GEOTECHNICAL BORING LOG

MACTEC

MACTEC PROJECT NO.: 6468-06-1472	**COUNTY** Louisa, VA	**GEOLOGIST** S. Nicely	
SITE DESCRIPTION NORTH ANNA COL			**GROUND WATER (ft)**
BORING NO. B-946	**DRILL METHOD:** Mud Rotary/Core	**SAMPLE METHODS:** SPT/CORE	**0 HR.** 25.0
COLLAR ELEV. 333.4 ft **(NAVD88)**	**NORTHING** 3,908,787 **US ft (NAD83)**	**EASTING** 11,683,811 **US ft (NAD83)**	**24 HR.** ND
TOTAL DEPTH 100.7 ft	**DRILL MACHINE** CME 550 ATV	**DRILLER:** G. Akins	**HAMMER TYPE** 140 lbs Auto
DATE STARTED 10/23/06	**COMPLETED** 10/25/06	**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
333.4					Ground Surface				333.4 0.0
331.8	1.6								Sandy SILT (ML) yellowish red (5YR 5/8), moist, very stiff to stiff, trace gravel (Fill)
330.1	3.3	12	11	9	20	946-1			
327.3	6.1	4	5	7	12	946-2			328.4 5.0
324.9	8.5	3	4	5	9	946-3			Sandy SILT (ML) strong brown (7.5YR 5/8), moist, stiff, trace gravel and mica (Residual Soil)
322.3	11.1	4	5	7	12	946-4			
319.2	14.2	4	5	8	13	946-5			320.4 13.0
314.2	19.2	3	4	4	8	946-6			Silty, fine to medium SAND (SM) strong brown (7.5YR 5/8), dark yellowish brown (10YR 4/6), and olive brown (2.5Y 4/3), moist to wet, loose to medium dense, micaceous (Residual Soil)
309.2	24.2	2	4	6	10	946-7			
304.2	29.2	3	5	8	13	946-8	▽		
299.2	34.2	3	5	7	12	946-9			302.4 31.0
294.2	39.2	19	41	38	79	946-10			Silty, fine to coarse SAND (SM) brownish yellow (10YR 6/6) and dark yellowish brown (10YR 4/4), moist, medium dense and very dense, micaceous (Residual Soil)
291.6	41.8	6	10	14	24	946-11			292.4 41.0
		50/0.1				946-12			291.5 41.9 Weathered Rock: BIOTITE-QUARTZ GNEISS Hard Rock: Light gray, gray, brown, and reddish brown, moderately severe to slightly weathered, very close to moderately close fracturing, soft to very hard, BIOTITE-QUARTZ GNEISS with severely weathered zones

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** S. Nicely	
SITE DESCRIPTION NORTH ANNA COL			**GROUND WATER (ft)**
BORING NO. B-946	**DRILL METHOD:** Mud Rotary/Core	**SAMPLE METHODS:** SPT/CORE	**0 HR.** 25.0
COLLAR ELEV. 333.4 ft (NAVD88)	**NORTHING** 3,908,787 US ft (NAD83)	**EASTING** 11,683,811 US ft (NAD83)	**24 HR.** ND
TOTAL DEPTH 100.7 ft	**DRILL MACHINE** CME 550 ATV	**DRILLER:** G. Akins	**HAMMER TYPE** 140 lbs Auto
DATE STARTED 10/23/06	**COMPLETED** 10/25/06	**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
258.6					Continued from previous page				
									257.6 — 75.8 Hard Rock: Gray to light gray and reddish brown, moderately weathered to fresh, very close to moderately close fracturing, hard to very hard, BIOTITE-QUARTZ GNEISS
									232.7 — 100.7 Boring and coring terminated at 100.7 ft in Hard Rock: Very hard, BIOTITE-QUARTZ GNEISS

