GEOTECHNICAL BORING LOG

MACTEC

MACTEC PROJECT NO.: 6468-06-1472	COUNTY Louisa, VA	GEOLOGIST J. Lachewitz/ M. Lear
SITE DESCRIPTION NORTH ANNA COL		GROUND WATER (ft)
BORING NO. B-925	DRILL METHOD: Mud Rotary/Core	SAMPLE METHODS: SPT/CORE
COLLAR ELEV. 270.0 ft (NAVD88)	NORTHING 3,910,037 US ft (NAD83)	EASTING 11,686,576 US ft (NAD83)
TOTAL DEPTH 75.8 ft	DRILL MACHINE CME 550 ATV	DRILLER: G. Akins
DATE STARTED 10/30/06	COMPLETED 10/31/06	CORE BARREL TYPE: HQ 3 triple tube-wireline

GROUND WATER (ft)	
0 HR.	12.3
24 HR.	12.3

HAMMER TYPE 140 lbs Auto	

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
270.0					Ground Surface				270.0 / 0.0
									No samples due to utility clearance operations- soft dig/vac. truck excavation
261.4	8.6								262.0 / 8.0
		4	6	8	14	925-1			Silty, fine to coarse SAND (SM), brown (7.5YR 4/4) and gray (GLEY1 5/N), moist, medium dense (Residual Soil)
259.0	11.0								
		23	12	14	26	925-2	▼		
254.9	15.1								
		19	17	12	29	925-3			
250.3	19.7								249.8 / 20.2
		8	50/0.2			925-4			249.6 / 20.4 Weathered Rock: Very dense, BIOTITE-QUARTZ GNEISS
									Hard Rock: Light gray and pinkish white, moderately severely to slightly weathered, very close to close fracturing, soft to moderately hard, BIOTITE-QUARTZ GNEISS
									213.7 / 56.3
									Hard Rock: Light gray, slightly weathered to fresh, moderately close to wide fracturing, hard to very hard, BIOTITE-QUARTZ GNEISS

NORTH ANNA COL_CORE NORTH ANNA COL DATA REPORT REV0.GPJ NORTH ANNA COL.GDT 1/19/07

GEOTECHNICAL BORING LOG

MACTEC

MACTEC PROJECT NO.: 6468-06-1472	COUNTY Louisa, VA	GEOLOGIST J. Lachewitz/ M. Lear	
SITE DESCRIPTION NORTH ANNA COL			GROUND WATER (ft)
BORING NO. B-925	DRILL METHOD: Mud Rotary/Core	SAMPLE METHODS: SPT/CORE	0 HR. 12.3
COLLAR ELEV. 270.0 ft (NAVD88)	NORTHING 3,910,037 US ft (NAD83)	EASTING 11,686,576 US ft (NAD83)	24 HR. 12.3
TOTAL DEPTH 75.8 ft	DRILL MACHINE CME 550 ATV	DRILLER: G. Akins	HAMMER TYPE 140 lbs Auto
DATE STARTED 10/30/06	COMPLETED 10/31/06	CORE BARREL TYPE: HQ 3 triple tube-wireline	

