GEOTECHNICAL BORING LOG

Prepared By: MBL Date: 3/5/14

Checked By: JCM Date: 3/5/14

SHEET 1 OF 2

BECHTEL NO.: 25847	AMEC PROJECT NO.: 6468-13-1072	COUNTY: Roane, TN	GEOLOGIST: N. Smith
SITE DESCRIPTION: Clinch River SMR Project, Roane County, Tennessee		DRILLER: D. White/O. Smith	Boring Orientation
BORING NO.: CC-B1	DRILL METHOD: Mud Rotary/Core	DRILL MACHINE: CME-55LC (C)	Inclination: Vertical
GROUND ELEV.: 800.3 ft (NAVD88)	NORTHING: 569,036 US ft (NAD83)	EASTING: 2,449,632 US ft (NAD83)	Azimuth: NA
TOTAL DEPTH: 140.6 ft	SAMPLE METHODS: ASTM D 1586-11; 2488-09a; 2113-08; 6032-08	ROD TYPE: AWJ	HAMMER (ID): 140-lb Auto (331145)
DATE STARTED: 8/27/13	COMPLETED: 8/30/13	HOLE DIA.: 4"	CASING DEPTH: 47.0 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
800.3					Ground Surface			
800.3	0.0	4	3	4	7	SS-1		TOPSOIL: LEAN CLAY (CL), reddish brown (2.5YR 4/4) and brown (7.5YR 4/4), mottled, medium stiff, moist, low plasticity fines, few to little fine to medium sand, trace fine gravel sized rock fragments, with roots and wood fragments, no HCl reaction (PP=1.75 tsf)
797.8	2.5							COLLUVIUM: CLAYEY GRAVEL with Sand (GC), red (2.5YR 4/6) and strong brown (7.5YR 5/6), mottled, dense, moist, some fine to coarse sand, little low to moderate plasticity fines, some fine to coarse gravel sized subrounded to subangular chert and sandstone rock fragments, no HCl reaction (possible terrace deposits)
796.5	3.8	10	13	18	31	SS-2		
794.4	5.9	16	17	17	34	SS-3		
792.3	8.0							RESIDUAL SOIL: ELASTIC SILT (MH), dark reddish brown (2.5YR 3/3) and strong brown (7.5YR 5/6), mottled, stiff, moist, moderate to high plasticity fines, few fine sand, trace fine gravel sized rock fragments, saprolitic, no HCl reaction
791.3	9.0	4	5	7	12	SS-4		
789.3	11.0							RESIDUAL SOIL: SILT with Sand (ML), dark reddish brown (2.5YR 3/3), yellowish red (5YR 4/6), dark reddish gray (2.5YR 4/1), and brown (7.5YR 4/4), mottled, stiff to hard, moist, non-plastic to low plasticity fines, little fine to medium sand, trace organics, saprolitic, no HCl reaction (PP=1.5-2.0 tsf)
789.0	11.3	2	5	4	9	SS-5		
786.5	13.8	6	6	6	12	SS-6		
781.3	19.0	18	17	16	33	SS-7		
776.2	24.1	8	8	10	18	SS-8		
773.3	27.0							RESIDUAL SOIL: ELASTIC SILT (MH), reddish brown (2.5YR 4/4) to reddish brown (2.5YR 3/3), dark reddish gray (2.5YR 4/1), and yellowish brown (10YR 5/4), mottled, very soft, moist to wet, low to moderate plasticity fines, trace to few fine sand, saprolitic, no HCl reaction (PP=0.25 tsf)
771.3	29.0	WOH	WOH	2	2	SS-9		
766.3	34.0	WOH	WOH	2	2	SS-10		
761.3	39.0	WOH	WOH	2	2	SS-11		
756.3	44.0	WOH	WOH	50/0.1	50/0.1	SS-12		
755.3	45.0							WEATHERED ROCK: CALCAREOUS SILTSTONE, sampled as Gravelly SILT (ML), reddish brown (2.5YR 3/3), very dense, moist, non-plastic to low plasticity fines, some fine gravel sized rock fragments, trace to few fine to coarse sand, strong HCl reaction
751.6	48.7							

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

GEOTECHNICAL BORING LOG

BECHTEL NO.: 25847	AMEC PROJECT NO.: 6468-13-1072	COUNTY: Roane, TN	GEOLOGIST: N. Smith
SITE DESCRIPTION: Clinch River SMR Project, Roane County, Tennessee		DRILLER: D. White/O. Smith	Boring Orientation
BORING NO.: CC-B1	DRILL METHOD: Mud Rotary/Core	DRILL MACHINE: CME-55LC (C)	Inclination: Vertical
GROUND ELEV.: 800.3 ft (NAVD88)	NORTHING: 569,036 US ft (NAD83)	EASTING: 2,449,632 US ft (NAD83)	Azimuth: NA
TOTAL DEPTH: 140.6 ft	SAMPLE METHODS: ASTM D 1586-11; 2488-09a; 2113-08; 6032-08	ROD TYPE: AWJ	HAMMER (ID): 140-lb Auto (331145)
DATE STARTED: 8/27/13	COMPLETED: 8/30/13	HOLE DIA.: 4"	CASING DEPTH: 47.0 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
751.7					Continued from previous page			
		50/0.1			50/0.1	SS-13		751.5 / 48.8 Soil drilling halted. Log continues on geotechnical coring log

Observed water levels:
Dry, AM 8/28/13
39.8 ft bgs, AM 8/29/13
41.4 ft bgs, AM 8/30/13