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

GEOTECHNICAL CORING LOG

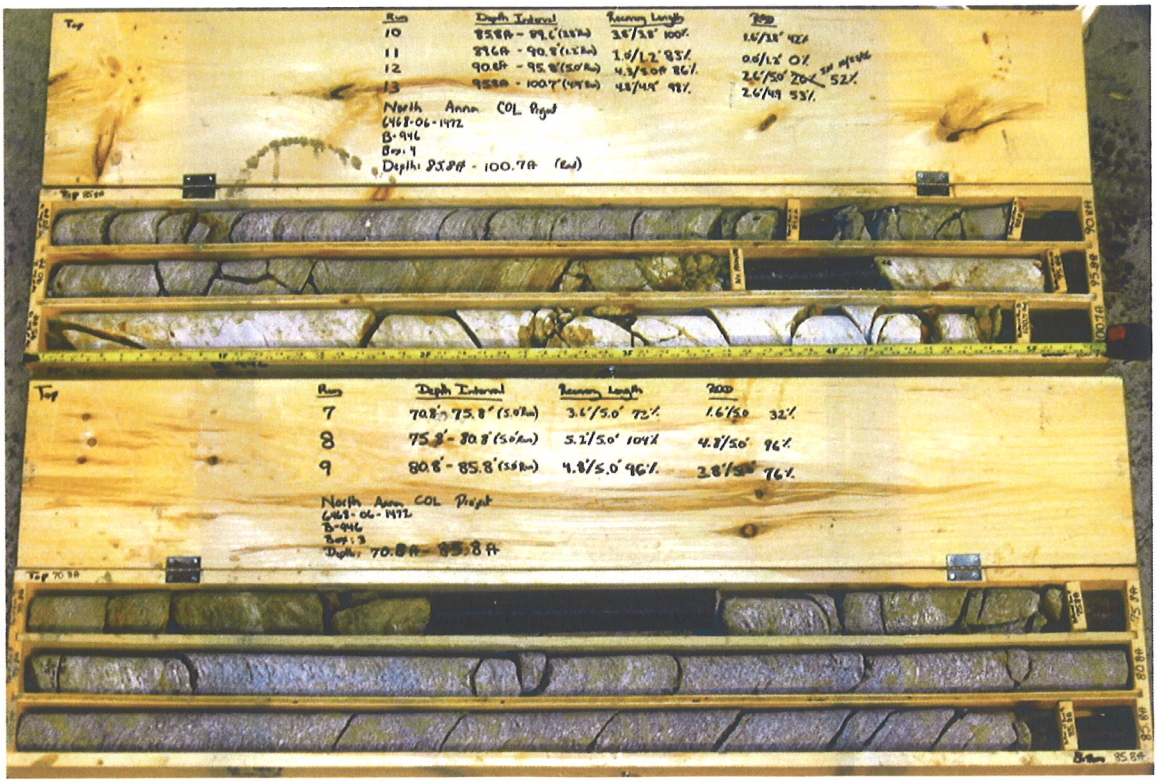
MACTEC

MACTEC PROJECT NO.: 6468-06-1472	**COUNTY** Louisa, VA	**GEOLOGIST** S. Nicely	
SITE DESCRIPTION NORTH ANNA COL			**GROUND WATER (ft)**
BORING NO. B-946	**DRILL METHOD:** Mud Rotary/Core	**SAMPLE METHODS:** SPT/CORE	**0 HR.** 25.0
COLLAR ELEV. 333.4 ft **(NAVD88)**	**NORTHING** 3,908,787 **US ft (NAD83)**	**EASTING** 11,683,811 **US ft (NAD83)**	**24 HR.** ND
TOTAL DEPTH 100.7 ft	**DRILL MACHINE** CME 550 ATV	**DRILLER:** G. Akins	**HAMMER TYPE** 140 lbs Auto
DATE STARTED 10/23/06	**COMPLETED** 10/25/06	**CORE BARREL TYPE:** HQ 3 triple tube-wireline	
CORE SIZE HQ3	**TOTAL RUN** 58.8 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 @ 41.9 ft
291.5	41.9	3.9	3:46 1:54 2:16 1:12/0.9	(3.1) 79%	(2.6) 67%	1				291.5 — 41.9 Hard Rock: Light gray, gray, brown, and reddish brown, moderately severe to slightly weathered, very close to moderately close fracturing, soft to very hard, BIOTITE-QUARTZ GNEISS with severely weathered zones (1 joints at 30° with Fe stain; severely weathered fracture zone with no recovery from 42.3-43.1 ft) (2 joints at 50° with Fe and Mn staining; 2 joints at 10° with Fe stain; no recovery from 45.3-49.1 ft)
287.6	45.8	4.9	1:29 1:32 2:16 2:20 1:31/0.9	(1.6) 33%	(1.3) 27%	2				
282.7	50.7	5.0	2:48 1:25 1:41 1:25 1:12	(4.2) 84%	(2.1) 42%	3				-Highly fractured zones from 50.7-51.5 ft and 54.8-55.7 ft
277.7	55.7	5.0	1:05 1:26 1:31 1:49 1:42	(4.3) 86%	(3.5) 70%	4				(6 joints at 15-25° with Fe staining; 5 joints at 30-40° with Fe staining)
272.7	60.7	5.0	1:31 1:22 1:36 3:06 1:31	(4.9) 98%	(2.9) 58%	5				(10 joints at 20-30°, some with Fe staining)
267.7	65.7	5.1	2:05 2:09 1:10 1:15 1:09/1.1	(2.3) 45%	(1.9) 37%	6				(2 joints at 10° with Fe staining; no recovery from 67.7-70.5 ft)
262.6	70.8	5.0	2:16 1:25 1:19 1:06 1:23	(3.6) 72%	(1.6) 32%	7				-Highly fractured, no recovery from 72.7-73.9 ft
257.6	75.8	5.0	1:16 1:26 1:20 1:20 1:10	(5.2) 104%	(4.8) 96%	8				257.6 — 75.8 Hard Rock: Gray to light gray and reddish brown, moderately weathered to fresh, very close to moderately close fracturing, hard to very hard, BIOTITE-QUARTZ GNEISS (5 joints at 35-45° with trace Fe stain; 2 joints at 30°)
252.6	80.8	5.0	2:11 1:31 1:20 1:18 1:31	(4.8) 96%	(3.8) 76%	9				(7 joints at 35-45°; 1 joint at 70° with clay)
247.6	85.8	3.8	1:31 1:47 2:08 3:16/0.8	(3.8) 100%	(1.6) 42%	10				(12 joints at 30-40° with clay; 2 joints at 75° with Fe and Mn stain)
243.8	89.6	1.2	5:15/1.2	(1.0) 83%	(0.0) 0%	11				-Water loss during coring at 90.1 ft
242.6	90.8	5.0	2:18 2:24 4:15 2:23 3:17	(4.3) 86%	(2.6) 52%	12				(2 joints at 80° with Fe and Mn staining; 7 joints at 20-30° with Fe staining and clay; severely weathered zone from 93.8-95.0 ft with no recovery)
237.6	95.8	4.9	2:17 2:22 2:21 2:23 2:48/0.9	(4.8) 98%	(2.6) 53%	13				(2 joints at 65-75°, 8 joints at 35-45°, 2 joints at 20-30° -all with Fe and Mn staining)
232.7	100.7									232.7 — 100.7 Coring terminated at 100.7 ft in Hard Rock: Very hard, BIOTITE-QUARTZ GNEISS

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

B-946 – Box 1
B-946 – Box 2



B-946 – Box 4
B-946 – Box 3

GEOTECHNICAL BORING LOG

MACTEC

MACTEC PROJECT NO.: 6468-06-1472	**COUNTY** Louisa, VA	**GEOLOGIST** S.Lehman	
SITE DESCRIPTION NORTH ANNA COL			**GROUND WATER (ft)**
BORING NO. B-947	**DRILL METHOD:** Mud Rotary	**SAMPLE METHODS:** SPT	**0 HR.** ND
COLLAR ELEV. 312.5 ft (NAVD88)	**NORTHING** 3,909,575 US ft (NAD83)	**EASTING** 11,686,367 US ft (NAD83)	**24 HR.** 19.5
TOTAL DEPTH 88.8 ft	**DRILL MACHINE** CME 55LC Track	**DRILLER:** D. White	**HAMMER TYPE** 140 lbs Auto
DATE STARTED 9/27/06	**COMPLETED** 9/28/06	**CORE BARREL TYPE:** NA	

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
312.5					Ground Surface				312.5 0.0
311.0	1.5								Elastic SILT (MH) light gray (2.5Y 7/2) and light greenish gray (GLEY1 8/5GY), dry to moist, stiff (Residual Soil)
309.0	3.5	4	6	9	15	947-1			
306.5	6.0	6	5	6	11	947-2			
304.0	8.5	4	3	6	9	947-3			304.5 8.0
301.5	11.0	4	4	5	9	947-4			Silty, SAND (SM) strong brown (7.5YR 4/6), moist, loose (Residual Soil)
299.0	13.5	2	4	5	9	947-5			299.5 13.0
293.8	18.7	2	3	4	7	947-6			Sandy SILT (ML) light gray (2.5Y 7/2), moist, medium stiff (Residual Soil)
288.8	23.7	5	6	6	12	947-7			295.5 17.0
283.8	28.7	5	6	10	16	947-8			Silty, fine to medium SAND (SM) reddish yellow (7.5YR 6/6), yellowish brown (2.5 Y 6/4), white (2.5Y 8/1), light yellow (2.5Y 7/3), and light olive brown (2.5Y 5/4&5/3), wet, medium dense to very dense, relict rock fabric (Residual Soil)
278.8	33.7	4	3	10	13	947-9			
273.8	38.7	3	7	12	19	947-10			
268.8	43.7	12	14	16	30	947-11			
263.8	48.7	9	11	17	28	947-12			
258.8	53.7	13	23	24	47	947-13			
253.8	58.7	23	27	28	55	947-14			254.5 58.0
248.8	63.7	36	50/0.4			947-15			Weathered Rock: Light yellowish brown (2.5Y 6/4) and light brownish gray (2.5Y 6/2), moist, very dense, severely weathered, soft, QUARTZ GNEISS
243.8	68.7	50/0.4				947-16			
238.8	73.7	50/0.4				947-17			
		50/0.3				947-18			