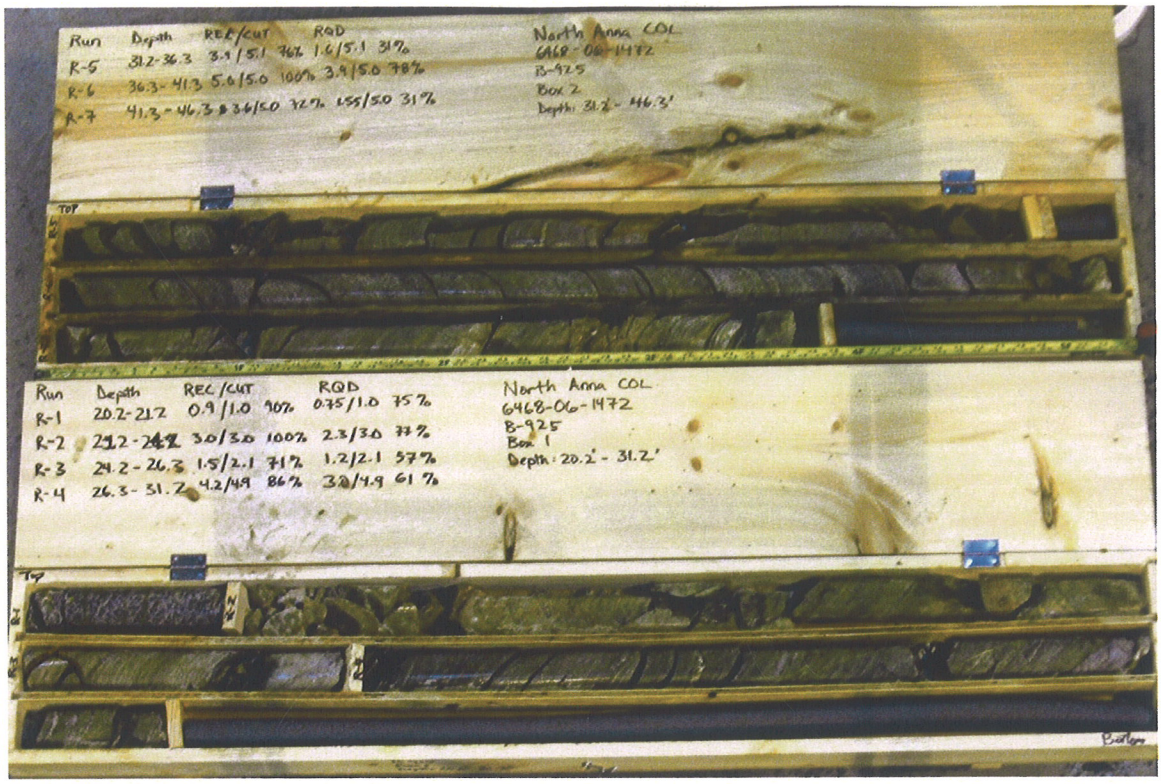
ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
195.2					Continued from previous page				
									194.2 — 75.8 Boring and coring terminated at 75.8 ft in Hard Rock: Hard to very hard, BIOTITE-QUARTZ GNEISS