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

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: N. Smith**
SITE DESCRIPTION: Clinch River SMR Project, Roane County, Tennessee		**DRILLER: D. White/O. Smith**	**Boring Orientation**
BORING NO.: CC-B1	**DRILL METHOD: Mud Rotary/Core**	**DRILL MACHINE: CME-55LC (C)**	**Inclination: Vertical**
GROUND ELEV.: 800.3 ft (NAVD88)	**NORTHING: 569,036 US ft (NAD83)**	**EASTING: 2,449,632 US ft (NAD83)**	**Azimuth: NA**
TOTAL DEPTH: 140.6 ft	**SAMPLE METHODS: ASTM D 1586-11; 2488-09a; 2113-08; 6032-08**		**HAMMER (ID): 140-lb Auto (331145)**
DATE STARTED: 8/27/13	**COMPLETED: 8/30/13**	**CASING DEPTH: 47.0 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 @ 48.8 ft
751.5	48.8	1.8	4:14	(1.8) 100%	(1.5) 83%	Run 1		751.5 CALCAREOUS SILTSTONE, dusky red (10R 3/3), medium strong to strong, laminated to thinly bedded, slightly weathered, interbedded with few to little, laminated to thin LIMESTONE (MICRITE), gray (10YR 5/1), planar to wavy/irregular and diffuse; slight to moderate bioturbation, trace to few calcite filled pits, strong HCl reaction **(Rome Formation)** 48.8
749.7	50.6		2:20/0.8					49.5,50.0ft: BJ, 30°, PR, PO-O, C, III
		2.8	4:05	(2.7) 96%	(2.7) 96%	Run 2		
			2:36					
746.9	53.4		2:55/0.8					747.0 51.1,52.3,53.1ft: SH, 35°, PS, VT, A, I, intact with calcite (opposite of bedding) 53.3
			N=50/0.4			SS-14		745.9 WEATHERED ROCK: CALCAREOUS SILTSTONE, highly weathered, sampled as CLAYEY GRAVEL (GC), reddish brown (2.5YR 3/3), very dense, moist, fine to coarse gravel, little moderate plasticity fines, trace coarse sand, strong HCl reaction (SS-14 53.4-53.8ft: 50/0.4') 54.4
746.5	53.8	1.8	4:26	(1.5) 83%	(0.9) 50%	Run 3		
744.7	55.6		4:18/0.8					
		5.0	5:06	(4.6) 92%	(4.0) 80%	Run 4		CALCAREOUS SILTSTONE, dusky red (10R 3/3), medium strong to strong, laminated to thinly bedded, slightly weathered, locally highly to moderately weathered, interbedded with little to some, laminated to thin LIMESTONE (MICRITE), gray (10YR 5/1), planar to wavy/irregular and diffuse; slight to moderate bioturbation, trace to few calcite filled pits, strong HCl reaction
			5:23					54.4,54.5,54.6,54.7,59.1,59.3ft: BJ, 30-60°, PR, PO, B-C, II-III
			3:41					56.8-57.0ft: FZ, 30°, PR, MO-P, IV, completely weathered
			3:35					
739.7	60.6		3:28					739.7 58.5-59.1ft: FZ, 30°, PR, MO, C, III, with calcite; 0.4' core loss 60.6
		5.0	5:39	(4.4) 88%	(3.6) 72%	Run 5		LIMESTONE (MICRITE) gray (10YR 5/1), medium strong to strong, laminated to thinly bedded, slightly weathered, interbedded with some Calcareous SILTSTONE, dusky red (10R 3/3); slight bioturbation, trace calcite filled pits, strong HCl reaction
			3:33					60.9,61.2,62.0,65.6ft: BJ, 30°, PO-O, PR, B-C, III
			4:21					61.6,63.2,64.5,64.8ft: SH, 35-40°, PS, VT, A, I, intact with calcite (opposite of bedding)
			4:13					
734.7	65.6		3:57					735.3 65.0
		5.0	4:55	(4.3) 86%	(2.1) 42%	Run 6		WEATHERED ROCK: LIMESTONE (MICRITE), as above to olive gray (5Y 4/2) and gray (5Y 5/1), moderately to completely weathered
			6:10					65.0-67.3ft: 1.3' Core loss
			4:11					732.5 67.8
			4:10					LIMESTONE (MICRITE), gray (5Y 5/1), olive gray (5Y 4/2), and dark gray (N 4/), strong to medium strong and very weak, laminated to thinly bedded, moderately to slightly weathered, interbedded with little to some, laminated to very thin Calcareous SILTSTONE and Clayey SHALE, dusky red (10R 3/3) to olive (10Y 4/4) and olive gray (5Y 4/2); slight to moderate bioturbation, healed fractures with calcite through-out, trace calcite filled pits, strong HCl reaction (Bedding variable at 30-40° to 50-60°)
			4:08					
729.7	70.6							
		5.0	3:05	(4.2) 84%	(1.9) 38%	Run 7		67.8,68.4ft: SH, 40-50°, O-VT, A-D, I-III, with calcite
			4:56					69.4,69.8,70.3,71.0,71.1,71.3,71.4,71.5ft: BJ, 30°, PS-PR, T-O, A-C, II-III
			6:43					69.4-69.8ft: FZ, 30°, PR-SR, MO-W, K III, with trace calcite
			4:39					71.3,74.7ft: SH, 60° and 30°, PL, PO, C, III
			11:30					72.2-73.3ft: SZ, 60-70°, PS, K, III, core loss of 0.8'
724.7	75.6							
		5.0	5:51	(3.8) 76%	(1.0) 20%	Run 8		73.6,73.9,74.7,75.1,75.2ft: BJ, 50°, PS-PR, T-PO, B-C, II-III
			4:34					75.3,75.4,75.6ft: BJ, 30°, PR-SR, T-PO, C, III
			4:20					75.9ft: SH, 30°, PL-UL, PO-O, B, III
			5:41					721.3 79.0
			5:05					WEATHERED ROCK/FAULT GOUGE: CLAYEY CALCAREOUS SHALE/SILTSTONE, light gray (5Y 7/2) to olive gray (5Y 5/2) to very dusky red (10R 3/3), very weak to extremely weak, highly to completely weathered, with trace to few dolomite cemented, feldspathic sand lenses; strong HCl reaction **(Copper Creek Thrust Fault)**
719.7	80.6							
		5.0	5:10	(4.4) 88%	(2.5) 50%	Run 9		79.4-81.2ft: 1.8' Core loss
			2:55					
			4:43					717.0 83.3
			5:03					LIMESTONE (MICRITE), dark greenish gray (5GY 4/1) to gray (N 5/-N 6/), medium strong to strong, very thinly to moderately bedded, fresh, argillaceous, interbedded with some, laminated to very thin, clayey Calcareous SILTSTONE, dark reddish gray (10R 3/1) to dark greenish gray (10GY 4/1); moderate to strong bioturbation, trace calcite filled pits, strong HCl reaction **(Moccasin Formation)**
			4:27					
714.7	85.6							
		5.0	5:52	(4.9) 98%	(4.7) 94%	Run 10		83.3-83.5ft: Upper surface highly polished, silicified
			4:01					84.5,88.0ft: SH, 40°, PL, VT, A-B, I-II, with calcite
			3:19					88.3ft: SH, 70°, PL, VT, A, I, intact
			4:52					88.6-88.9ft: SZ, 0-70°, VT-O, A-F, I-III; 0.1' core loss
			3:28					
709.7	90.6							
		5.0	4:10	(5.0) 100%	(4.0) 80%	Run 11		91.7,93.3ft: BJ, 30°, T-PO, B, III
			4:27					
			4:26					706.9 93.4
			4:15					
			3:58					
704.7	95.6							
		5.0	7:14	(2.3) 46%	(1.5) 30%	Run 12		
			5:17					

