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-927	DRILL METHOD: HSA/Rot. Wash/Core	SAMPLE METHODS: SPT/CORE	0 HR. ND
COLLAR ELEV. 292.5 ft (NAVD88)	NORTHING 3,909,966 US ft (NAD83)	EASTING 11,685,879 US ft (NAD83)	24 HR. 22.9
TOTAL DEPTH 100.4 ft	DRILL MACHINE CME 550 ATV	DRILLER: G. Akins	HAMMER TYPE 140 lbs Auto
DATE STARTED 8/1/06	COMPLETED 8/7/06	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
292.5					Ground Surface				292.5 / 0.0
291.0	1.5								Clayey SAND (SC) strong brown (7.5YR 4/6), moist, medium dense (Residual Soil)
289.0	3.5	3	5	5	10	927-1			289.5 / 3.0
286.5	6.0	5	6	6	12	927-2			Silty, fine to coarse SAND (SM) brownish yellow (10YR 6/8), reddish yellow (7.5YR 6/8), and pale yellow (2.5Y 7/4), moist, medium dense, micaceous (Residual Soil)
284.0	8.5	7	7	7	14	927-3			
281.5	11.0	5	5	7	12	927-4			
279.0	13.5	8	7	10	17	927-5			
274.0	18.5	8	11	12	23	927-6			
269.0	23.5	15	12	14	26	927-7	▼		268.5 / 24.0
264.0	28.5	20	50/0.5			927-8			Weathered Rock: Brownish yellow (10YR 6/8) to light yellowish brown (2.5Y 6/4), moist, very dense, weathered GNEISS
260.8	31.7	50/0.1				927-9			
256.6	35.9	50/0.5				927-10			
		6	50/0.5			927-11			252.7 / 39.8
									Hard Rock: Yellow, white, and light gray, moderately to slightly weathered, close to wide fracturing, moderately hard to hard, QUARTZ-BIOTITE GNEISS with trace magnetite and pyrite
									222.0 / 70.5
									Hard rock: Light gray and white, moderately severe to slightly weathered, close fracturing, soft to hard, QUARTZ-BIOTITE GNEISS
									217.9 / 74.6

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-927	DRILL METHOD: HSA/Rot. Wash/Core	SAMPLE METHODS: SPT/CORE	0 HR. ND
COLLAR ELEV. 292.5 ft (NAVD88)	NORTHING 3,909,966 US ft (NAD83)	EASTING 11,685,879 US ft (NAD83)	24 HR. 22.9
TOTAL DEPTH 100.4 ft	DRILL MACHINE CME 550 ATV	DRILLER: G. Akins	HAMMER TYPE 140 lbs Auto
DATE STARTED 8/1/06	COMPLETED 8/7/06	CORE BARREL TYPE: HQ 3 triple tube-wireline	