GEOTECHNICAL CORING LOG

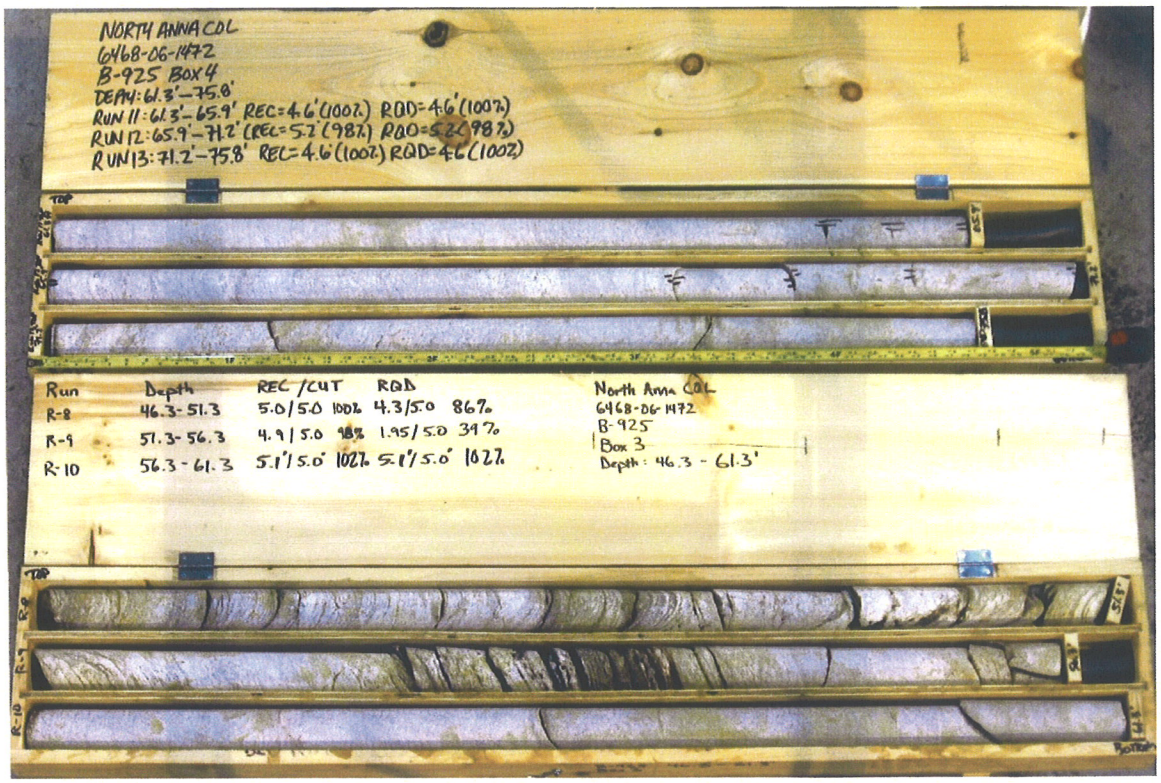
MACTEC

MACTEC PROJECT NO.: 6468-06-1472	COUNTY Louisa, VA	GEOLOGIST J. Lachewitz/ M. Lear
SITE DESCRIPTION NORTH ANNA COL		GROUND WATER (ft)
BORING NO. B-925	DRILL METHOD: Mud Rotary/Core	SAMPLE METHODS: SPT/CORE	0 HR. 12.3
COLLAR ELEV. 270.0 ft (NAVD88)	NORTHING 3,910,037 US ft (NAD83)	EASTING 11,686,576 US ft (NAD83)	24 HR. 12.3
TOTAL DEPTH 75.8 ft	DRILL MACHINE CME 550 ATV	DRILLER: G. Akins	HAMMER TYPE 140 lbs Auto
DATE STARTED 10/30/06	COMPLETED 10/31/06	CORE BARREL TYPE: HQ 3 triple tube-wireline	
CORE SIZE HQ3	TOTAL RUN 55.6 ft		

ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
										Begin Coring @ 20.4 ft
249.6	20.4	0.8	5:48/0.8	(0.8) 100%	(0.8) 100%	1				249.6 — 20.4 Hard Rock: Light gray and pinkish white, moderately severely to slightly weathered, very close to close fracturing, soft to moderately hard, BIOTITE-QUARTZ GNEISS
248.8	21.2	3.0	2:59 2:38 4:02			2				(2 joints at 0-10° slight weathering and Fe stain)
245.8	24.2			(3.0) 100%	(2.3) 77%					(Multiple joints at 0-60°; highly weathered fracture zone from 21.2-22.2 ft)
243.7	26.3	2.1	4:38 3:39/1.1	(1.5) 71%	(1.2) 57%	3				(3 joints at 45-60° with Fe stain)
238.8	31.2	4.9	2:42 1:54 1:54 1:46 1:58/0.9	(4.2) 86%	(3.0) 61%	4				(Multiple joints at 45° with Fe stain and weathering)
233.7	36.3	5.1	1:39 1:18 1:37 2:22 1:56/1.1	(3.9) 76%	(1.6) 31%	5				(Multiple joints at 0-90° with Fe stain, clay, and weathering)
228.7	41.3	5.0	3:11 2:12 2:23 2:10 3:44	(5.0) 100%	(3.9) 78%	6				(Multiple joints at 35-75°, some with Fe stain and weathering)
223.7	46.3	5.0	2:29 2:05 1:29 1:37 4:31	(3.6) 72%	(1.6) 32%	7				(Multiple joints at 10-60°, severely weathered)
218.7	51.3	5.0	1:28 2:21 1:18 2:30 2:09	(5.0) 100%	(4.3) 86%	8				(Multiple joints at 10-45°, some severely weathered with Fe staining)
213.7	56.3	5.0	2:37 2:13 1:23 2:27 2:14	(4.9) 98%	(2.0) 40%	9				(Multiple joints at 10-55°, some severely weathered with Fe staining)
208.7	61.3	5.0	2:40 2:46 3:28 3:12 3:56	(5.1) 102%	(5.1) 102%	10				213.7 — 56.3 Hard Rock: Light gray, slightly weathered to fresh, moderately close to wide fracturing, hard to very hard, BIOTITE-QUARTZ GNEISS (2 joints at 50-60° with trace clay)
204.1	65.9	4.6	4:10 5:04 5:30 5:45 6:40/0.6	(4.6) 100%	(4.6) 100%	11				-No Joints
198.8	71.2	5.3	3:45 2:47 3:18 3:48 5:48/1.3	(5.2) 98%	(5.2) 98%	12				-No Joints
194.2	75.8	4.6	3:47 3:38 3:52 3:58 2:54/0.6	(4.6) 100%	(4.6) 100%	13				(2 joints at 40-50° with trace clay)
										194.2 — 75.8 Coring terminated at 75.8 ft in Hard Rock: Hard to very hard, BIOTITE-QUARTZ GNEISS