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

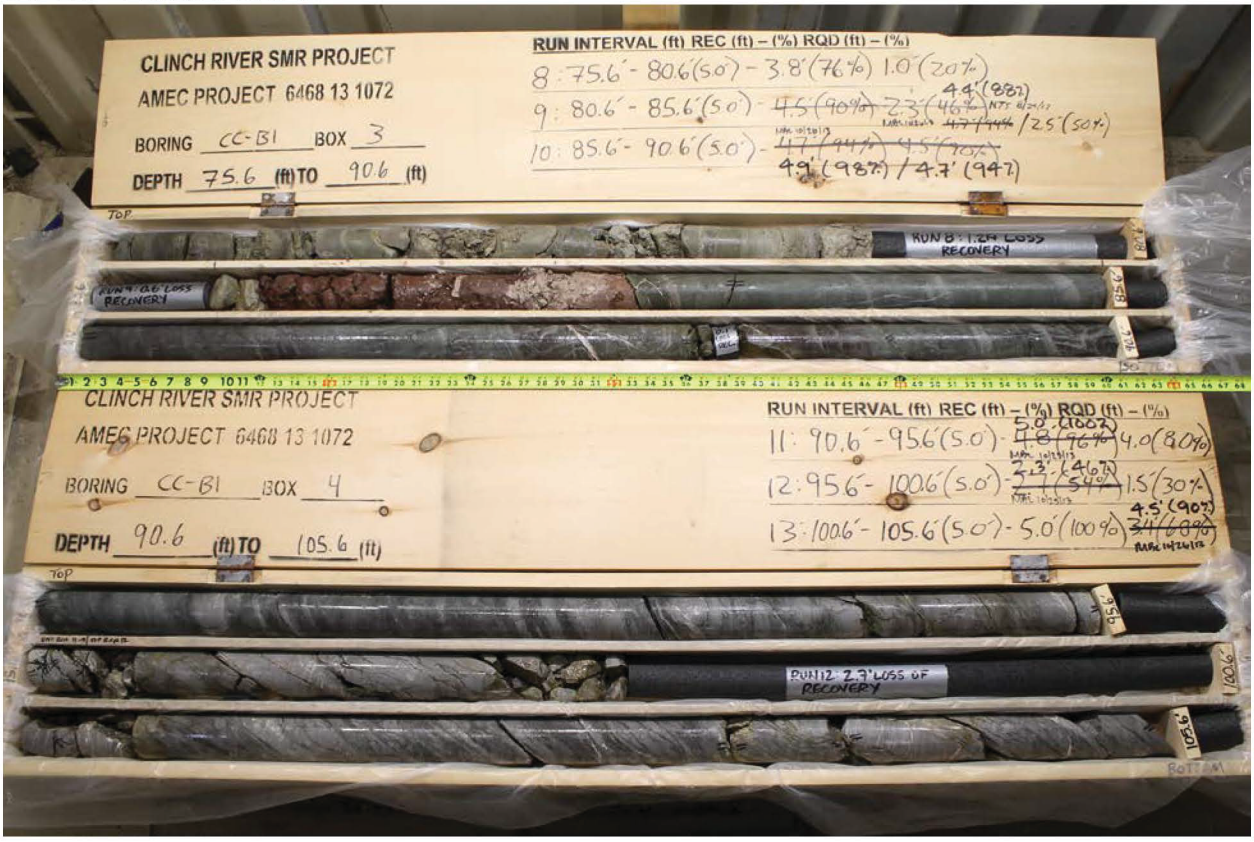
BECHTEL PROJECT NO.: 25847	AMEC PROJECT NO.: 6468-13-1072	COUNTY: Roane, TN	GEOLOGIST: N. Smith
SITE DESCRIPTION: Clinch River SMR Project, Roane County, Tennessee		DRILLER: D. White/O. Smith	Boring Orientation
BORING NO.: CC-B1	DRILL METHOD: Mud Rotary/Core	DRILL MACHINE: CME-55LC (C)	Inclination: Vertical
GROUND ELEV.: 800.3 ft (NAVD88)	NORTHING: 569,036 US ft (NAD83)	EASTING: 2,449,632 US ft (NAD83)	Azimuth: NA
TOTAL DEPTH: 140.6 ft	SAMPLE METHODS: ASTM D 1586-11; 2488-09a; 2113-08; 6032-08		HAMMER (ID): 140-lb Auto (331145)
DATE STARTED: 8/27/13	COMPLETED: 8/30/13	CASING DEPTH: 47.0 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
699.7	100.6	5.0	11:33 6:25 7:12 9:14 4:36 3:25 4:13 3:20	(5.0) 100%	(4.5) 90%	Run 13		LIMESTONE (MICRITE) and few (WACKESTONE/PACKSTONE), gray (N 5/-N 6/) to bluish gray (5PB 5/1), medium strong to strong, laminated to thinly bedded, slightly weathered to fresh, locally moderately weathered, interbedded with few to some, laminated to thin, clayey Calcareous SILTSTONE, olive gray (5Y 4/2) to very dark gray (N 3/), irregular to wavy bedding, and trace very thin chert lenses (gray to dark gray); slight bioturbation, locally fossiliferous in thin beds, trace calcite filled pits and vugs (separate/non-touching), strong HCl reaction (Bedding variable at 30-40° to 60-70°) *(continued)* 94.8,95.2,95.6ft: BJ, 30°, T-PO, B, III 94.2,94.5ft: SH, 20-30°, T-PO, B-C, III, with calcite 95.6-95.8ft: FZ, 60-70°, PL, O, C-D, III 96.3ft: SH, 60°, PL, PO-O, C, III, with calcite
694.7	105.6	5.0	4:29 3:13 6:19 3:57 3:20	(5.0) 100%	(3.3) 66%	Run 14		97.4-101.1ft: FZ, 60-70°, UR-PR, O-MO, C, III, highly weathered; 2.7' Core loss 97.8ft: BJ, 65°, US, O, C, III 100.6-101.1ft: FZ, 70-90°, PR, C, III 102.8,104.7,105.2ft: BJ, 50-70°, US, PO-O, C, III, with calcite 107.0ft: BJ, 60°, PS, T, B, II 107.3ft: SH, 10°, PL, T-PO, B, III 107.6-107.9ft: FZ, 0-40°, PR T-PO, C, III
689.7	110.6	5.0	6:13 3:16 3:32 2:45 2:43	(5.0) 100%	(4.5) 90%	Run 15		109.6-110.1ft: FZ, 60-90°, PS-PR, PO-O, B-C, II 110.7,110.8,110.9,111.0ft: BJ, 45°, PS-PR, T-O, B-C, II 114.7,114.8ft: BJ, 45°, PS-PR, T-PO, B, II 116.4,117.0ft: SH, 60-70°, PL, VT-T, A-B, I-II, with calcite 119.2-119.5ft: FZ, 45°, PR, core loss of 0.2'
684.7	115.6	5.0	3:33 3:14 3:09 3:37 6:54	(4.8) 96%	(4.4) 88%	Run 16		118.4,118.6ft: BJ, 40-50°, PR, T-PO, B, II-III
679.7	120.6	5.0	4:36 3:40 3:48 3:26 5:50	(4.2) 84%	(3.9) 78%	Run 17		120.8,120.9,121.0,121.1ft: BJ, 45°, UR, O, B, II 124.8-125.7ft: Weathered, core loss of 0.8'
674.7	125.6	5.0	3:49 3:51 3:40 3:45 3:28	(5.0) 100%	(4.9) 98%	Run 18		129.1ft: SH, 40°, SL, T-PO, B, II, with trace calcite
669.7	130.6	5.0	4:09 4:05 3:18 3:14 3:42	(5.0) 100%	(4.7) 94%	Run 19		131.0,131.2ft: SH, 30-40°, SL-PL, B, II with calcite 668.3 — 132.0 CALCAREOUS SILTSTONE, dark reddish gray (10R 3/1) and very dark greenish gray (5GY 3/1), strong, laminated to very thinly bedded with thickly bedded appearance, fresh, interbedded with little to some, laminated to thin LIMESTONE (MICRITE/WACKESTONE), dark gray (N 4/), trace fossils; strong bioturbation, trace calcite filled pits, strong HCl reaction
664.7	135.6	5.0	4:04 4:18 3:46 3:17 3:20	(4.9) 98%	(4.9) 98%	Run 20		133.1,133.2ft: J, 45°, SR, T, B, II 134.8ft: J, 70°, SR, T, B, II 135.6,138.4,139.2ft: SH, 30°, SL-PL, T-PO, B, II, with trace calcite
659.7	140.6							659.7 — 140.6 Boring and coring terminated at 140.6 feet.