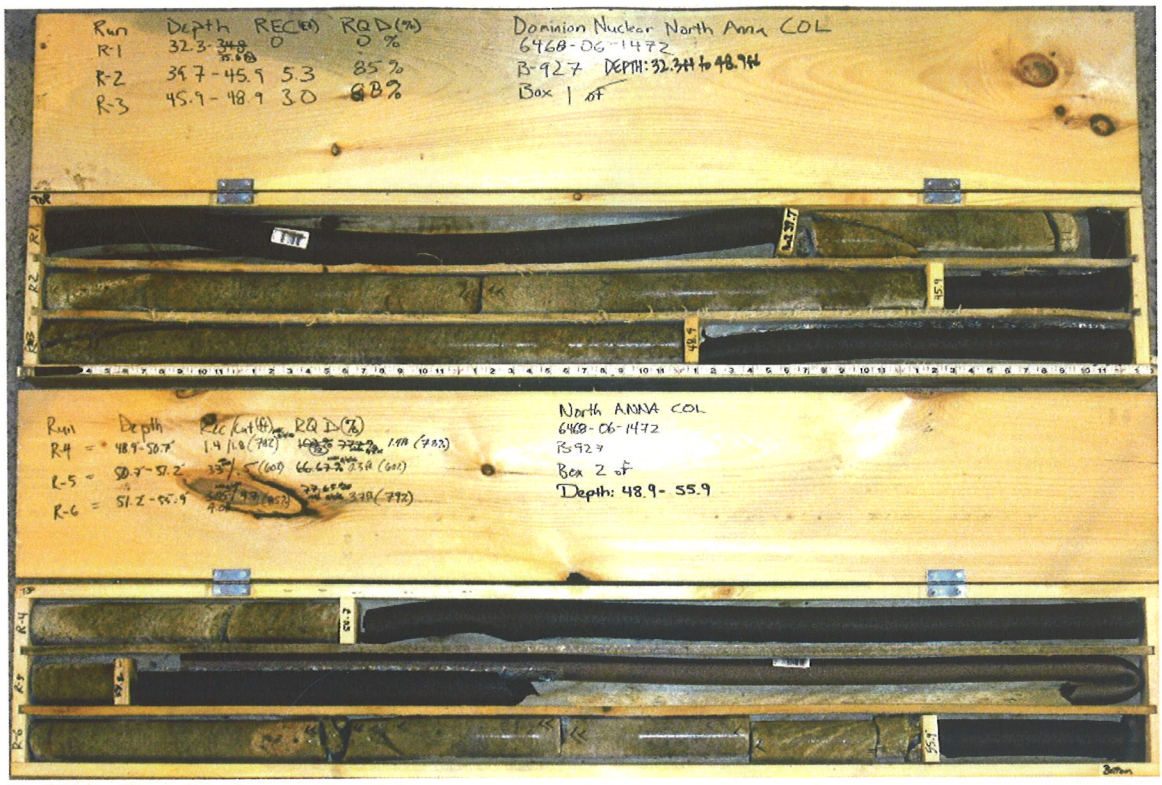
ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
217.7					Continued from previous page				
									Hard Rock: Light gray, moderately to very slightly weathered, close to wide fracturing, moderately hard to very hard, QUARTZ-BIOTITE GNEISS *(continued)*
									192.1 — 100.4
									Boring and coring terminated at 100.4 ft in Hard Rock: Hard to very hard, QUARTZ-BIOTITE GNEISS