B-925 – Box 2
B-925 – Box 1



B-925 – Box 4
B-925 – Box 3

GEOTECHNICAL BORING LOG

MACTEC

MACTEC PROJECT NO.: 6468-06-1472	COUNTY Louisa, VA	GEOLOGIST J. Howard
SITE DESCRIPTION NORTH ANNA COL		GROUND WATER (ft)
BORING NO. B-926	DRILL METHOD: Mud Rotary/Core	SAMPLE METHODS: SPT/CORE
COLLAR ELEV. 289.0 ft (NAVD88)	NORTHING 3,910,043 US ft (NAD83)	EASTING 11,685,709 US ft (NAD83)
TOTAL DEPTH 155.5 ft	DRILL MACHINE CME 550 ATV	DRILLER: G. Akins
DATE STARTED 9/29/06	COMPLETED 10/10/06	CORE BARREL TYPE: HQ 3 triple tube-wireline

GROUND WATER (ft)	
0 HR.	18.6
24 HR.	19.8

HAMMER TYPE 140 lbs Auto

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	SAMP. NO.	SOIL AND ROCK DESCRIPTION
289.0						Ground Surface
287.5	1.5					Silty SAND (SM), reddish yellow (5YR 5/6), dry, medium dense (Fill)
285.5	3.5	5	9	9	926-1	
283.0	6.0	6	6	5	926-2	Clayey, coarse SAND (SC), yellowish red (5YR 5/8), wet, medium dense (Fill)
280.5	8.5	2	2	2	926-3	Sandy SILT (ML), yellowish red (5YR 5/8), moist, soft to stiff, micaceous (Residual Soil)
278.0	11.0	1	1	2	926-4	
274.9	14.1	1	2	3	926-5	
270.5	18.5	2	2	4	926-6	
265.5	23.5	2	2	2	926-7	
260.5	28.5	2	2	5	926-8	
255.5	33.5	2	4	5	926-9	
250.5	38.5	4	6	7	926-10	
245.5	43.5	7	8	11	926-11	
240.5	48.5	6	12	18	926-12	
235.5	53.5	6	9	18	926-13	
229.8	59.2	24	50/0.3		926-14	Weathered Rock: Tan-orange, BIOTITE-QUARTZ GNEISS
		50/0.1			926-15	

BLOWS PER FOOT: 0, 20, 40, 60, 80, 100

MOI

LOG

289.0 — 0.0

286.0 — 3.0

283.5 — 5.5

258.0 — 31.0

Sandy SILT (ML), reddish gray (5YR 5/2) to very dark gray (5YR 3/1), moist, stiff to very stiff, micaceous (Residual Soil)

235.0 — 54.0

225.2 — 63.8

224.4 — 64.6

Hard Rock: Tan-gray, moderately weathered, close fracturing, medium hard, BIOTITE-QUARTZ GNEISS

222.4 — 66.6

Weathered Rock: No recovery-BIOTITE-QUARTZ GNEISS

Hard Rock: Tan-gray to blue-gray, moderately weathered to fresh, close to moderately close fracturing, hard to very hard, BIOTITE-QUARTZ GNEISS with trace magnetite and epidote

NORTH ANNA COL_CORE NORTH ANNA COL DATA REPORT REV0.GPJ NORTH ANNA COL.GDT 1/19/07

GEOTECHNICAL BORING LOG

MACTEC

MACTEC PROJECT NO.: 6468-06-1472	COUNTY Louisa, VA	GEOLOGIST J. Howard
SITE DESCRIPTION NORTH ANNA COL		GROUND WATER (ft)
BORING NO. B-926	DRILL METHOD: Mud Rotary/Core	SAMPLE METHODS: SPT/CORE	0 HR. 18.6
COLLAR ELEV. 289.0 ft (NAVD88)	NORTHING 3,910,043 US ft (NAD83)	EASTING 11,685,709 US ft (NAD83)	24 HR. 19.8
TOTAL DEPTH 155.5 ft	DRILL MACHINE CME 550 ATV	DRILLER: G. Akins	HAMMER TYPE 140 lbs Auto
DATE STARTED 9/29/06	COMPLETED 10/10/06	CORE BARREL TYPE: HQ 3 triple tube-wireline	

