

APPENDIX B.1

**GEOTECHNICAL BORING LOGS
(SOIL AND ROCK)**

NORTH ANNA COL

**DATA REPORT REV. 0
JANUARY 23, 2007**

MACTEC PROJECT NO. 6468-06-1472

[illegible]

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



MACTEC PROJECT NO.: 6468-06-1472										COUNTY Louisa, VA					GEOLOGIST S. Lehman				
SITE DESCRIPTION NORTH ANNA COL															GROUND WATER (ft)				
BORING NO. B-901					DRILL METHOD: Mud Rotary/Core					SAMPLE METHODS: SPT/UD/CORE					0 HR. ND				
COLLAR ELEV. 309.4 ft (NAVD88)					NORTHING 3,909,778 US ft (NAD83)					EASTING 11,685,929 US ft (NAD83)					24 HR. 21.3				
TOTAL DEPTH 300.0 ft					DRILL MACHINE CME 45 Trailer					DRILLER: F. Cox/D. Rhodes					HAMMER TYPE 140 lbs Auto				
DATE STARTED 8/10/06					COMPLETED 8/25/06					CORE BARREL TYPE: HQ 3 triple tube-wireline									
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT						SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION					
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100									
159.8					Continued from previous page														
																Hard Rock: Light to dark gray, slight weathering to fresh, close to very wide fracturing, hard to very hard, BIOTITE-QUARTZ GNEISS with feldspar and trace magnetite (continued)			

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



SHEET 5 OF 5

MACTEC PROJECT NO.: 6468-06-1472				COUNTY Louisa, VA				GEOLOGIST S.Lehman						
SITE DESCRIPTION NORTH ANNA COL										GROUND WATER (ft)				
BORING NO. B-901		DRILL METHOD: Mud Rotary/Core				SAMPLE METHODS: SPT/UD/CORE				0 HR. ND				
COLLAR ELEV. 309.4 ft (NAVD88)		NORTHING 3,909,778		US ft (NAD83)		EASTING 11,685,929		US ft (NAD83)		24 HR. 21.3				
TOTAL DEPTH 300.0 ft		DRILL MACHINE CME 45 Trailer				DRILLER: F. Cox/D. Rhodes				HAMMER TYPE 140 lbs Auto				
DATE STARTED 8/10/06		COMPLETED 8/25/06				CORE BARREL TYPE: HQ 3 triple tube-wireline								
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT						SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100				
10.2					Continued from previous page									
														Boring and coring terminated at 300.0 ft in Hard Rock: Very hard, BIOTITE-QUARTZ GNEISS