GEOTECHNICAL CORING LOG

MACTEC

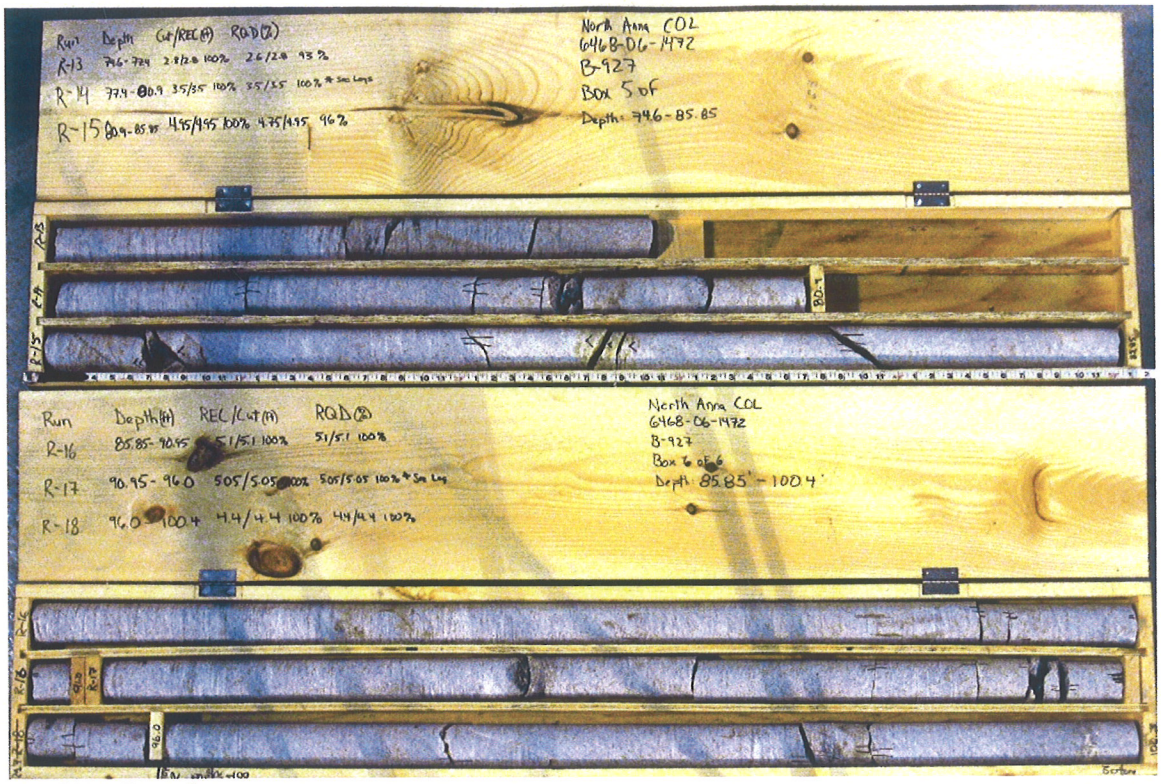
MACTEC PROJECT NO.: 6468-06-1472	**COUNTY** Louisa, VA	**GEOLOGIST** J. Lachewitz	
SITE DESCRIPTION NORTH ANNA COL			**GROUND WATER (ft)**
BORING NO. B-927	**DRILL METHOD:** HSA/Rot. Wash/Core	**SAMPLE METHODS:** SPT/CORE	**0 HR.** ND
COLLAR ELEV. 292.5 ft (NAVD88)	**NORTHING** 3,909,966 US ft (NAD83)	**EASTING** 11,685,879 US ft (NAD83)	**24 HR.** 22.9
TOTAL DEPTH 100.4 ft	**DRILL MACHINE** CME 550 ATV	**DRILLER:** G. Akins	**HAMMER TYPE** 140 lbs Auto
DATE STARTED 8/1/06	**COMPLETED** 8/7/06	**CORE BARREL TYPE:** HQ 3 triple tube-wireline	
CORE SIZE HQ3	**TOTAL RUN** 65.7 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 @ 32.3 ft
260.2	32.3	3.6	0:14 0:19 0:40/1.6	(0.0) 0%	(0.0) 0%	1				Weathered Rock: Brownish yellow (10YR 6/8) to light yellowish brown (2.5Y 6/4), moist, very dense, weathered GNEISS *(continued)* -No Recovery
256.6	35.9		*N=50/0.5*			*927-11*				
										252.7 — 39.8
252.8	39.7	6.2	3:58 4:47 6:12 4:51 7:12/2.2	(5.3) 85%	(5.3) 85%	UC-43.0'				Hard Rock: Yellow, white, and light gray, moderately to slightly weathered, close to wide fracturing, moderately hard to hard, QUARTZ-BIOTITE GNEISS with trace magnetite and pyrite
246.6	45.9									
243.6	48.9	3.0	10:38 12:41 18:13	(3.0) 100%	(3.0) 100%	3				
241.8	50.7	1.8	21:44 8:58/0.8	(1.4) 78%	(1.4) 78%	4				
241.3	51.2	0.5	12:14/0.5	(0.3) 60%	(0.3) 60%	5 UCS-51.6'				-No Joints