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

MACTEC

MACTEC PROJECT NO.: 6468-06-1472	**COUNTY** Louisa, VA	**GEOLOGIST** S.Lehman	
SITE DESCRIPTION NORTH ANNA COL			**GROUND WATER (ft)**
BORING NO. B-947	**DRILL METHOD:** Mud Rotary	**SAMPLE METHODS:** SPT	**0 HR.** ND
COLLAR ELEV. 312.5 ft (NAVD88)	**NORTHING** 3,909,575 US ft (NAD83)	**EASTING** 11,686,367 US ft (NAD83)	**24 HR.** 19.5
TOTAL DEPTH 88.8 ft	**DRILL MACHINE** CME 55LC Track	**DRILLER:** D. White	**HAMMER TYPE** 140 lbs Auto
DATE STARTED 9/27/06	**COMPLETED** 9/28/06	**CORE BARREL TYPE:** NA	

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
237.7					Continued from previous page				
233.8	78.7	50/0.2				947-19			Weathered Rock: Light yellowish brown (2.5Y 6/4) and light brownish gray (2.5Y 6/2), moist, very dense, severely weathered, soft, QUARTZ GNEISS *(continued)*
228.8	83.7	50/0.1				947-20			
223.8	88.7	50/0.1				947-21			223.7 88.8 Boring terminated at 88.8 ft in Weathered Rock: Very dense, severely weathered, soft, 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-948	**DRILL METHOD:** Mud Rotary/Core	**SAMPLE METHODS:** SPT/CORE	**0 HR.** 21.7
COLLAR ELEV. 310.4 ft (NAVD88)	**NORTHING** 3,909,619 US ft (NAD83)	**EASTING** 11,685,566 US ft (NAD83)	**24 HR.** 21.7
TOTAL DEPTH 100.6 ft	**DRILL MACHINE** CME 550 ATV	**DRILLER:** G. Akins	**HAMMER TYPE** 140 lbs Auto
DATE STARTED 9/26/06	**COMPLETED** 9/28/06	**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
310.4					Ground Surface				310.4 — 0.0
308.9	1.5								Silty SAND (SM) strong brown (7.5YR 5/8), reddish yellow (7.5YR 6/8), and white (7.5YR 8/1), moist to dry, medium dense, relict rock fabric (Residual Soil)
306.9	3.5	4	7	8	15	948-1			
304.4	6.0	5	9	10	19	948-2			
301.9	8.5	8	9	10	19	948-3			
299.4	11.0	9	9	9	18	948-4			299.9 — 10.5
296.7	13.7	6	8	11	19	948-5			Sandy SILT (ML) pinkish white (7.5YR 8/2), strong brown (7.5YR 5/8), and gray (7.5YR 6/1), moist, very stiff (Residual Soil)
291.9	18.5	9	15	15	30	948-6			
286.9	23.5	7	8	10	18	948-7	▼		288.4 — 22.0
281.9	28.5	45	50/0.4			948-8			Weathered Rock: Tan gray and brown tan, severely weathered, BIOTITE-QUARTZ GNEISS
276.9	33.5	43	50/0.3			948-9			274.2 — 36.2
		50/0.1				948-10			Hard Rock: Tan brown, moderately severe to moderately weathered, close fracturing, medium hard, BIOTITE-QUARTZ GNEISS with severely weathered zones
									261.0 — 49.4
									Hard Rock: Orange tan and tan gray, moderately weathered to fresh, close to moderately close fracturing, medium hard to hard, BIOTITE-QUARTZ GNEISS
									244.7 — 65.7
									Hard Rock: Blue gray, slightly weathered to fresh, close to moderately close fracturing, hard, BIOTITE-QUARTZ GNEISS

NORTH ANNA COL DUKE 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-948	**DRILL METHOD:** Mud Rotary/Core	**SAMPLE METHODS:** SPT/CORE — **0 HR.** 21.7
COLLAR ELEV. 310.4 ft **(NAVD88)**	**NORTHING** 3,909,619 **US ft (NAD83)**	**EASTING** 11,685,566 **US ft (NAD83)** — **24 HR.** 21.7
TOTAL DEPTH 100.6 ft	**DRILL MACHINE** CME 550 ATV	**DRILLER:** G. Akins — **HAMMER TYPE** 140 lbs Auto
DATE STARTED 9/26/06	**COMPLETED** 9/28/06	**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
235.6					Continued from previous page				
									Hard Rock: Blue gray, slightly weathered to fresh, close to moderately close fracturing, hard, BIOTITE-QUARTZ GNEISS *(continued)*
209.8	100.6								Boring and coring terminated at 100.6 ft in Hard Rock: Hard, BIOTITE-QUARTZ GNEISS

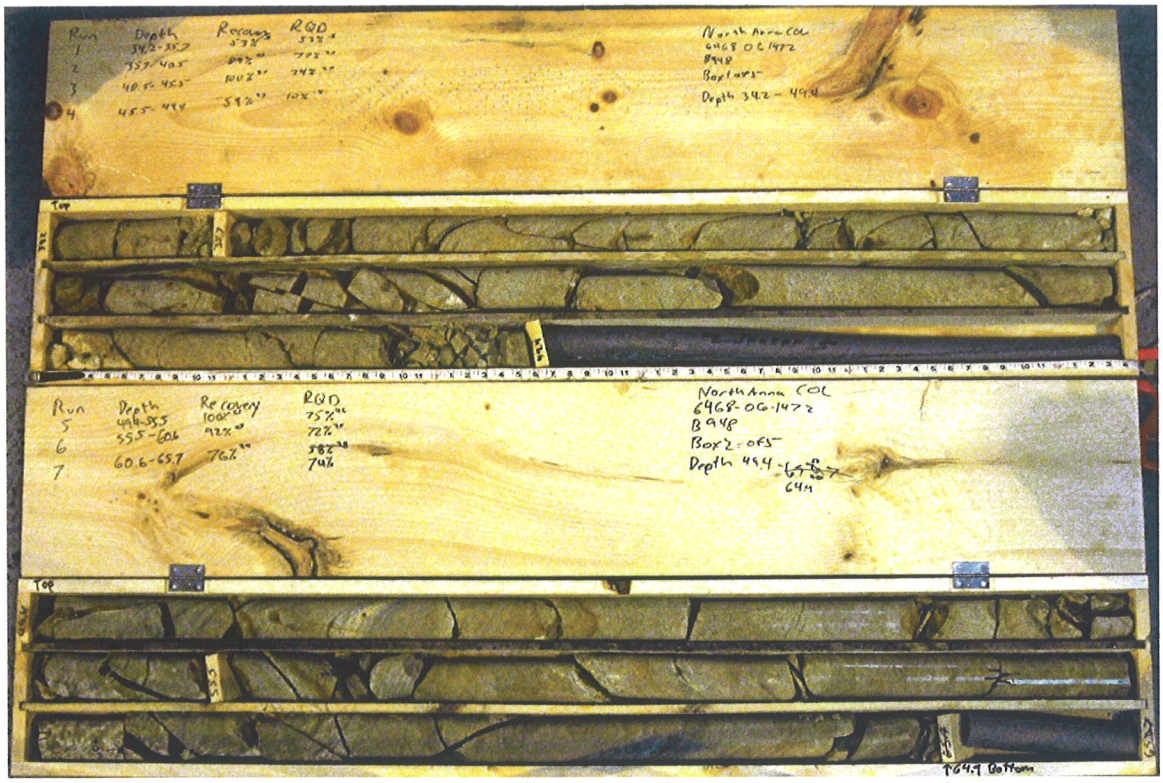
NORTH ANNA COL CORE NORTH ANNA COL DATA REPORT REV0.GPJ NORTH ANNA COL.GDT 1/19/07