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



SHEET 1 OF 4

MACTEC PROJECT NO.: 6468-06-1472						COUNTY Louisa, VA				GEOLOGIST S.Lehman			
SITE DESCRIPTION NORTH ANNA COL										GROUND WATER (ft)			
BORING NO. B-901			DRILL METHOD: Mud Rotary/Core				SAMPLE METHODS: SPT/UD/CORE				0 HR. ND		
COLLAR ELEV. 309.4 ft (NAVD88)			NORTHING 3,909,778		US ft (NAD83)		EASTING 11,685,929		US ft (NAD83)		24 HR. 21.3		
TOTAL DEPTH 300.0 ft			DRILL MACHINE CME 45 Trailer				DRILLER: F. Cox/D. Rhodes				HAMMER TYPE 140 lbs Auto		
DATE STARTED 8/10/06			COMPLETED 8/25/06				CORE BARREL TYPE: HQ 3 triple tube-wireline						
CORE SIZE HQ3			TOTAL RUN 256.7 ft										
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	RQD (ft) %	SAMP. NO.	REC. (ft) %	RQD (ft) %	L O G	DESCRIPTION AND REMARKS			
										Begin Coring @ 43.3 ft			
266.1	43.3	0.7	5:40/0.7	(0.6)	(0.0)	1				266.1	Hard Rock: Light gray with orange Fe-oxide staining, moderately severe to moderate weathering, close to moderately close fracturing, medium to moderately hard, QUARTZ GNEISS with biotite	43.3	
265.4	44.0	1.0	6:40	86%	0%	2							
264.4	45.0	3.8	3:21 3:20 4:08	(0.8) (0.0) (0.9)	(0.0) (0.0) (0.9)	3					(1 joint at 30° with trace clay) (3 joints at 45° with trace clay and Fe stain) (7 joints at 45° with clay and Fe stain; 5 joints at 30° with clay; severe weathering along joints) (1 joint at 45° with Fe staining) (3 joints at 45° with Fe staining; 3 joints at 30° with trace clay and Fe staining)		
260.6	48.8		4:20/0.8	(3.3)	(0.9)								
259.4	50.0	1.2	1:02/0.2	87%	24%	4							
		5.0	5:20 4:56 3:26 3:48 3:20 3:05	(1.0) (1.0) (4.9) (2.2) 98% 44%	(1.0) (1.0) (2.2) (2.2) 98% 44%	UC-54.0'							
254.4	55.0		3:17 2:54 3:43 4:45 4:33	(4.9) 98%	(3.8) 76%	6					(Severely weathered from 56.8-57.1 ft; 2 joints at 45° with trace clay and Fe staining; 2 joints at 30° with clay and Fe staining; 1 joint at 70° with Fe staining)		
249.4	60.0	5.0	3:40 3:51 4:24 4:56 4:17	(5.0) 100%	(4.4) 88%	UCS-60.3'				249.4	Hard Rock: Light gray with orange Fe staining, slight weathering, close to moderately close fracturing, moderately hard, QUARTZ GNEISS with biotite (1 joint at 70°, 3 joints at 45°, and 3 joints at 30°-all with trace clay and Fe staining) (14 joints at 20-30° with clay and Fe staining)	60.0	
244.4	65.0	5.0	3:52 3:39 3:58 3:43 2:19	(4.2) 84%	(2.0) 40%	8							
