3-23		60.7ft: BJ, 30°, PS, T, C, II
			3:09					
			3:33					
732.8	64.1		3:31					
		5.0	3:27	(5.0) 100%	(5.0) 100%	Run 12		68.2ft: J, 55°, PR, T-O, B, II
			2:39					

CLINCH RIVER SMR CORE FINAL CLINCH FINAL LOGS.GPJ CLINCH BORING DATA TEMPLATE.GDT 3/5/14

BECHTEL PROJECT NO.: 25847	AMEC PROJECT NO.: 6468-13-1072	COUNTY: Roane, TN	GEOLOGIST: M. Flanik
SITE DESCRIPTION: Clinch River SMR Project, Roane County, Tennessee		DRILLER: J. Landeros/N. Molinalara	Boring Orientation
BORING NO.: MP-115	DRILL METHOD: Mud Rotary/Core	DRILL MACHINE: CME-550X (P)	Inclination: Vertical
GROUND ELEV.: 796.9 ft (NAVD88)	NORTHING: 570,095 US ft (NAD83)	EASTING: 2,448,562 US ft (NAD83)	Azimuth: NA
TOTAL DEPTH: 99.1 ft	SAMPLE METHODS: ASTM D 1586-11; 2488-09a; 2113-08; 6032-08		HAMMER (ID): 140-lb Auto (337153)
DATE STARTED: 6/23/13	COMPLETED: 6/24/13	CASING DEPTH: 16.7 ft	CORE BARREL TYPE: HQ3/Diamond Impregnated core bits

ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	LOG	ROCK DESCRIPTION AND REMARKS
								Continued from previous page
			2:48					LIMESTONE (MICRITE), gray (N 6/ to N 5/), strong, very thinly to moderately bedded, slightly weathered to fresh, interbedded with few to little, mostly laminated to thin, wavy and diffuse Calcareous SILTSTONE, very dark gray (N 3/); locally strongly bioturbated with vertical and horizontal burrows, trace to few calcite filled pits and burrows and sparry calcite "bird eyes", strong HCl reaction **(Benbolt Formation-Unit E)** *(continued)*
			2:36					
727.8	69.1		2:12					
		5.0	3:23	(5.0) 100%	(5.0) 100%	Run 13 *L3-24*		
			2:40					
			2:27					71.1ft: As above, little to some Calcareous SILTSTONE interbeds
			3:15					
			3:25					
722.8	74.1							723.5 — 73.4
		5.0	3:29	(5.0) 100%	(5.0) 100%	Run 14		CALCAREOUS SILTSTONE, greenish black (10Y 2.5/1), weak to medium strong, very thinly to moderately bedded, fresh, interbedded with few, laminated to very thin, amorphous LIMESTONE (MICRITE), dark gray (N 4/); strong HCl reaction
			3:04					721.0 — 75.9
			3:22					LIMESTONE (MICRITE), dark gray (N 4/), medium strong to strong, laminated to very thinly bedded, fresh, interbedded with some, laminated to very thinly bedded Calcareous SILTSTONE, greenish black (10Y 2.5/1); trace calcite filled pits and burrows, strong HCl reaction
			3:50					
717.8	79.1		3:27					83.1ft: BJ, 30°, PR, PO, B, II
		5.0	4:27	(5.0) 100%	(4.5) 90%	Run 15		
			3:43					
			3:24					
			3:27					
712.8	84.1		3:21					713.4 — 83.5
		5.0	2:48	(5.0) 100%	(4.5) 90%	Run 16		LIMESTONE (MICRITE/WACKESTONE), gray (N 5/) to dark gray (N 4/), medium strong to strong, very thinly to moderately bedded, fresh, interbedded with little, laminated to thin, wavy to irregular Calcareous SILTSTONE, greenish black (10Y 2.5/1), and few very thin to thin chert beds, lenses, and nodules (dark gray to black, with calcite healed tensional fractures orthogonal to bedding); trace calcite and pyrite filled burrows, strong HCl reaction
			2:24					83.6,83.7,83.8,83.9ft: SH, 20-25°, PL, T, B, II
			3:31					85.2ft: BJ, 25°, PR, T, B, III, trace pyrite
			3:30					
707.8	89.1		3:46					
		5.0	5:08	(5.0) 100%	(4.2) 84%	Run 17		90.3,93.7ft: BJ, 30°, PS, T, B, II-III
			3:35					93.2ft: J, 65°, PR, T, C, III
			3:24					
			3:45					
702.8	94.1		2:33					
		5.0	3:23	(4.9) 98%	(4.9) 98%	Run 18		
			2:54					
			3:00					
			3:00					
697.8	99.1		2:41					697.8 — 99.1
								Boring and coring terminated at 99.1 feet.