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
214.2					Continued from previous page				
									Hard Rock: Tan-gray to blue-gray, moderately weathered to fresh, close to moderately close fracturing, hard to very hard, BIOTITE-QUARTZ GNEISS with trace magnetite and epidote *(continued)*
									185.6 — 103.4
									Hard Rock: Brown, dark gray, and dark gray-blue, moderately weathered, close fracturing, moderately hard, BIOTITE-QUARTZ GNEISS with weathered zones
									179.5 — 109.5
									Hard Rock: Blue-gray, slightly weathered to fresh, close to moderately close fracturing, hard to very hard, BIOTITE-QUARTZ GNEISS
									149.7 — 139.3
									Hard Rock-Weathered Rock: Brown and blue-gray, severely to slightly weathered, very close to closely fractured, soft to moderately hard, BIOTITE-QUARTZ GNEISS

GEOTECHNICAL BORING LOG

MACTEC

MACTEC PROJECT NO.: 6468-06-1472	COUNTY Louisa, VA	GEOLOGIST J. Howard
SITE DESCRIPTION NORTH ANNA COL		GROUND WATER (ft)
BORING NO. B-926	DRILL METHOD: Mud Rotary/Core	SAMPLE METHODS: SPT/CORE	0 HR. 18.6
COLLAR ELEV. 289.0 ft (NAVD88)	NORTHING 3,910,043 US ft (NAD83)	EASTING 11,685,709 US ft (NAD83)	24 HR. 19.8
TOTAL DEPTH 155.5 ft	DRILL MACHINE CME 550 ATV	DRILLER: G. Akins	HAMMER TYPE 140 lbs Auto
DATE STARTED 9/29/06	COMPLETED 10/10/06	CORE BARREL TYPE: HQ 3 triple tube-wireline	

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
139.4					Continued from previous page				
									138.5 — 150.5 Hard Rock: Blue-gray, very slightly weathered to fresh, close to moderately close fracturing, hard, BIOTITE-QUARTZ GNEISS
									133.5 — 155.5 Boring and coring terminated at 155.5 ft in Hard Rock: Hard, BIOTITE-QUARTZ GNEISS

NORTH ANNA COL.GPJ NORTH ANNA COL DATA REPORT REV0.GPJ NORTH ANNA COL.GDT 1/19/07

GEOTECHNICAL CORING LOG

MACTEC

MACTEC PROJECT NO.: 6468-06-1472	**COUNTY** Louisa, VA	**GEOLOGIST** J. Howard
SITE DESCRIPTION NORTH ANNA COL		**GROUND WATER (ft)**
BORING NO. B-926	**DRILL METHOD:** Mud Rotary/Core	**SAMPLE METHODS:** SPT/CORE
COLLAR ELEV. 289.0 ft (NAVD88)	**NORTHING** 3,910,043 US ft (NAD83)	**EASTING** 11,685,709 US ft (NAD83)
TOTAL DEPTH 155.5 ft	**DRILL MACHINE** CME 550 ATV	**DRILLER:** G. Akins
DATE STARTED 9/29/06	**COMPLETED** 10/10/06	**CORE BARREL TYPE:** HQ 3 triple tube-wireline
CORE SIZE HQ3	**TOTAL RUN** 96.2 ft	