239.4	70.0		3:35 4:16 3:25 2:50 3:13/0.7	(4.6) 98%	(0.9) 19%	9				239.4	Hard Rock: Light gray to dark gray with orange Fe staining, moderately severe to slight weathering, close fracturing, medium to moderately hard, QUARTZ-BIOTITE GNEISS grading into QUARTZ GNEISS with biotite at 73.8 ft (14 joints at 20-30° with trace clay and Fe staining) (8 joints at 20°, 2 joints at 45°, and 3 joints at 70°-all with trace clay and Fe staining)	70.0	
234.7	74.7	4.7	0:48/0.3	(5.3)	(2.1)	10							
229.4	80.0	5.3	2:45 2:54 2:10 2:38 3:10	100%	40%					229.4	Hard Rock: Light gray to dark gray with orange Fe stains, slight to very slight weathering, close to moderately close fracturing, moderately hard, QUARTZ GNEISS with biotite (2 joints at 30°, 1 joint at 50°, and 4 joints at 70°-all with trace clay and Fe staining) (3 joints at 60°, 1 joint at 45°, and 2 joints at 30°-all with Fe staining)	80.0	
224.4	85.0	5.0	3:20 3:46 3:20 3:39 3:34	(5.0) 100%	(3.8) 76%	11							
		5.0	2:56 2:54 3:38 3:55 4:50	(4.6) 92%	(2.8) 56%	12							
219.4	90.0	5.0	3:57 3:41 3:19 3:18 3:18	(5.0) 100%	(2.7) 54%	13					(2 joints at 80° with trace clay and Fe staining; 2 joints at 45° and 3 joints at 30° with Fe staining; moderate weathering along joints)		
214.4	95.0		3:24 3:20 3:40 3:39	(4.5) 100%	(3.5) 78%	UC-97.9'					(4 joints at 45° with Fe staining; 2 joints at 70° with trace clay and light Fe staining)		
209.9	99.5		2:42/0.5	(0.5)	(0.0)	15							
209.4	100.0	0.5	2:14/0.5	100%	0%	16					(1 joint at 80° with trace clay) (2 joints at 80°, 2 joints at 60°, 2 joints at 45°, and 2 joints at 30°-all with trace clay and Fe staining)		
		5.0	3:40 2:44 3:30 3:14 2:45	(5.0) 100%	(2.8) 56%								
204.4	105.0		3:06 3:20/0.5	(0.6) 40%	(0.0) 0%	17				203.8	(1 joint at 80° with trace clay and Fe staining)	105.6	
202.9	106.5	1.5	2:21/0.5 3:40 4:04 3:11	(4.0) 114%	(2.2) 63%	18				201.9	Weathered Rock: Dark to light gray, severe weathering, QUARTZ GNEISS with biotite-No recovery from 105.6 to 106.0 ft (4 joints at 45° with clay and Fe staining)	107.6	
199.4	110.0		3:10 2:24	(2.0) 100%	(0.7) 35%	19				198.4	Hard Rock: Light to dark gray, moderate to slight weathering, close fracturing, moderately hard, QUARTZ GNEISS with biotite (4 joints at 30° with Fe staining)	111.0	
197.4	112.0	2.0	2:56 4:13 1:57	(2.8) 93%	(0.9) 30%	20				197.4	Weathered Rock: Dark gray, severe weathering, QUARTZ GNEISS with biotite Hard Rock: Light gray, moderate weathering, close fracturing, moderately hard, QUARTZ-MUSCOVITE GNEISS with feldspar	112.0	
194.4	115.0	3.0	5:26 3:12 2:01	(4.2) 84%	(2.4) 48%	21				195.4	Weathered Rock: light to dark gray, very severe weathering, close fracturing, medium hard, QUARTZ GNEISS with muscovite	114.0	
		5.0								193.4		116.0	