		4.7	2:46 3:06 8:02 5:03 1:51/0.7	(4.0) 85%	(3.7) 79%					
236.6	55.9									
		3.5	7:57 11:32 11:08 4:49/0.5	(3.5) 100%	(3.5) 100%	7				-No Joints
233.1	59.4									
231.6	60.9	1.5	13:25 12:15/0.5	(1.3) 87%	(1.3) 87%	8				-No Joints
		4.9	4:56 7:40 12:22 6:09 11:44/0.9	(4.9) 100%	(3.9) 80%	9				
226.7	65.8									
225.1	67.4	1.6	16:58 12:21/0.6	(1.6) 100%	(1.0) 63%	10				
		3.1	4:44 9:29 10:55/1.1	(3.1) 100%	(3.1) 100%	11				
222.0	70.5									222.0 — 70.5
		4.1	5:58 4:15 6:18 11:22/1.1	(3.8) 93%	(2.1) 51%	12				Hard rock: Light gray and white, moderately severe to slightly weathered, close fracturing, soft to hard, QUARTZ-BIOTITE GNEISS
217.9	74.6									217.9 — 74.6
		2.8	16:00 16:10 ND/0.8	(2.8) 100%	(2.6) 93%	UC-74.9'				Hard Rock: Light gray, moderately to very slightly weathered, close to wide fracturing, moderately hard to very hard, QUARTZ-BIOTITE GNEISS
215.1	77.4									
		3.5	2:25/0.5 5:30 8:13 11:40	(3.5) 100%	(3.5) 100%	14				-No Joints
211.6	80.9									
		5.0	5:43 4:43 4:36 6:30 8:30	(5.0) 100%	(4.8) 96%	15				
206.6	85.9									
		5.1	4:18 4:24 5:01 7:09 11:10/1.1	(5.1) 100%	(5.1) 100%	16				-No Joints
201.5	91.0									
		5.0	3:53 3:50 5:19 6:18 8:01	(5.0) 100%	(5.0) 100%	17				-No Joints
196.5	96.0									
		4.4	4:41 5:48 5:55 8:40/1.4	(4.4) 100%	(4.4) 100%	UC-96.3'				-No Joints
192.1	100.4									192.1 — 100.4
										Coring terminated at 100.4 ft in Hard Rock: Hard to very hard, QUARTZ-BIOTITE GNEISS