GEOTECHNICAL CORING LOG

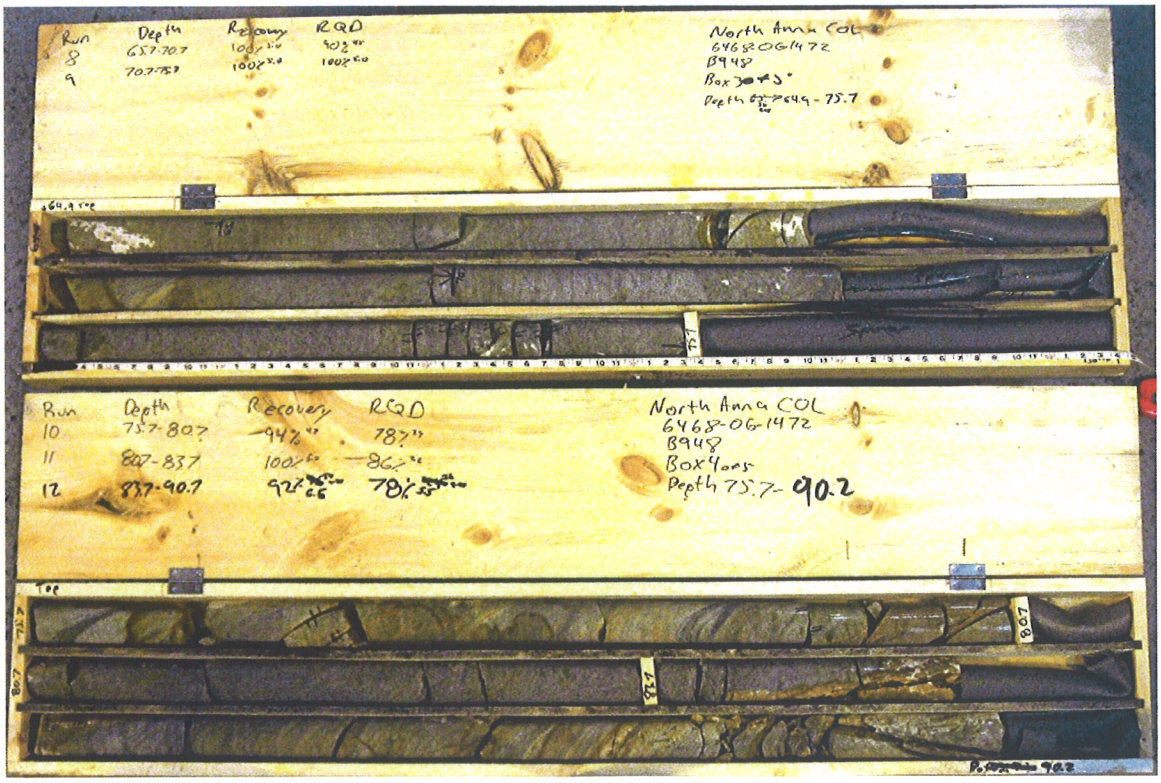
MACTEC

MACTEC PROJECT NO.: 6468-06-1472	**COUNTY** Louisa, VA	**GEOLOGIST** J. Howard	
SITE DESCRIPTION NORTH ANNA COL			**GROUND WATER (ft)**
BORING NO. B-948	**DRILL METHOD:** Mud Rotary/Core	**SAMPLE METHODS:** SPT/CORE	**0 HR.** 21.7
COLLAR ELEV. 310.4 ft **(NAVD88)**	**NORTHING** 3,909,619 **US ft (NAD83)**	**EASTING** 11,685,566 **US ft (NAD83)**	**24 HR.** 21.7
TOTAL DEPTH 100.6 ft	**DRILL MACHINE** CME 550 ATV	**DRILLER:** G. Akins	**HAMMER TYPE** 140 lbs Auto
DATE STARTED 9/26/06	**COMPLETED** 9/28/06	**CORE BARREL TYPE:** HQ 3 triple tube-wireline	
CORE SIZE HQ3	**TOTAL RUN** 66.4 ft		