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



SHEET 2 OF 4

MACTEC PROJECT NO.: 6468-06-1472										COUNTY Louisa, VA										GEOLOGIST S.Lehman									
SITE DESCRIPTION NORTH ANNA COL																				GROUND WATER (ft)									
BORING NO. B-901					DRILL METHOD: Mud Rotary/Core					SAMPLE METHODS: SPT/UD/CORE					0 HR. ND														
COLLAR ELEV. 309.4 ft (NAVD88)					NORTHING 3,909,778					US ft (NAD83)					EASTING 11,685,929					US ft (NAD83)					24 HR. 21.3				
TOTAL DEPTH 300.0 ft					DRILL MACHINE CME 45 Trailer					DRILLER: F. Cox/D. Rhodes					HAMMER TYPE 140 lbs Auto														
DATE STARTED 8/10/06					COMPLETED 8/25/06					CORE BARREL TYPE: HQ 3 triple tube-wireline																			
CORE SIZE HQ3					TOTAL RUN 256.7 ft																								
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %RQD (ft) %		SAMP. NO.	STRATA REC. (ft) %RQD (ft) %		L O G	DESCRIPTION AND REMARKS																			
										Continued from previous page																			
189.4	120.0		2:00 4:36							(2 joints at 70-80° with trace clay and Fe staining; 1 joint at 45° with trace clay)										120.0									
		3.0	5:40 3:48 5:20	(1.4) 47%	(0.0) 0%	22				189.4 188.4	Hard Rock: Light gray with orange Fe staining, slight weathering, moderately close fracturing, moderately hard, QUARTZ-MUSCOVITE GNEISS with feldspar (continued)										121.0								
186.4	123.0		6:27 3:24	(0.1) 5%	(0.0) 0%	23				186.4	Weathered Rock: Light gray to bluish gray, severely weathered, QUARTZ GNEISS with muscovite and feldspar										123.0								
184.4	125.0		6:38 7:29	(1.4) 70%	(0.0) 0%	24				183.8	(2 joints at 45° and 1 joint at 30° with clay)										125.6								
182.4	127.0		7:28 5:20 3:38	(2.5) 83%	(1.9) 63%	UC-129.5					Hard Rock: Light gray to bluish gray, moderately severe to moderate weathering, close fracturing, moderately hard, QUARTZ GNEISS with muscovite and feldspar																		
179.4	130.0		3:21 3:16 3:59 4:54	(4.6) 92%	(2.5) 50%	26					Weathered Rock: Severely weathered, QUARTZ GNEISS with muscovite and feldspar-Very poor recovery																		
		5.0	4:57								(4 joints at 30° with trace clay and Fe staining)																		
174.4	135.0		4:55 4:18 3:31	(5.0) 100%	(4.8) 96%	27				174.4	Hard Rock: Light to dark gray with orange Fe staining, moderately severe to slight weathering, close to moderately close fracturing, moderately hard, BIOTITE-QUARTZ GNEISS and QUARTZ GNEISS with biotite										135.0								
		5.0	4:06 3:26								(4 joints at 45° with trace clay and Fe staining)																		
169.4	140.0		2:58 3:14 3:16 4:04	(4.9) 98%	(4.9) 98%	28					Hard Rock: Light to dark gray, slight weathering to fresh, close to very wide fracturing, hard to very hard, BIOTITE-QUARTZ GNEISS with feldspar and trace magnetite																		
		5.0	4:03								(1 joint at 80° and 1 joint at 45° with trace clay, slight weathering along joints)																		
164.4	145.0		4:05 3:45 3:42	(5.0) 100%	(4.7) 94%	29					(1 joint at 30° with clay)																		
		5.0	3:46 3:06								(1 joint at 65° with trace clay; 1 joint at 50° with weathered biotite)																		
159.4	150.0		3:25 2:38 2:51	(5.0) 100%	(5.0) 100%	30					(1 joint at 45° with trace clay and weathered biotite; 1 joint at 80° with weathered biotite)																		
		5.0	3:10 3:50																										
154.4	155.0		3:25 2:23 2:45	(5.0) 100%	(5.0) 100%	31					-No Joints																		
		5.0	2:25 2:32																										
149.4	160.0		2:22 2:52 2:50	(5.0) 100%	(5.0) 100%	32					-No Joints																		
		5.0	2:54 4:09																										
144.4	165.0		5:53 5:10 3:18	(5.1) 102%	(5.1) 102%	33					-No Joints																		
		5.0	3:28 3:24																										
139.4	170.0		3:58 5:20 4:06	(5.0) 100%	(5.0) 100%	UCS-170.5					(1 joint at 45° with trace Fe stain)																		
		5.0	4:36 3:29																										
134.4	175.0		5:08 4:34 4:10	(5.0) 100%	(5.0) 100%	35					-No Joints																		
		5.0	3:51 4:09																										
129.4	180.0		6:06 5:07 5:56	(5.0) 100%	(5.0) 100%	36					(2 joints at 70° with trace clay)																		
		5.0	4:43 3:51																										
124.4	185.0		6:49	(1.2)	(0.9)	37					(1 joint at 15°)																		
123.2	186.2	1.2	2:44/0.2	100%	75%	38					(1 joint at 80° with trace clay)																		
		3.8	1:02/0.8	(3.8)	(3.8)																								
			4:44	100%	100%																								
119.4	190.0		4:10																										
		5.0	5:05																										
			3:41	(5.0)	(5.0)	39					-No Joints																		
			3:53	100%	100%																								