B-927 – Box 1
B-927 – Box 2

B-927 – Box 3
B-927 – Box 4



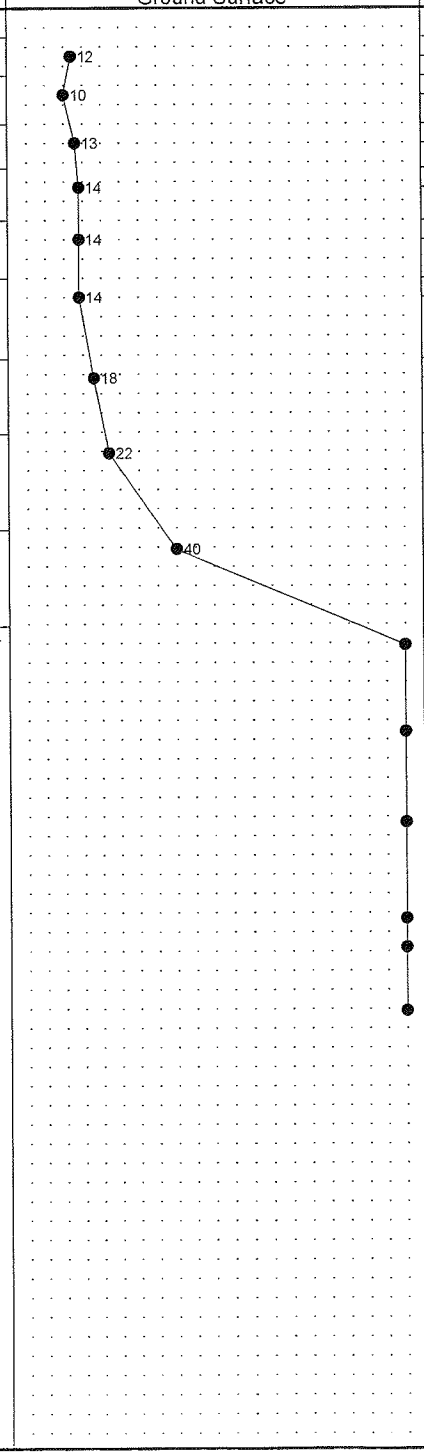
B-927 – Box 5
B-927 – Box 6

GEOTECHNICAL BORING LOG

MACTEC

MACTEC PROJECT NO.: 6468-06-1472	COUNTY Louisa, VA	GEOLOGIST J. Wallen/ M. Lear	
SITE DESCRIPTION NORTH ANNA COL			GROUND WATER (ft)
BORING NO. B-928	DRILL METHOD: Mud Rotary/Core	SAMPLE METHODS: SPT/CORE	0 HR. 12.5
COLLAR ELEV. 272.2 ft (NAVD88)	NORTHING 3,910,223 US ft (NAD83)	EASTING 11,686,159 US ft (NAD83)	24 HR. 8.1
TOTAL DEPTH 75.2 ft	DRILL MACHINE CME 45 Trailer	DRILLER: D. Rhodes	HAMMER TYPE 140 lbs Auto
DATE STARTED 9/7/06	COMPLETED 9/14/06	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	
272.2								Ground Surface	272.2 / 0.0
270.7	1.5							Silty, fine to coarse SAND (SM), brownish yellow (10YR 6/6), moist, medium dense, relict rock fabric (Residual Soil)	
268.7	3.5	6	6	6	928-1				
266.2	6.0	3	5	5	928-2				
263.9	8.3	4	6	7	928-3				
261.2	11.0	5	6	8	928-4				
258.2	14.0	4	7	7	928-5				
254.0	18.2	5	6	8	928-6				
250.1	22.1	6	9	9	928-7				
245.1	27.1	10	10	12	928-8				
240.1	32.1	11	17	23	928-9				247.2 / 25.0
235.1	37.1	27	46	50/0.4	928-10			Silty, fine to coarse SAND (SM), brownish yellow (10YR 6/6), moist, dense to very dense, relict rock fabric (Residual Soil)	239.1 / 33.1
230.1	42.1	50/0.5			928-11			Weathered Rock: Sampled as Silty, fine to coarse SAND (SM), brownish yellow (10YR 6/6) and yellowish brown (10YR 5/6), moist, very dense (BIOTITE-QUARTZ GNEISS)	
225.1	47.1	50/0.2			928-12				
223.5	48.7	50/0.2			928-13				
220.1	52.1	50/0.1			928-14				220.1 / 52.1
		50/0.0			928-15			Hard Rock: Dark gray, moderately severely weathered, very close to close fracturing, moderately hard, BIOTITE-QUARTZ GNEISS	217.0 / 55.2
								Weathered Rock: No recovery- BIOTITE-QUARTZ GNEISS	215.9 / 56.3
								Hard Rock: Tan-gray and white, with orange Fe staining, moderately severe to slightly weathered, close to moderately close fracturing, moderately hard to 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. Wallen/ M. Lear
SITE DESCRIPTION NORTH ANNA COL		GROUND WATER (ft)
BORING NO. B-928	DRILL METHOD: Mud Rotary/Core	SAMPLE METHODS: SPT/CORE	0 HR. 12.5
COLLAR ELEV. 272.2 ft (NAVD88)	NORTHING 3,910,223 US ft (NAD83)	EASTING 11,686,159 US ft (NAD83)	24 HR. 8.1
TOTAL DEPTH 75.2 ft	DRILL MACHINE CME 45 Trailer	DRILLER: D. Rhodes	HAMMER TYPE 140 lbs Auto
DATE STARTED 9/7/06	COMPLETED 9/14/06	CORE BARREL TYPE: HQ 3 triple tube-wireline	