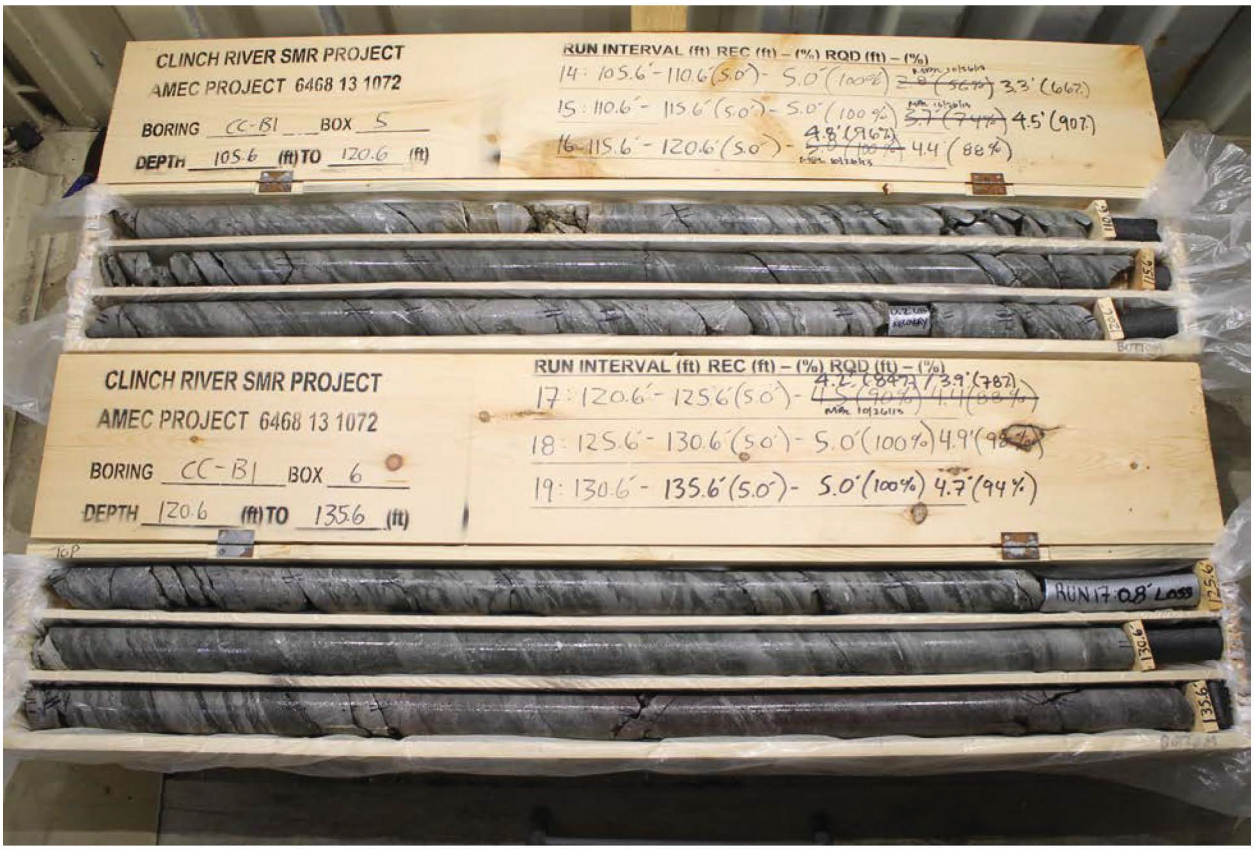
CLINCH RIVER SMR CORE FINAL CLINCH FINAL LOGS.GPJ CLINCH BORING DATA TEMPLATE.GDT 3/5/14