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



MACTEC PROJECT NO.: 6468-06-1472						COUNTY Louisa, VA			GEOLOGIST S. Lehman		
SITE DESCRIPTION NORTH ANNA COL									GROUND WATER (ft)		
BORING NO. B-901			DRILL METHOD: Mud Rotary/Core			SAMPLE METHODS: SPT/UD/CORE			0 HR. ND		
COLLAR ELEV. 309.4 ft (NAVD88)			NORTHING 3,909,778		US ft (NAD83)		EASTING 11,685,929		US ft (NAD83)		24 HR. 21.3
TOTAL DEPTH 300.0 ft			DRILL MACHINE CME 45 Trailer			DRILLER: F. Cox/D. Rhodes			HAMMER TYPE 140 lbs Auto		
DATE STARTED 8/10/06			COMPLETED 8/25/06			CORE BARREL TYPE: HQ 3 triple tube-wireline					
CORE SIZE HQ3			TOTAL RUN 256.7 ft								
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) % RQD (ft) %		SAMP. NO.	STRATA REC. (ft) % RQD (ft) %		L O G	DESCRIPTION AND REMARKS	
										Continued from previous page	
114.4	195.0	5.0	4:28 4:42 3:55	(5.0)	(5.0)	40				Hard Rock: Light to dark gray, slight weathering to fresh, close to very wide fracturing, hard to very hard, BIOTITE-QUARTZ GNEISS with feldspar and trace magnetite (continued) -No Joints	
109.4	200.0	5.0	4:05 4:29 3:35 4:09 4:06	100%	100%	41				-No Joints	
104.4	205.0	5.0	4:29 4:45 5:48 5:38 5:58	(5.0) 100%	(5.0) 100%	41				-No Joints	
		3.9	9:10 5:15 7:55 8:50/0.9	(3.9) 100%	(3.9) 100%	UC-208.5'				(1 joint at 70° with trace clay)	
100.5	208.9	1.1	1:18/0.1 5:48	(1.0) 91%	(0.9) 82%	43				-No Joints	
99.4	210.0	5.0	7:21 4:41 8:17 5:10 4:12	(5.0) 100%	(5.0) 100%	44				(1 joint at 45° with trace clay)	
94.4	215.0	3.8	5:05 4:07 4:49 4:43/0.8	(3.9) 103%	(3.9) 103%	45				-No Joints	
90.6	218.8	1.2	4:25 0:30/0.2	(1.0) 83%	(1.0) 83%	46				-No Joints	
89.4	220.0	5.0	5:56 5:27 4:07 4:06 3:53	(5.0) 100%	(5.0) 100%	47				(1 joint at 70-80° with Fe mineralization)	
84.4	225.0	5.0	3:06 3:37 4:07 4:51 4:30	(5.0) 100%	(5.0) 100%	48				-No Joints	
79.4	230.0	5.1	4:36 4:46 4:49 4:36 4:58/1.1	(5.1) 100%	(5.1) 100%	49				-No Joints	
74.3	235.1	4.9	8:13 8:16 6:06 8:29 8:08	(4.9) 100%	(4.9) 100%	50				-No Joints	
69.4	240.0	5.1	9:56 8:06 8:17 8:16 10:44/1.1	(5.1) 100%	(5.1) 100%	UC-240.5'				-No Joints	
64.3	245.1	5.0	17:21 17:38 6:56 7:54 4:37	(5.1) 102%	(4.7) 94%	52				(1 joint at 20-30°; 1 joint at 30-40° with chlorite)	
59.3	250.1	5.0	4:48 4:53 6:28 5:51 5:18	(5.0) 100%	(5.0) 100%	53				(1 joint at 65°)	
54.3	255.1	4.9	7:23 7:15 6:56 6:00 5:09/0.9	(4.9) 100%	(4.9) 100%	54				(1 joint at 45°)	
49.4	260.0	5.0	6:30 5:52 6:27 6:56 10:46	(5.0) 100%	(5.0) 100%	55				-No Joints	
44.4	265.0	5.0	14:33 14:42	(5.0) 100%	(5.0) 100%	56				(1 joint at 40°)	