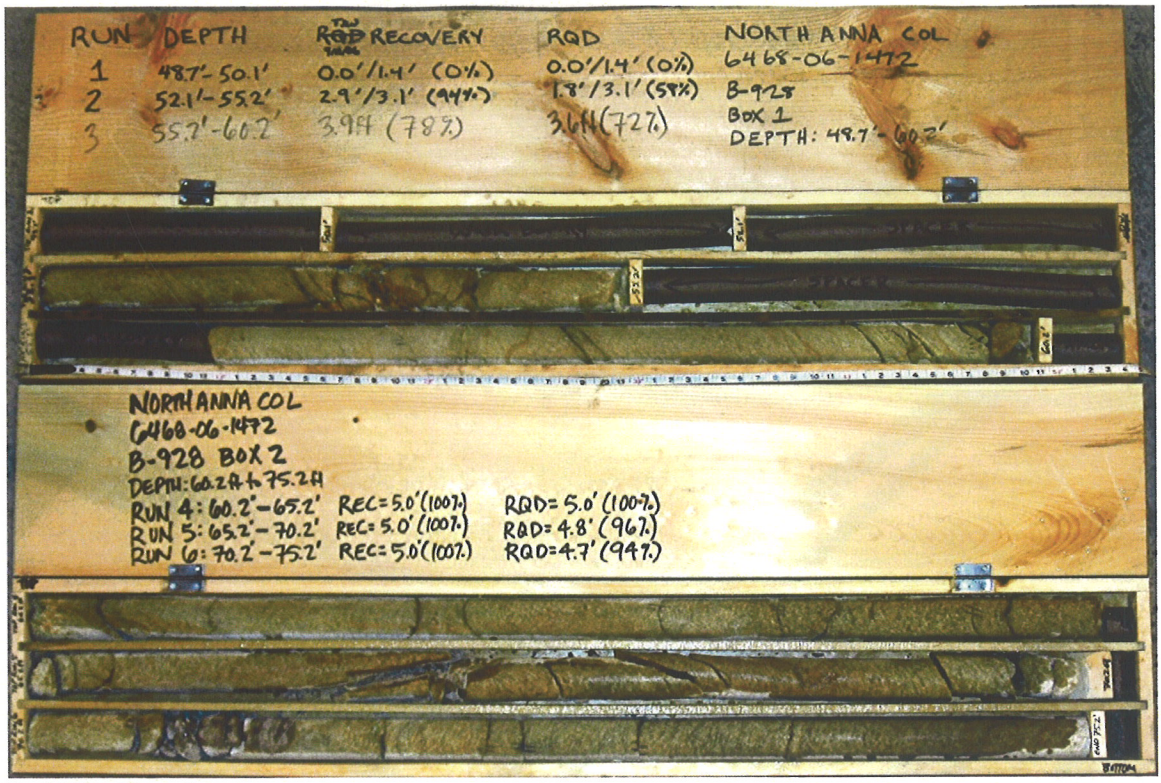
ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
197.4					Continued from previous page				
									197.0 Boring and coring terminated at 75.2 ft in Hard Rock: Hard, BIOTITE-QUARTZ GNEISS 75.2