CC-B1 – Boxes 1 and 2

CC-B1 – Boxes 3 and 4



CC-B1 – Boxes 5 and 6



CC-B1 – Box 7

GEOTECHNICAL BORING LOG

Prepared By: MBL Date: 3/5/14

Checked By: JCM Date: 3/5/14

BECHTEL NO.: 25847	AMEC PROJECT NO.: 6468-13-1072	COUNTY: Roane, TN	GEOLOGIST: J. Howard
SITE DESCRIPTION: Clinch River SMR Project, Roane County, Tennessee		DRILLER: L. Carter/J. Rosser	Boring Orientation
BORING NO.: CC-B2	DRILL METHOD: Mud Rotary/Core	DRILL MACHINE: CME-750X (P)	Inclination: Vertical
GROUND ELEV.: 799.8 ft (NAVD88)	NORTHING: 568,891 US ft (NAD83)	EASTING: 2,449,760 US ft (NAD83)	Azimuth: NA
TOTAL DEPTH: 206.0 ft	SAMPLE METHODS: ASTM D 1586-11; 2488-09a; 2113-08; 6032-08	ROD TYPE: AWJ	HAMMER (ID): 140-lb Auto (323438)
DATE STARTED: 8/28/13	COMPLETED: 9/1/13	HOLE DIA.: 4"	CASING DEPTH: 101.0 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
799.8					Ground Surface			
799.8	0.0	4	5	6	11	SS-1		TOPSOIL: Sandy LEAN CLAY (CL), yellowish red (5YR 5/8), stiff, dry to moist, non-plastic to low plasticity fines, little to some fine sand, no HCl reaction
797.8	2.0							RESIDUAL SOIL: Sandy LEAN CLAY (CL), yellowish red (5YR 5/8), stiff to very stiff, dry to moist, non-plastic fines, some fine to medium sand, no HCl reaction
796.0	3.8	5	9	14	23	SS-2		
793.7	6.1	3	6	10	16	SS-3		
791.1	8.7	2	4	6	10	SS-4		8.7ft: As above to reddish yellow (5YR 6/8)
789.3	10.5							RESIDUAL SOIL: Sandy SILT (ML), strong brown (7.5YR 5/8), medium stiff to stiff, moist, non-plastic fines, some fine to medium sand, trace subrounded to subangular fine gravel sized rock fragments, no HCl reaction
788.6	11.2	4	4	7	11	SS-5		
786.0	13.8	3	5	6	11	SS-6		13.8ft: As above, strong brown (7.5YR 5/8) to weak red (10R 4/3), saprolitic
783.1	16.7	3	4	3	7	SS-7		
780.5	19.3	2	2	4	6	SS-8		19.3ft: As above, becomes moist to wet
775.5	24.3	WOH	1	3	4	SS-9		24.3ft: As above to strong brown (7.5YR 5/6), soft
772.8	27.0							RESIDUAL SOIL: Sandy SILT (ML), dusky red (2.5YR 3/2), hard, moist to wet, non-plastic fines, some fine to coarse sand, trace angular fine gravel sized rock fragments (siltstone), saprolitic, no HCl reaction
770.5	29.3	18	22	30	52	SS-10		
765.5	34.3	21	50/0.5		50/0.5	SS-11		
765.0	34.8							WEATHERED ROCK: SILTSTONE/SANDSTONE, sampled as SILTY SAND (SM), dusky red (2.5YR 3/2) to dark reddish brown (2.5YR 3/3), very dense, moist, fine to coarse sand, some non-plastic to low plasticity fines, trace to few angular fine gravel sized rock fragments, no HCl reaction
760.5	39.3	50/0.4			50/0.4	SS-12		
755.5	44.3	50/0.4			50/0.4	SS-13		