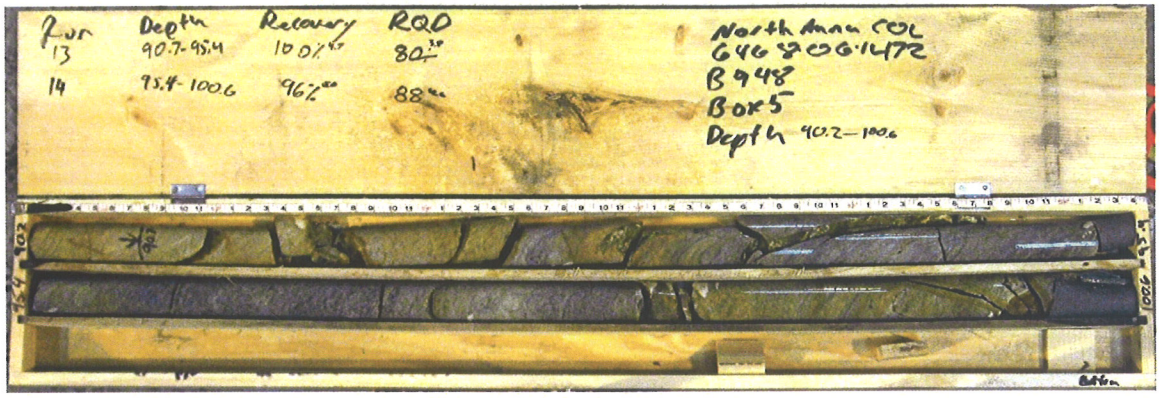
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
										Begin Coring @ 34.2 ft
276.2	34.2	1.5	1:30/1.5	(0.8) 53%	(0.8) 53%	1				Weathered Rock: Tan gray and brown tan, severely weathered, BIOTITE-QUARTZ GNEISS *(continued)*
274.2	36.2									
274.7	35.7	4.8	1:15 1:30 1:30 1:15 1:30/0.8	(4.3) 90%	(3.7) 77%	2				Hard Rock: Tan brown, moderately severe to moderately weathered, close fracturing, medium hard, BIOTITE-QUARTZ GNEISS with severely weathered zones
269.9	40.5									(4 joints at 50°, 1 joint at 8°, 1 joint at 20°)
264.9	45.5	5.0	2:15 1:00 1:15 1:15 1:30	(5.0) 100%	(3.7) 74%	3				
261.0	49.4	3.9	1:00 1:00 0:45 2:30/0.9	(2.3) 59%	(0.4) 10%	4				
261.0	49.4									
254.9	55.5	6.1	1:30 1:45 1:45 1:00 1:30 1:30/1.1	(6.1) 100%	(4.6) 75%	5				Hard Rock: Orange tan and tan gray, moderately weathered to fresh, close to moderately close fracturing, medium hard to hard, BIOTITE-QUARTZ GNEISS (5 joints at 30°, 3 joints at 60-70°)
249.8	60.6	5.1	1:00 1:15 1:00 2:00 1:30/1.1	(4.7) 92%	(3.7) 73%	UC-56.8'				(3 joints at 40°, 1 joint at 10°)
244.7	65.7	5.1	1:30 1:30 1:30 1:15 2:15/1.1	(3.9) 76%	(3.8) 75%	7				
244.7	65.7									
239.7	70.7	5.0	2:00 2:15 3:00 3:30 4:15	(5.0) 100%	(4.5) 90%	8				Hard Rock: Blue gray, slightly weathered to fresh, close to moderately close fracturing, hard, BIOTITE-QUARTZ GNEISS
234.7	75.7	5.0	3:15 1:45 1:45 2:30 3:15	(5.0) 100%	(5.0) 100%	9				(1 joint at 80°, 5 joints at 10°)
229.7	80.7	5.0	2:30 2:15 3:15 2:15 3:30	(4.7) 94%	(3.9) 78%	UC-76.1'				(2 joints at 30°, 3 joints at 50°)
226.7	83.7	3.0	5:30 8:45 10:45	(3.0) 100%	(2.6) 87%	11				(4 joints at 20-30°)
219.7	90.7	7.0	9:30 3:30 2:00 1:30 2:15 ND ND	(6.5) 93%	(5.5) 79%	12				
215.0	95.4	4.7	2:45 2:30 3:30 3:15 4:00/0.7	(4.7) 100%	(3.8) 81%	13				(2 joints at 70°, 3 joints at 10-20°, 2 joints at 40-50°)
209.8	100.6	5.2	4:15 4:00 4:00 3:30 3:33/1.2	(5.0) 96%	(4.6) 88%	14				(2 joints at 10°, 4 joints at 30-40°, 2 joints at 70°)
209.8	100.6									Coring terminated at 100.6 ft in Hard Rock: Hard, BIOTITE-QUARTZ GNEISS



B-948 – Box 1
B-948 – Box 2



B-948 – Box 3
B-948 – Box 4


Run
Depth
Recovery
RQD
13
90.7-95.4
100%
80%
14
95.4-100.6
96%
88%
North Anna COL
G46-06-1472
B-948
Box 5
Depth 90.2-100.6

B-948 – Box 5

GEOTECHNICAL BORING LOG

MACTEC

MACTEC PROJECT NO.: 6468-06-1472	**COUNTY** Louisa, VA	**GEOLOGIST** J. Lachewitz
SITE DESCRIPTION NORTH ANNA COL		**GROUND WATER (ft)**
BORING NO. B-949	**DRILL METHOD:** Mud Rotary/Core	**SAMPLE METHODS:** SPT/CORE — **0 HR.** 20.2
COLLAR ELEV. 334.8 ft (NAVD88)	**NORTHING** 3,909,018 US ft (NAD83) **EASTING** 11,685,157 US ft (NAD83)	**24 HR.** ND
TOTAL DEPTH 106.4 ft	**DRILL MACHINE** CME 550 ATV	**DRILLER:** G. Akins — **HAMMER TYPE** 140 lbs Auto
DATE STARTED 8/11/06	**COMPLETED** 8/15/06	**CORE BARREL TYPE:** HQ 3 triple tube-wireline

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
334.8								Ground Surface
334.8	0.0							
333.3	1.5							Sandy SILT (ML) light yellowish brown (2.5Y 6/4), moist, stiff to very stiff (Residaul Soil)
331.3	3.5	3	5	6	949-1			
328.8	6.0	5	7	10	949-2			
326.3	8.5	5	6	9	949-3			
323.8	11.0	7	9	13	949-4			
321.3	13.5	5	6	8	949-5			
316.8	18.0	5	7	10	949-6			
314.9	19.9	5	7	9	949-7			Sandy SILT (ML) very dark grayish green (GLEY1 3/5G) to dark brown (7.5YR 3/4), moist, very stiff to hard, micaceous, trace clay and quartz fragments (Residual Soil)
309.9	24.9	7	8	10	949-8			
304.9	29.9	10	12	13	949-9			
299.9	34.9	16	50/0.5		949-10			
294.9	39.9	4	11	20	949-11			
289.9	44.9	12	22	19	949-12			
284.9	49.9	5	6	14	949-13			
279.9	54.9	9	14	50/0.2	949-14			
278.9	55.9							Weathered Rock: Brown, black, and very dark gray, severely weathered, very close to close fracturing, very soft to soft, BIOTITE GNEISS
274.0	60.8	50/0.5			949-15			
268.5	66.3	50/0.2			949-16			

GEOTECHNICAL BORING LOG

MACTEC

MACTEC PROJECT NO.: 6468-06-1472	**COUNTY** Louisa, VA	**GEOLOGIST** J. Lachewitz
SITE DESCRIPTION NORTH ANNA COL		**GROUND WATER (ft)**
BORING NO. B-949	**DRILL METHOD:** Mud Rotary/Core	**SAMPLE METHODS:** SPT/CORE — **0 HR.** 20.2
COLLAR ELEV. 334.8 ft (NAVD88)	**NORTHING** 3,909,018 US ft (NAD83) **EASTING** 11,685,157 US ft (NAD83)	**24 HR.** ND
TOTAL DEPTH 106.4 ft	**DRILL MACHINE** CME 550 ATV	**DRILLER:** G. Akins — **HAMMER TYPE** 140 lbs Auto
DATE STARTED 8/11/06	**COMPLETED** 8/15/06	**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
260.0					Continued from previous page				
									258.4 — 76.4 Hard Rock: Gray to white, moderately to slightly weathered, close to moderately close fracturing, medium hard to hard, QUARTZ-BIOTITE GNEISS with trace magnetite
									228.4 — 106.4 Boring and coring terminated at 106.4 ft in Hard Rock: Moderately hard, QUARTZ-BIOTITE GNEISS