GEOTECHNICAL CORING LOG

MACTEC

MACTEC PROJECT NO.: 6468-06-1472	**COUNTY** Louisa, VA	**GEOLOGIST** J. Wallen/ M. Lear
SITE DESCRIPTION NORTH ANNA COL		**GROUND WATER (ft)**
BORING NO. B-928	**DRILL METHOD:** Mud Rotary/Core	**SAMPLE METHODS:** SPT/CORE — **0 HR.** 12.5
COLLAR ELEV. 272.2 ft **(NAVD88)**	**NORTHING** 3,910,223 **US ft (NAD83)**	**EASTING** 11,686,159 **US ft (NAD83)** — **24 HR.** 8.1
TOTAL DEPTH 75.2 ft	**DRILL MACHINE** CME 45 Trailer	**DRILLER:** D. Rhodes — **HAMMER TYPE** 140 lbs Auto
DATE STARTED 9/7/06	**COMPLETED** 9/14/06	**CORE BARREL TYPE:** HQ 3 triple tube-wireline
CORE SIZE HQ3	**TOTAL RUN** 24.5 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 @ 48.7 ft
223.5 222.1	48.7 50.1	1.4	N=50/0.1 1:24 0:25/0.4	(0.0) 0%	(0.0) 0%	1				Weathered Rock: Sampled as Silty, fine to coarse SAND (SM), brownish yellow (10YR 6/6) and yellowish brown (10YR 5/6), moist, very dense (BIOTITE-QUARTZ GNEISS) *(continued)* 220.1 -No Recovery 52.1
220.1 217.0	52.1 55.2	3.1	N=50/0.0 3:49 3:00 3:03/1.1	(2.9) 94%	(1.8) 58%	UC-52.6'				Hard Rock: Dark gray, moderately severely weathered, very close to close fracturing, moderately hard, BIOTITE-QUARTZ GNEISS 217.0 (4 joints at 45°) 55.2
212.0	60.2	5.0	3:56 2:38 2:58 3:04 2:48	(3.9) 78%	(3.6) 72%	3				215.9 56.3 Weathered Rock: No recovery- BIOTITE-QUARTZ GNEISS (4 joints at 50-60° with clay and brown Fe stain) Hard Rock: Tan-gray and white, with orange Fe staining, moderately severe to slightly weathered, close to moderately close fracturing, moderately hard to hard, BIOTITE-QUARTZ GNEISS
207.0	65.2	5.0	2:46 3:00 2:57 1:56 2:02	(5.0) 100%	(5.0) 100%	4				(4 joints at 45-55° with clay and orange Fe stain)
202.0	70.2	5.0	2:56 3:01 3:13 3:20 2:54	(5.0) 100%	(4.8) 96%	5				(2 joints at 40-50° with trace clay and orange Fe stain; 2 joints at 80-90° with clay and brown Fe stain)
197.0	75.2	5.0	3:00 3:31 3:21 2:52 2:23	(5.0) 100%	(4.7) 94%	UCS-74.7'				(1 joint at 45° with clay; 2 joints at 10-20° with trace clay; fractured quartz vein at 60° from 70.8-71.5 ft) 197.0 75.2 Coring terminated at 75.2 ft in Hard Rock: Hard, BIOTITE-QUARTZ GNEISS



B-928 – Box 1
B-928 – Box 2

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-928A	DRILL METHOD: Mud Rotary	SAMPLE METHODS: UD/PITCHER BARREL
COLLAR ELEV. 271.8 ft (NAVD88)	NORTHING 3,910,220 US ft (NAD83)	EASTING 11,686,165 US ft (NAD83)
TOTAL DEPTH 37.5 ft	DRILL MACHINE CME 550 ATV	DRILLER: F. Cox
DATE STARTED 10/23/06	COMPLETED 10/23/06	CORE BARREL TYPE: NA

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

HAMMER 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
271.8					Ground Surface				271.8 — 0.0
									No samples due to utility clearance operations- soft dig/vac. truck excavation
									263.8 — 8.0
261.8	10.0					928A-UD-1			Silty, fine to coarse SAND (SM), tan-white, moist, relict rock fabric (Residual Soil)
256.8	15.0					928A-UD-2			928A-UD-1: Pushed from 10.0-10.5 ft; push pressure= weight of rig; recovery=0.3 ft-sample not retained for testing due to low recovery
251.8	20.0					928A-UD-3			928A-UD-2: Pushed from 15.0-16.9 ft; push pressure= ND; recovery=1.8 ft
246.8	25.0					928A-PB-1			928A-UD-3: Pushed from 20.0-22.0 ft; push pressure= ND; recovery=1.9 ft
244.5	27.3					928A-PB-2			928A-PB-1: Advanced from 25.0-27.3 ft; recovery=0.7 ft
									928A-PB-2: Advanced from 27.3-29.8 ft; recovery=0.7 ft
									-Hard drilling at 29.0 ft
									241.8 — 30.0
									Weathered Rock: BIOTITE-QUARTZ GNEISS
236.8	35.0					928A-PB-3			928A-PB-3: Advanced from 35.0-37.5 ft; recovery=0.7 ft
									234.3 — 37.5
									Boring terminated at 37.5 ft in Weathered Rock: BIOTITE-QUARTZ GNEISS

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