0 HR.	18.6
24 HR.	19.8

HAMMER TYPE 140 lbs Auto

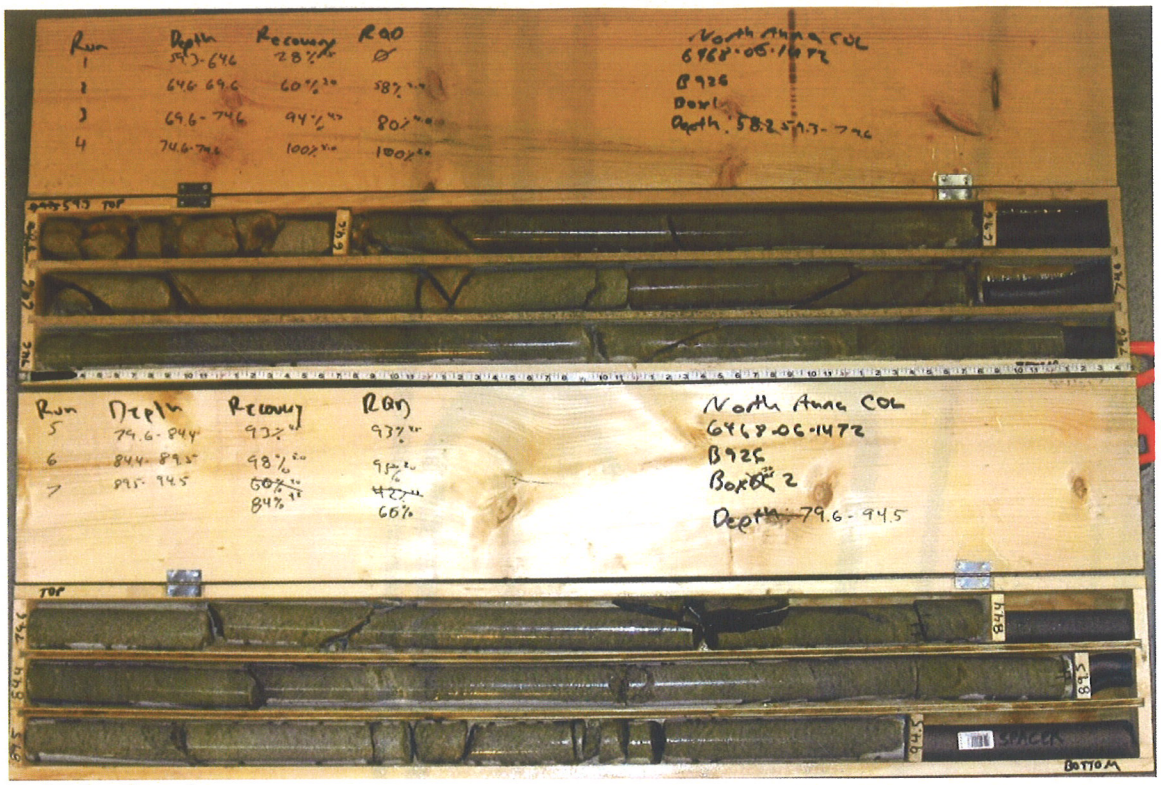
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
										Begin Coring @ 59.3 ft
229.7	59.3	5.3	1:15 1:15 1:00 1:45 1:15/1.3	(1.5) 28%	(0.0) 0%	1				Weathered Rock: Tan-orange, BIOTITE-QUARTZ GNEISS *(continued)*
224.4	64.6									225.2 — 63.8 224.4 — 64.6 Hard Rock: Tan-gray, moderately weathered, close fracturing, medium hard, BIOTITE-QUARTZ GNEISS
219.4	69.6	5.0	0:45 1:45 1:45 2:45 2:30	(3.0) 60%	(2.9) 58%	2				222.4 — 66.6 Weathered Rock: No recovery-BIOTITE-QUARTZ GNEISS (2 joints at 50°) Hard Rock: Tan-gray to blue-gray, moderately weathered to fresh, close to moderately close fracturing, hard to very hard, BIOTITE-QUARTZ GNEISS with trace magnetite and epidote (3 joints at 30°, 2 joints at 60°, 1 joint at 40°)
214.4	74.6	5.0	1:45 1:30 1:15 2:15 3:30	(4.7) 94%	(4.0) 80%	3				
209.4	79.6	5.0	2:30 2:45 1:45 1:15 2:45	(5.0) 100%	(5.0) 100%	4				(2 joints at 60°)
204.6	84.4	4.8	2:15 2:15 2:00 2:15 2:00/0.8	(4.5) 94%	(4.5) 94%	5				(1 joint at 30°, 2 joints at 70°; complete loss of circulation/100% water loss to formation)
199.5	89.5	5.1	3:45 3:45 3:15 3:00 5:15/1.1	(5.0) 98%	(5.0) 98%	6				(3 joints at 60-70°)
194.5	94.5	5.0	6:00 3:15 3:00 3:45 5:30	(4.2) 84%	(3.3) 66%	7				(1 joint at 20°, 1 joint at 70°)
192.5	96.5	2.0	9:00 14:15	(2.0) 100%	(2.0) 100%	8				(1 joint at 50°, 1 joint at 30°)
184.5	104.5	8.0	4:00 3:00 4:15 2:30 3:00 2:45 2:30 2:15	(8.0) 100%	(7.0) 88%	9				185.6 — 103.4 Hard Rock: Brown, dark gray, and dark gray-blue, moderately weathered, close fracturing, moderately hard, BIOTITE-QUARTZ GNEISS with weathered zones (13 joints at 30-40°, 1 joint at 70°)
179.5	109.5	5.0	3:30 2:15 2:45 2:15 2:30	(4.9) 98%	(2.9) 58%	10				179.5 — 109.5 Hard Rock: Blue-gray, slightly weathered to fresh, close to moderately close fracturing, hard to very hard, BIOTITE-QUARTZ GNEISS (2 joints at 80°, 1 joint at 30°)
174.5	114.5	5.0	4:30 4:30 4:00 4:15 4:45	(5.0) 100%	(4.9) 98%	11				
169.5	119.5	5.0	4:30 3:00 4:15 4:30 2:45	(5.0) 100%	(4.9) 98%	12				(2 joints at 60°, 1 joint at 0°, 1 joint at 20°)
164.5	124.5	5.0	3:00 1:30 1:30 2:00 1:45	(5.0) 100%	(4.5) 90%	13				(5 joints at 10-20°, 1 joint at 60°, 1 joint at 40°)
159.5	129.5	5.0	3:00 4:00 3:00 3:00 4:30	(5.0) 100%	(4.9) 98%	14				(3 joints at 80°, 2 joints at 10°, 1 joint at 60°)
155.6	133.4	3.9	2:45 2:45 3:15 3:15/0.9	(3.6) 92%	(3.4) 87%	15				