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

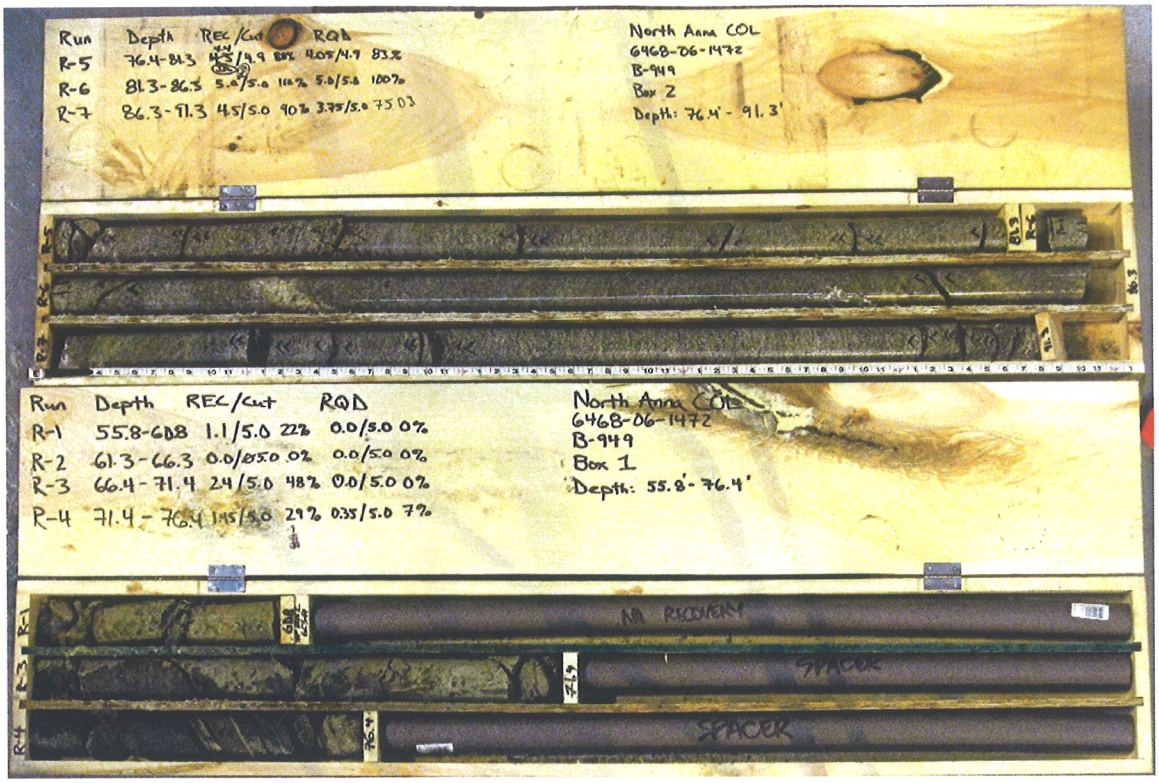
GEOTECHNICAL CORING LOG

MACTEC

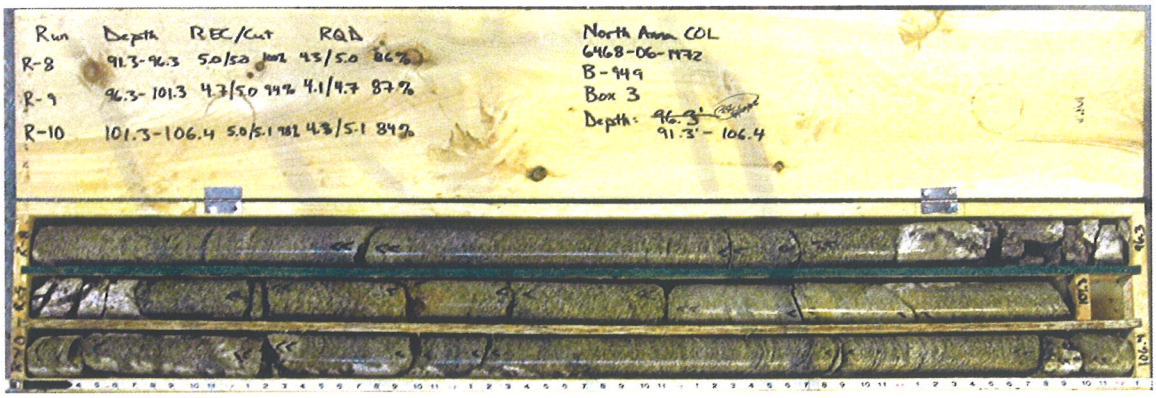
MACTEC PROJECT NO.: 6468-06-1472	**COUNTY** Louisa, VA	**GEOLOGIST** J. Lachewitz	
SITE DESCRIPTION NORTH ANNA COL			**GROUND WATER (ft)**
BORING NO. B-949	**DRILL METHOD:** Mud Rotary/Core	**SAMPLE METHODS:** SPT/CORE	**0 HR.** 20.2
COLLAR ELEV. 334.8 ft **(NAVD88)**	**NORTHING** 3,909,018 **US ft (NAD83)**	**EASTING** 11,685,157 **US ft (NAD83)**	**24 HR.** ND
TOTAL DEPTH 106.4 ft	**DRILL MACHINE** CME 550 ATV	**DRILLER:** G. Akins	**HAMMER TYPE** 140 lbs Auto
DATE STARTED 8/11/06	**COMPLETED** 8/15/06	**CORE BARREL TYPE:** HQ 3 triple tube-wireline	
CORE SIZE HQ3	**TOTAL RUN** 50.0 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 @ 56.1 ft
278.7	56.1	4.7	0:57 2:22 1:17 1:50 1:02/0.7	(1.1) 23%	(0.0) 0%	1				Weathered Rock: Brown, black, and very dark gray, severely weathered, very close to close fracturing, very soft to soft, BIOTITE GNEISS *(continued)* -Poor Recovery
274.0	60.8									
273.5	61.3	5.0	N=50/0.5 1:41 1:32 1:27 1:38 1:43	(0.0) 0%	(0.0) 0%	949-15 2				-No Recovery
268.5	66.3									
268.3	66.5	4.9	N=50/0.2 4:49 2:58 5:50 3:01 2:43/0.9	(2.4) 49%	(0.0) 0%	949-16 3				-Poor Recovery
263.4	71.4									
258.4	76.4	5.0	3:33 3:34 2:46 1:27 2:20	(1.5) 30%	(0.0) 0%	4				-Poor Recovery
258.4	76.4									76.4
253.5	81.3	4.9	1:35 1:39 1:46 1:33 2:09/0.9	(4.3) 88%	(4.1) 84%	5				Hard Rock: Gray to white, moderately to slightly weathered, close to moderately close fracturing, medium hard to hard, QUARTZ-BIOTITE GNEISS with trace magnetite (5 joints at 0-30° with Fe stain)
248.5	86.3	5.0	1:35 2:22 2:24 2:31 4:10	(5.0) 100%	(5.0) 100%	6				(2 joints at 45-55° with Fe stain)
243.5	91.3	5.0	2:00 1:00 1:47 1:28 1:41	(4.5) 90%	(3.8) 76%	7				(4 joints at 10-40°)
238.5	96.3	5.0	1:28 2:00 1:59 1:15 2:53	(5.0) 100%	(4.3) 86%	8				(5 joints at 5-45°)
233.5	101.3	5.0	1:07 1:19 1:09 0:55 1:30	(4.7) 94%	(4.4) 88%	9				(Multiple joints at 0-75°)
228.4	106.4	5.1	1:02 1:22 1:22 1:07 1:32/1.1	(5.0) 98%	(4.3) 84%	10				(Multiple joints at 0-75°)
228.4	106.4									106.4 Coring terminated at 106.4 ft in Hard Rock: Moderately hard, QUARTZ-BIOTITE GNEISS