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

BECHTEL NO.: 25847	AMEC PROJECT NO.: 6468-13-1072	COUNTY: Roane, TN	GEOLOGIST: J. Howard
SITE DESCRIPTION: Clinch River SMR Project, Roane County, Tennessee		DRILLER: L. Carter/J. Rosser	Boring Orientation
BORING NO.: CC-B2	DRILL METHOD: Mud Rotary/Core	DRILL MACHINE: CME-750X (P)	Inclination: Vertical
GROUND ELEV.: 799.8 ft (NAVD88)	NORTHING: 568,891 US ft (NAD83)	EASTING: 2,449,760 US ft (NAD83)	Azimuth: NA
TOTAL DEPTH: 206.0 ft	SAMPLE METHODS: ASTM D 1586-11; 2488-09a; 2113-08; 6032-08	ROD TYPE: AWJ	HAMMER (ID): 140-lb Auto (323438)
DATE STARTED: 8/28/13	COMPLETED: 9/1/13	HOLE DIA.: 4"	CASING DEPTH: 101.0 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
751.2					Continued from previous page			
750.5	49.3							WEATHERED ROCK: SILTSTONE/SANDSTONE, sampled as SILTY SAND (SM), dusky red (2.5YR 3/2) to dark reddish brown (2.5YR 3/3), very dense, moist, fine to coarse sand, some non-plastic to low plasticity fines, trace to few angular fine gravel sized rock fragments, no HCl reaction *(continued)* 49.3ft: As above to reddish brown (2.5YR 5/3), moist to wet, few to little fine angular gravel sized rock fragments
		34	50/0.3		50/0.3	SS-14		
745.5	54.3							54.3ft: As above to light greenish gray (5GY 7/1)
		25	50/0.2		50/0.2	SS-15		
742.8								57.0
740.5	59.3							RESIDUAL SOIL: SILTY SAND (SM), yellowish brown (10YR 5/6) to dusky red (2.5YR 3/2), very dense, moist to wet, fine to coarse sand, some non-plastic to low plasticity fines, few angular fine gravel sized rock fragments, saprolitic, no HCl reaction
		15	31	22	53	SS-16		
735.5	64.3							
		22	32	49	81	SS-17		
730.5	69.3							
		22	43	50/0.3	50/0.3	SS-18		
729.5								70.3
								WEATHERED ROCK: SILTSTONE/SHALE, sampled as Sandy SILT (ML), dusky red (2.5YR 3/2), hard, dry, non-plastic to low plasticity fines, some fine to medium sand, no HCl reaction
726.8								73.0
725.5	74.3							RESIDUAL SOIL: SILTY SAND (SM), brownish yellow (10YR 6/6) to brown (7.5YR 4/2), medium dense, moist to wet, fine to medium sand, some non-plastic to low plasticity fines, saprolitic, no HCl reaction
		2	4	11	15	SS-19		
720.5	79.3							
		15	16	9	25	SS-20		
717.8								82.0
715.5	84.3							WEATHERED ROCK: SILTSTONE, sampled as Sandy SILT (ML), dusky red (2.5YR 3/2) to weak red (2.5YR 4/2), hard, dry to moist, non-plastic fines, some fine sand, no HCl reaction
		50/0.1			50/0.1	SS-21		
710.5	89.3							
		50/0.4			50/0.4	SS-22		
705.5	94.3							
		50/0.3			50/0.3	SS-23		

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

GEOTECHNICAL BORING LOG

BECHTEL NO.: 25847	AMEC PROJECT NO.: 6468-13-1072	COUNTY: Roane, TN	GEOLOGIST: J. Howard
SITE DESCRIPTION: Clinch River SMR Project, Roane County, Tennessee		DRILLER: L. Carter/J. Rosser	Boring Orientation
BORING NO.: CC-B2	DRILL METHOD: Mud Rotary/Core	DRILL MACHINE: CME-750X (P)	Inclination: Vertical
GROUND ELEV.: 799.8 ft (NAVD88)	NORTHING: 568,891 US ft (NAD83)	EASTING: 2,449,760 US ft (NAD83)	Azimuth: NA
TOTAL DEPTH: 206.0 ft	SAMPLE METHODS: ASTM D 1586-11; 2488-09a; 2113-08; 6032-08	ROD TYPE: AWJ	HAMMER (ID): 140-lb Auto (323438)
DATE STARTED: 8/28/13	COMPLETED: 9/1/13	HOLE DIA.: 4"	CASING DEPTH: 101.0 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
702.6					Continued from previous page			
700.5	99.3	23	42	50/0.2	50/0.2	SS-24		WEATHERED ROCK: SILTSTONE, sampled as Sandy SILT (ML), dusky red (2.5YR 3/2) to weak red (2.5YR 4/2), hard, dry to moist, non-plastic fines, some fine sand, no HCl reaction *(continued)*
698.8								Advanced casing to 101.0 feet; begin rock coring (101.0)
								Soil drilling halted. Log continues on geotechnical coring log

Observed water levels:
30.2 ft bgs, AM 8/29/13
2.5 ft bgs, AM 8/30/13
42.1 ft bgs, AM 8/31/13
42.1 ft bgs, AM 9/1/13