CLINCH RIVER SMR CORE FINAL CLINCH FINAL LOGS.GPJ CLINCH BORING DATA TEMPLATE.GDT 3/5/14

MP-115 – Boxes 1 and 2

MP-115 – Boxes 3 and 4

MP-115 – Boxes 5 and 6

GEOTECHNICAL BORING LOG

Prepared By: MBL Date: 3/5/14

Checked By: JCM Date: 3/5/14

SHEET 1 OF 1

BECHTEL NO.: 25847	AMEC PROJECT NO.: 6468-13-1072	COUNTY: Roane, TN	GEOLOGIST: K. Lloyd
SITE DESCRIPTION: Clinch River SMR Project, Roane County, Tennessee		DRILLER: L. Carter/J. Rosser	Boring Orientation
BORING NO.: MP-116	DRILL METHOD: Mud Rotary/Core	DRILL MACHINE: CME-750X (P)	Inclination: Vertical
GROUND ELEV.: 797.6 ft (NAVD88)	NORTHING: 570,202 US ft (NAD83)	EASTING: 2,448,560 US ft (NAD83)	Azimuth: NA
TOTAL DEPTH: 100.4 ft	SAMPLE METHODS: ASTM D 1586-11; 2488-09a; 2113-08; 6032-08	ROD TYPE: AWJ	HAMMER (ID):140-lb Auto (323438)
DATE STARTED: 7/30/13	COMPLETED: 7/31/13 HOLE DIA.: 4"	CASING DEPTH: 33.5 ft CORE SIZE:HQ3	BITS USED: 4" Roller Cone

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	LOG	SOIL DESCRIPTION AND REMARKS
797.6					Ground Surface			797.6 0.0
797.6	0.0	2	4	10	14	SS-1		FILL:Sandy LEAN CLAY with Gravel (CL), light yellowish brown (2.5Y 6/4), stiff, moist, moderately plastic fines, little fine to coarse sand, little fine subangular gravel, strong HCl reaction
795.1	2.5							FILL: Gravelly FAT CLAY (CH), light yellowish brown (2.5Y 6/4), stiff, moist, moderately to highly plastic fines, little to some fine to coarse subangular gravel, few fine to coarse sand, strong HCl reaction
794.1	3.5	5	4	7	11	SS-2		
791.6	6.0	2	2	5	7	SS-3		6.0ft: As above, to reddish brown (5YR 4/4), medium stiff, trace fine to coarse sand
789.1	8.5	6	5	12	17	SS-4		8.5ft: As above, to yellowish brown (10YR 5/4), very stiff, moist to wet
786.4	11.2	4	7	7	14	SS-5		11.2ft: As above, to light yellowish brown (2.5Y 6/4), stiff, moist, little coarse sand
784.6	13.0							FILL: WELL GRADED GRAVEL (GW), gray (2.5Y 6/1) and dark reddish gray (2.5YR 3/1), medium dense, moist, fine to coarse subangular gravel, strong HCl reaction
783.7	13.9	5	5	12	17	SS-6		
781.6	16.0							FILL: Sandy FAT CLAY with Gravel (CH), light olive brown (2.5Y 5/4), reddish brown (5YR 4/3), and strong brown (7.5YR 5/6), stiff, moist, moderately to highly plastic fines, little coarse sand, little coarse gravel, strong HCl reaction
781.2	16.4	7	6	7	13	SS-7		18.9ft: As above, to brownish yellow (10YR 6/6), little fine to coarse subangular gravel, no sand
778.7	18.9	6	4	5	9	SS-8		
776.6	21.0							RESIDUAL SOIL: FAT CLAY (CH), olive gray (5YR 4/2), very stiff, moist, highly plastic fines, trace fine to medium sand, strong HCl reaction
773.7	23.9	4	6	12	18	SS-9		
769.6	28.0							WEATHERED ROCK: LIMESTONE, sampled as Gravelly FAT CLAY (CH), light olive brown (2.5Y 5/3) and gray (N 5/), hard, moist, moderately plastic fines, some fine to coarse gravel, little fine to coarse sand, strong HCl reaction
768.7	28.9	44	50/0.4		50/0.4	SS-10		
764.9	32.7							LIMESTONE, no recovery, hard drilling
763.7	33.9	50/0.1			50/0.1	SS-11		763.6 34.0 Soil drilling halted. Log continues on geotechnical coring log
								Observed water levels: 12.3 ft bgs, AM 7/31/13

CLINCH RIVER SMR BORE FINAL CLINCH FINAL LOGS.GPJ CLINCH BORING DATA TEMPLATE.GDT 3/5/14