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



B-949 – Box 2
B-949 – Box 1



B-949 – Box 3

GEOTECHNICAL BORING LOG

MACTEC

MACTEC PROJECT NO.: 6468-06-1472	**COUNTY** Louisa, VA	**GEOLOGIST** S. Nicely	
SITE DESCRIPTION NORTH ANNA COL			**GROUND WATER (ft)**
BORING NO. B-950	**DRILL METHOD:** Mud Rotary/Core	**SAMPLE METHODS:** SPT/CORE	**0 HR.** 10.4
COLLAR ELEV. 282.5 ft (NAVD88)	**NORTHING** 3,910,836 US ft (NAD83)	**EASTING** 11,686,282 US ft (NAD83)	**24 HR.** 41.1
TOTAL DEPTH 100.8 ft	**DRILL MACHINE** CME 55 Truck	**DRILLER:** H. Meyerson	**HAMMER TYPE** 140 lbs Auto
DATE STARTED 8/11/06	**COMPLETED** 8/15/06	**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
282.5					Ground Surface				282.5 — 0.0
281.0	1.5								Silty, fine to coarse SAND (SM) yellowish brown (10YR 5/4), moist, loose to very loose, trace gravel (Fill)
279.0	3.5	3	5	5	10	950-1			
276.5	6.0	2	3	1	4	950-2			
274.0	8.5	WOH	WOH	2	2	950-3			275.2 — 7.3
271.4	11.1	4	4	4	8	950-4			Sandy SILT (ML) yellowish brown (10YR 5/6), moist, medium stiff, trace clay (Residual Soil)
269.0	13.5	4	5	8	13	950-5			272.0 — 10.5
263.8	18.7	5	7	14	21	950-6			Silty, fine to coarse SAND (SM) yellowish brown (10YR 5/6) to dark yellowish brown (10YR 4/4&4/6), moist, medium dense to dense, trace gravel (Residual Soil)
258.8	23.7	11	17	19	36	950-7			261.5 — 21.0
253.8	28.7	28	50/0.5			950-8			Weathered Rock: Dark yellowish brown (10YR 4/6) and very dark greenish gray (GLEY1 3/1), moist to dry, very dense, severely weathered, BIOTITE GNEISS
248.8	33.7	50/0.3				950-9			
243.8	38.7	50/0.2				950-10			
238.8	43.7	50/0.3				950-11			
233.8	48.7	50/0.3				950-12			
232.2	50.3	50/0.3				950-13			232.2 — 50.3
		50/0.0				950-14			Hard Rock: Dark gray, slightly to very slightly weathered, very close to moderately close fracturing, hard, QUARTZ-BIOTITE GNEISS
									218.7 — 63.8
									Hard Rock: Dark gray, very slightly weathered to fresh, very close to wide fracturing, hard to very hard, QUARTZ-BIOTITE GNEISS

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

MACTEC

MACTEC PROJECT NO.: 6468-06-1472	**COUNTY** Louisa, VA	**GEOLOGIST** S. Nicely	
SITE DESCRIPTION NORTH ANNA COL			**GROUND WATER (ft)**
BORING NO. B-950	**DRILL METHOD:** Mud Rotary/Core	**SAMPLE METHODS:** SPT/CORE	**0 HR.** 10.4
COLLAR ELEV. 282.5 ft (NAVD88)	**NORTHING** 3,910,836 US ft (NAD83)	**EASTING** 11,686,282 US ft (NAD83)	**24 HR.** 41.1
TOTAL DEPTH 100.8 ft	**DRILL MACHINE** CME 55 Truck	**DRILLER:** H. Meyerson	**HAMMER TYPE** 140 lbs Auto
DATE STARTED 8/11/06	**COMPLETED** 8/15/06	**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
207.7					Continued from previous page				
									Hard Rock: Dark gray, very slightly weathered to fresh, very close to wide fracturing, hard to very hard, QUARTZ-BIOTITE GNEISS *(continued)*
181.7									100.8
									Boring and coring terminated at 100.8 ft in Hard Rock: Very hard, QUARTZ-BIOTITE GNEISS