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

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: J. Howard
SITE DESCRIPTION: Clinch River SMR Project, Roane County, Tennessee		DRILLER: L. Carter/J. Rosser	Boring Orientation
BORING NO.: CC-B2	DRILL METHOD: Mud Rotary/Core	DRILL MACHINE: CME-750X (P)	Inclination: Vertical
GROUND ELEV.: 799.8 ft (NAVD88)	NORTHING: 568,891 US ft (NAD83)	EASTING: 2,449,760 US ft (NAD83)	Azimuth: NA
TOTAL DEPTH: 206.0 ft	SAMPLE METHODS: ASTM D 1586-11; 2488-09a; 2113-08; 6032-08		HAMMER (ID): 140-lb Auto (323438)
DATE STARTED: 8/28/13	COMPLETED: 9/1/13	CASING DEPTH: 101.0 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 @ 101.0 ft
698.8	101.0	5.0	4:30 4:30 4:00 2:45 3:30	(0.0) 0%	(0.0) 0%	Run 1		698.8 WEATHERED ROCK: SILTSTONE, weak red (2.5YR 4/2), completely weathered, subrounded fine to coarse gravel sized rock fragments, very poor core recovery 101.0
693.8	106.0							
693.5	106.3	4.7	N=50/0.3 2:15/0.7 3:45 2:30 3:45 4:45	(0.5) 11%	(0.0) 0%	SS-25 Run 2		SS-25 (106.0-106.3ft)=50/0.3' Sampled as SILTY SAND (SM), weak red (7.5YR 4/2) to olive brown (2.5Y 4/3), very dense, dry to moist, fine to medium sand, some non-plastic fines, no HCl reaction
688.8	111.0							
688.3	111.5	4.5	N=50/0.3 4:30/0.5 6:15 5:15 3:00 5:45	(0.3) 7%	(0.0) 0%	SS-26 Run 3		SS-26 (111.2-111.5ft)=50/0.3'
683.8	116.0							684.1 115.7
678.8	121.0	5.0	5:00 4:00 4:15 6:30 6:00	(4.8) 96%	(4.5) 90%	Run 4		CALCAREOUS SILTSTONE, dark reddish gray (2.5YR 3/1) to weak red (2.5YR 4/2), medium strong to strong, laminated to thinly bedded, slightly weathered to fresh, interbedded with few to little, laminated to thin LIMESTONE (MICRITE), gray (N 5/), wavy/irregular to diffuse bedding; slight to moderate bioturbation, trace calcite filled pits, strong HCl reaction **(Rome Formation)** 116.3ft: BJ, 50°, PR, T, B, II 117.1ft: SH, 10°, PL, PO, B, III, with calcite 117.7ft: SH, 20°, PL, T-PO, B, II
673.8	126.0	5.0	5:15 4:30 3:30 3:30 4:00	(4.9) 98%	(4.5) 90%	Run 5 L7-38		118.2,120.2ft: BJ, 30°, PR, T-PO-O, B, II-III 118.8ft: J, 60°, PR, PO, C, II 121.9,122.8,125.5ft: BJ, 30°, PS-PR, PO, B, II
668.8	131.0	5.0	2:45 3:00 4:45 3:15 3:15	(5.0) 100%	(5.0) 100%	Run 6		126.7,127.6,128.1,129.2ft: SH, 40°, PS, VT, A, I, intact with calcite (opposite of bedding) 127.0ft: BJ, 30°, PR, PO, B, II
663.8	136.0	5.0	3:30 4:00 4:30 4:30 7:15	(4.5) 90%	(3.7) 74%	Run 7		131.9,132.4ft: BJ, 30°, UR, T-PO, B-C, II-III 132.0-132.1ft: SZ, 30-70°, PS-PL, VT, A, I 133.5,133.6ft: BJ, 60°, PS, PO-O, C, III 134.1,134.3,134.5,134.8ft: BJ, 50°, T-PO, PS-PR, B-C, II-III 132.0-133.7ft: FAULT ZONE/SHEAR ZONE- multiple shears at 30-70°, severely disturbed/folded above shear surface at 133.1' (hanging wall) and planar below (foot wall) with weakly altered/discolored and slightly silicified LIMESTONE, dark grayish green (5GY 4/2) from 133.1-133.7'
658.8	141.0	5.0	4:15 2:30 2:30 2:45 5:30	(4.7) 94%	(4.5) 90%	Run 8		137.0,138.7ft: BJ, 30°, PR-PS, T- B, II 137.7,140ft: J, 40-45°, SR-PR, T, B, II 139.2ft: BJ, 40°, PL, T, B, II
653.8	146.0	5.0	4:45 4:15 3:45 3:30 6:30	(4.7) 94%	(4.2) 84%	Run 9		141.0-141.3ft: FZ, no recovery 141.5ft: J, 70°, SR, PO, C, III 142.2,144.6ft: BJ, 30°, PS-PR, T, B, II 142.9ft: SH, 10°, PL, T, B, II 144.8-144.9ft: FZ, 40°, PR, O, C-D, III
		5.0	3:45 5:15 4:30 3:30	(4.9) 98%	(4.9) 98%	Run 10		146.7,149.6ft: BJ, 40°, US-UR, T-PO, B, II 150.2-150.3ft: FZ, 30°, UR, PO-O, B, III, core loss of 0.1'