GEOTECHNICAL CORING LOG

MACTEC

MACTEC PROJECT NO.: 6468-06-1472	COUNTY Louisa, VA	GEOLOGIST J. Howard	
SITE DESCRIPTION NORTH ANNA COL			GROUND WATER (ft)
BORING NO. B-926	DRILL METHOD: Mud Rotary/Core	SAMPLE METHODS: SPT/CORE	0 HR. 18.6
COLLAR ELEV. 289.0 ft (NAVD88)	NORTHING 3,910,043 US ft (NAD83)	EASTING 11,685,709 US ft (NAD83)	24 HR. 19.8
TOTAL DEPTH 155.5 ft	DRILL MACHINE CME 550 ATV	DRILLER: G. Akins	HAMMER TYPE 140 lbs Auto
DATE STARTED 9/29/06	COMPLETED 10/10/06	CORE BARREL TYPE: HQ 3 triple tube-wireline	
CORE SIZE HQ3	TOTAL RUN 96.2 ft		

ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
										Continued from previous page
149.7	139.3	5.9	4:30 6:00 9:00 3:00 2:45 4:15/0.9	(5.9) 100%	(4.2) 71%	16				(3 joints at 40°, 2 joints at 20°) Hard Rock: Blue-gray, slightly weathered to fresh, close to moderately close fracturing, hard to very hard, BIOTITE-QUARTZ GNEISS *(continued)* 149.7 139.3
144.1	144.9	5.6	2:30 2:15 2:15 3:45 5:45/1.6	(0.2) 4%	(0.0) 0%	17				Hard Rock-Weathered Rock: Brown and blue-gray, severely to slightly weathered, very close to closely fractured, soft to moderately hard, BIOTITE-QUARTZ GNEISS
138.5	150.5	5.6	2:00 0:45 2:45 2:45 3:30/1.6	(1.9) 34%	(0.0) 0%	18				138.5 150.5
133.5	155.5	5.0	2:00 2:00 2:00 2:00 2:30	(5.0) 100%	(4.6) 92%	19				Hard Rock: Blue-gray, very slightly weathered to fresh, close to moderately close fracturing, hard, BIOTITE-QUARTZ GNEISS (1 joint at 70°, 3 joints at 40°) 133.5 155.5
										Coring terminated at 155.5 ft in Hard Rock: Hard, BIOTITE-QUARTZ GNEISS



B-926 – Box 1
B-926 – Box 2

B-926 – Box 3
B-926 – Box 4

B-926 – Box 5
B-926 – Box 6