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

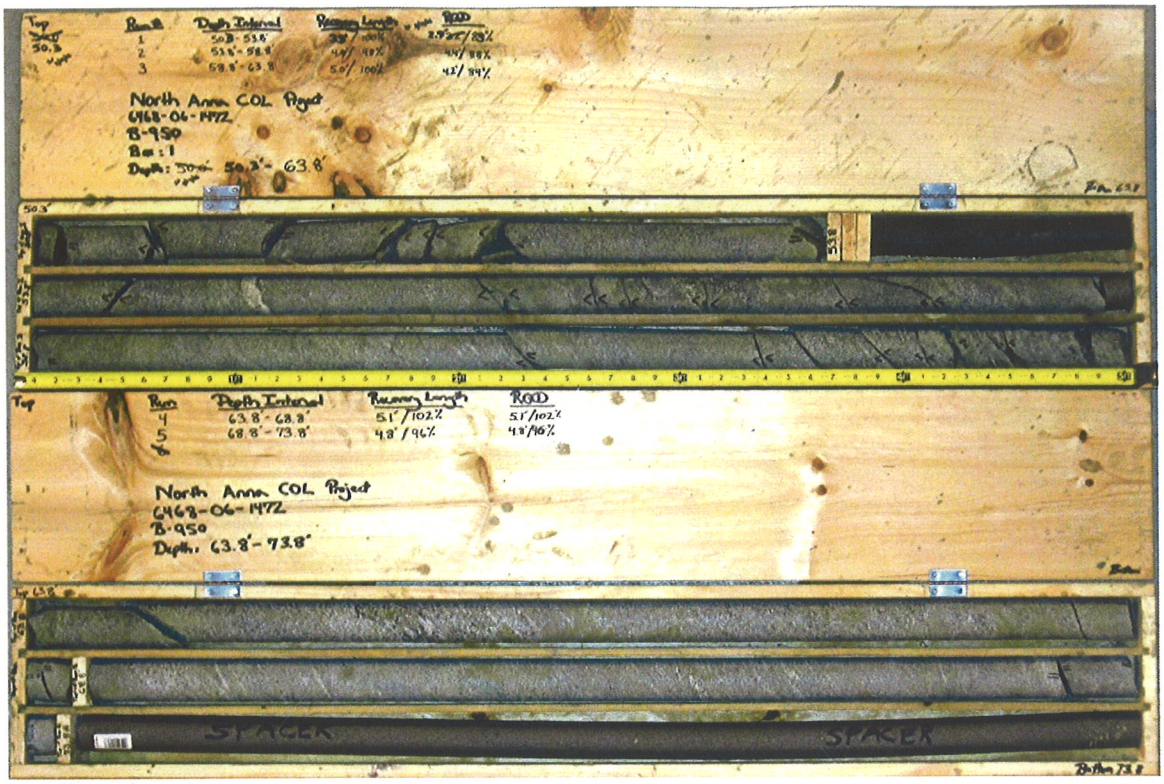
GEOTECHNICAL CORING LOG

MACTEC

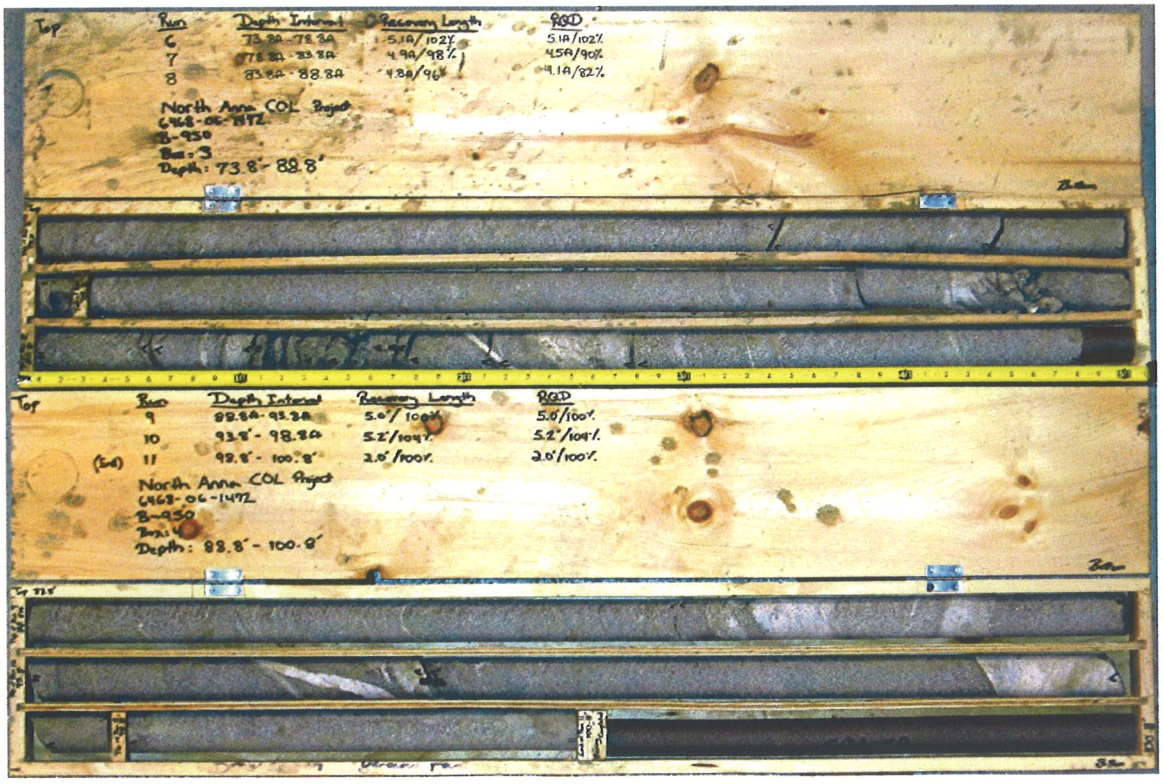
MACTEC PROJECT NO.: 6468-06-1472	**COUNTY** Louisa, VA	**GEOLOGIST** S. Nicely	
SITE DESCRIPTION NORTH ANNA COL			**GROUND WATER (ft)**
BORING NO. B-950	**DRILL METHOD:** Mud Rotary/Core	**SAMPLE METHODS:** SPT/CORE	**0 HR.** 10.4
COLLAR ELEV. 282.5 ft **(NAVD88)**	**NORTHING** 3,910,836 **US ft (NAD83)**	**EASTING** 11,686,282 **US ft (NAD83)**	**24 HR.** 41.1
TOTAL DEPTH 100.8 ft	**DRILL MACHINE** CME 55 Truck	**DRILLER:** H. Meyerson	**HAMMER TYPE** 140 lbs Auto
DATE STARTED 8/11/06	**COMPLETED** 8/15/06	**CORE BARREL TYPE:** HQ 3 triple tube-wireline	
CORE SIZE HQ3	**TOTAL RUN** 50.5 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 @ 50.3 ft
232.2	50.3	3.5	N=50/0.0 2:57/0.5 1:50 1:58	(3.5) 100%	(2.9) 83%	1				232.2 — Hard Rock: Dark gray, slightly to very slightly weathered, very close to moderately close fracturing, hard, QUARTZ-BIOTITE GNEISS (2 joints at 40-50° with clay; 2 joints at 10-20°; 1 joint at 50-60°; severely weathered zone from 52.3-52.5 ft) (1 joint at 70-80° with chlorite; 3 joints at 20-30° with clay; 3 joints at 30-40° with clay) 50.3
228.7	53.8	5.0	1:39 2:03 2:14 2:08 2:35 2:34	(4.9) 98%	(4.4) 88%	2				
223.7	58.8	5.0	2:16 2:10 2:18 2:10 2:46	(5.0) 100%	(4.2) 84%	3				(6 joints at 40-50° and 3 joints at 20-30° with moderate weathering)
218.7	63.8	5.0	3:55 1:44 1:34 2:25 1:44	(5.1) 102%	(5.1) 102%	4				218.7 — Hard Rock: Dark gray, very slightly weathered to fresh, very close to wide fracturing, hard to very hard, QUARTZ-BIOTITE GNEISS (1 joint at 40-50°) 63.8
213.7	68.8	5.0	1:51 1:24 1:37 1:46 2:36	(4.8) 96%	(4.8) 96%	5				-No Joints
208.7	73.8	5.0	2:31 1:30 1:42 1:23 1:47	(5.1) 102%	(5.1) 102%	6				(1 joint at 20-30° with clay)
203.7	78.8	5.0	1:34 1:47 1:52 2:05 1:48	(4.9) 98%	(4.5) 90%	7				(1 joint at 20-30°; Quartz vein from 83.0-83.4 ft)
198.7	83.8	5.0	2:01 1:46 2:02 2:23 2:20	(4.8) 96%	(4.1) 82%	8				(2 joints at 10-20° with Fe stain; Quartz vein from 86.2-86.5 ft with small vugs and epidote mineralization; highly fractured, severely weathered zone from 84.8-85.5 ft)
193.7	88.8	5.0	2:10 2:11 2:18 3:17 2:00	(5.0) 100%	(5.0) 100%	9				(1 joint at 10-20° with trace clay)
188.7	93.8	5.0	2:43 1:53 1:58 1:54 3:34	(5.2) 104%	(5.2) 104%	10				(2 joints at 20-30°)
183.7	98.8	2.0	2:09 2:03	(2.0) 100%	(2.0) 100%	11				-No Joints
181.7	100.8									181.7 — Coring terminated at 100.8 ft in Hard Rock: Very hard, QUARTZ-BIOTITE GNEISS 100.8

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



B-950 – Box 1
B-950 – Box 2



B-950 – Box 3
B-950 – Box 4