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: J. Howard
SITE DESCRIPTION: Clinch River SMR Project, Roane County, Tennessee		DRILLER: L. Carter/J. Rosser	Boring Orientation
BORING NO.: CC-B2	DRILL METHOD: Mud Rotary/Core	DRILL MACHINE: CME-750X (P)	Inclination: Vertical
GROUND ELEV.: 799.8 ft (NAVD88)	NORTHING: 568,891 US ft (NAD83)	EASTING: 2,449,760 US ft (NAD83)	Azimuth: NA
TOTAL DEPTH: 206.0 ft	SAMPLE METHODS: ASTM D 1586-11; 2488-09a; 2113-08; 6032-08		HAMMER (ID): 140-lb Auto (323438)
DATE STARTED: 8/28/13	COMPLETED: 9/1/13	CASING DEPTH: 101.0 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
648.8	151.0		4:30					CALCAREOUS SILTSTONE, dark reddish gray (2.5YR 3/1) to weak red (2.5YR 4/2), medium strong to strong, laminated to thinly bedded, slightly weathered to fresh, interbedded with few to little, laminated to thin LIMESTONE (MICRITE), gray (N 5/), wavy/irregular to diffuse bedding; slight to moderate bioturbation, trace calcite filled pits, strong HCl reaction **(Rome Formation)** *(continued)*
		5.0	4:00	(4.9) 98%	(4.9) 98%	Run 11		154.1ft: BJ, 40°, US, T, B, II 154.7-154.8ft: FZ/SZ, 40°, PL, O, C, II, core loss of 0.1'
			4:15					
			4:15					
			4:15					
643.8	156.0		4:30					
		5.0	3:45	(5.0) 100%	(4.7) 94%	Run 12		156.4,160.6ft: BJ, 40°, PS-PR, T, B, II 157.1ft: BJ, 50°, PS, T, B, II 157.5-157.9ft: SZ, 40-60°, PL-PS, VT, A, I, intact with calcite 158.1,158.3,158.8ft: BJ, 60°, PS-PR, T-PO, B, II 157.5-165.1ft: SHEAR/SHEAR ZONE- bedding at 30-40° above 157.5'; bedding becomes 60-70° below 157.5' and appears severely disturbed, with multiple healed shears, few with calcite mineralization; bedding returns to 30-40° below shear at 165.1'
			3:15					
			3:00					
			4:15					
638.8	161.0		4:30					
		5.0	5:00	(5.0) 100%	(5.0) 100%	Run 13 *L7-39*		161.6ft: BJ, 60°, US, T-PO, B, II 165.1ft: SH, 20°, PL, T-PO, B, II, with calcite
			3:15					
			3:00					
			3:15					
633.8	166.0		2:30					
		5.0	4:15	(4.8) 96%	(3.9) 78%	Run 14		167.1-167.3ft: FZ, 30°, PS, PO-O, F, V 168.0,168.8,169.4ft: BJ, 30°, PS, T, B, II-III 169.7-170.0ft: FZ, 30°, PR-PS, O, F, III
			5:15					
			3:30					
			4:15					
628.8	171.0		6:30					629.0 — 170.8
		5.0	4:45	(5.0) 100%	(2.9) 58%	Run 15		CALCAREOUS SILTSTONE/SHALE, greenish gray (10Y 5/1) and dark grayish olive (10Y 4/2) with dusky red (2.5YR 3/2), strong to weak, laminated to thinly bedded, fresh to moderately weathered/altered, interbedded with few to little, laminated to thin LIMESTONE (MICRITE), gray (N 5/); weathering/alteration becomes pronounced at 174.0, strong to weak HCl reaction (decreases with depth) 171.1,171.4,172.4,172.6,172.9,173.2,173.5,174.9,176.2ft: BJ, 30°, PS-PR, T-PO, B, II-III 174.2-174.3ft: FZ, 30°, PR, PO, F, III
			5:00					
			4:15					
			4:45					
623.8	176.0		5:30					
		5.0	6:30	(2.3) 46%	(0.4) 8%	Run 16		623.3 — 176.5 175.2ft: J, 60-70°, PS, O, F, III 175.6-175.8ft: FZ, 30°, PS, O, G, III
			3:45					WEATHERED ROCK/FAULT GOUGE: CLAYEY CALCAREOUS SILTSTONE/SHALE, weak red (2.5YR 4/3) to dusky red (7.5R 3/2) with trace light grayish brown (10YR 6/2), very weak to extremely weak, highly to completely weathered, with few thin interbeds of dolomite cemented, feldspathic sand lenses; pervasive sheared fabric altered to silt and clay, trace sparry calcite, weak to strong HCl reaction **(Copper Creek Thrust Fault)**
			4:00					
			4:15					
618.8	181.0		4:15					
		5.0	3:00	(4.6) 92%	(2.0) 40%	Run 17		176.5ft: J/SH, 60°, PR, O, B, II 178.3-181.0ft: 2.7' Core loss
			2:15					
			3:30					615.9 — 183.9
			5:30					LIMESTONE (MICRITE), argillaceous, and CALCAREOUS SILTSTONE, dark grayish green (5GY 4/2) with trace dusky red (10R 3/2), and gray (N 5/), strong, laminated to very thinly and thinly bedded, fresh; moderate bioturbation, weak to strong HCl reaction; upper surface at 183.9 highly polished, silicified to 185.4', appears to have been weakly altered to 189.0' **(Moccasin Formation)** 184.8,185.2ft: SH, 40-60°, PS, VT, A, I, intact with calcite
613.8	186.0		4:15					
		5.0	3:45	(5.0) 100%	(5.0) 100%	Run 18		
			4:30					
			4:15					610.8 — 189.0
			3:30					LIMESTONE (MICRITE) with few (WACKESTONE), gray (N 6/-N 5/), strong, very thinly to moderately bedded and nodular, fresh, interbedded with little to some, laminated to very thin clayey Calcareous SILTSTONE, very dark gray (N 3/); moderate to slight bioturbation, locally with fossils, trace calcite filled pits and burrows, strong HCl reaction 189.0ft: BJ, 30°, PS, T-PO, B, II 192.6-192.8ft: FZ, 30°, PS, O, K, III 193.8,194.8ft: BJ, 30°, PR, PO, C, III
608.8	191.0		4:15					
		5.0	4:45	(4.9) 98%	(4.6) 92%	Run 19		
			5:45					
			4:30					
			4:15					
603.8	196.0		5:00					
		5.0	5:15	(5.0) 100%	(4.8) 96%	Run 20		197.6,198.7,199.8ft: BJ, 30°, US-UR, T-PO, B, II 200.5ft: SH, 20°, UR, PO, C, III, with calcite
			3:45					

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: J. Howard
SITE DESCRIPTION: Clinch River SMR Project, Roane County, Tennessee		DRILLER: L. Carter/J. Rosser	Boring Orientation
BORING NO.: CC-B2	DRILL METHOD: Mud Rotary/Core	DRILL MACHINE: CME-750X (P)	Inclination: Vertical
GROUND ELEV.: 799.8 ft (NAVD88)	NORTHING: 568,891 US ft (NAD83)	EASTING: 2,449,760 US ft (NAD83)	Azimuth: NA
TOTAL DEPTH: 206.0 ft	SAMPLE METHODS: ASTM D 1586-11; 2488-09a; 2113-08; 6032-08		HAMMER (ID): 140-lb Auto (323438)
DATE STARTED: 8/28/13	COMPLETED: 9/1/13	CASING DEPTH: 101.0 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
			3:30 4:15 5:00					LIMESTONE (MICRITE) with few (WACKESTONE), gray (N 6/-N 5/), strong, very thinly to moderately bedded and nodular, fresh, interbedded with little to some, laminated to very thin clayey Calcareous SILTSTONE, very dark gray (N 3/); moderate to slight bioturbation, locally with fossils, trace calcite filled pits and burrows, strong HCl reaction *(continued)*
598.8	201.0							
		5.0	5:00 4:30 4:00 5:30 6:00	(4.7) 94%	(4.7) 94%	Run 21		202.9,204.2ft: BJ, 30°, PS, T-PO, B-C, II-III 203.3ft: BJ, 30°, UR, PO-O, B, III 203.8ft: BJ, 30°, PR, T-PO, B, II 205.7ft: SH, 30°, PL, T, C, II, with calcite, opposite to bedding
593.8	206.0							593.8 — 206.0
								Boring and coring terminated at 206.0 feet.

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