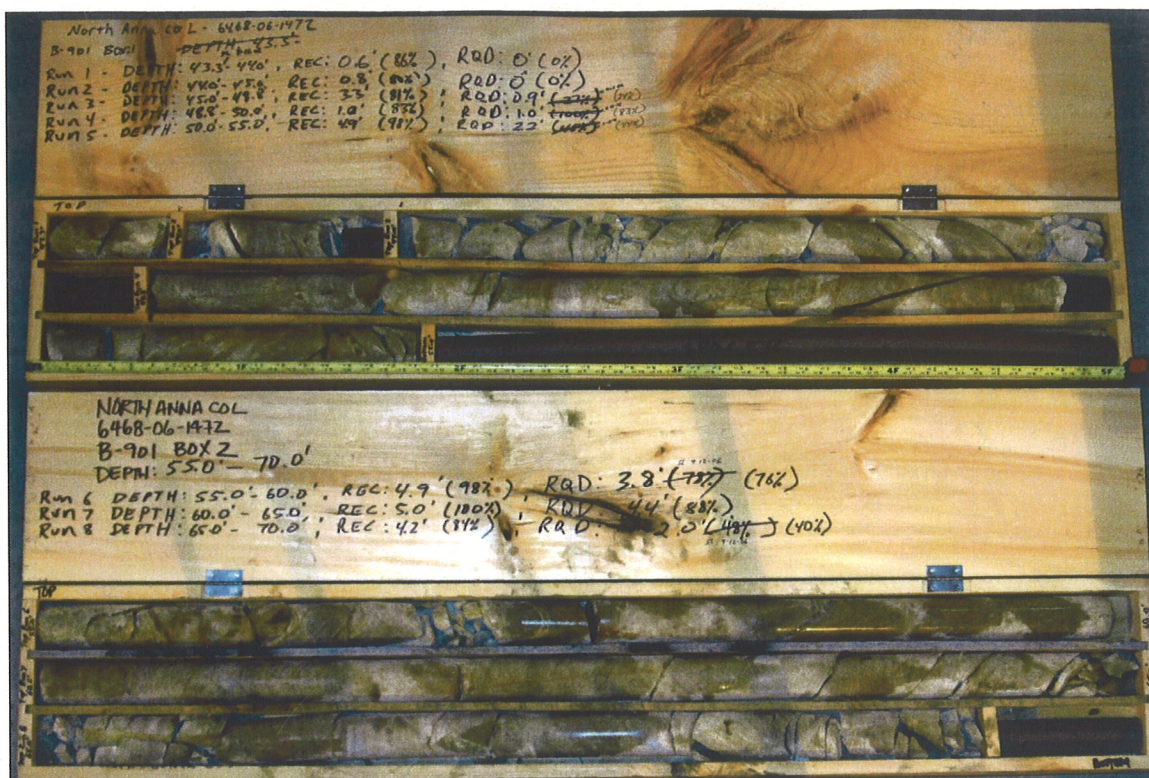
NORTH ANNA COL Core NORTH ANNA COL DATA REPORT REV0.GPJ NORTH ANNA COL.GDT 1/19/07



SHEET 4 OF 4

MACTEC PROJECT NO.: 6468-06-1472				COUNTY Louisa, VA		GEOLOGIST S. Lehman				
SITE DESCRIPTION NORTH ANNA COL							GROUND WATER (ft)			
BORING NO. B-901		DRILL METHOD: Mud Rotary/Core		SAMPLE METHODS: SPT/UD/CORE		0 HR. ND				
COLLAR ELEV. 309.4 ft (NAVD88)		NORTHING 3,909,778 US ft (NAD83)		EASTING 11,685,929 US ft (NAD83)		24 HR. 21.3				
TOTAL DEPTH 300.0 ft		DRILL MACHINE CME 45 Trailer		DRILLER: F. Cox/D. Rhodes		HAMMER TYPE 140 lbs Auto				
DATE STARTED 8/10/06		COMPLETED 8/25/06		CORE BARREL TYPE: HQ 3 triple tube-wireline						
CORE SIZE HQ3		TOTAL RUN 256.7 ft								
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	RQD (ft) %	L O G	DESCRIPTION AND REMARKS
Continued from previous page										
39.4	270.0	5.0	23:03 18:50 25:40	(5.0) 100%	(5.0) 100%	57				Hard Rock: Light to dark gray, slight weathering to fresh, close to very wide fracturing, hard to very hard, BIOTITE-QUARTZ GNEISS with feldspar and trace magnetite (continued) -No Joints
34.4	275.0	5.0	33:30 4:48 4:35 4:49 5:29	(5.0) 100%	(5.0) 100%	58				-No Joints
29.4	280.0	5.0	4:07 3:00 2:52 3:51 4:43	(5.0) 100%	(5.0) 100%	UCS-280.5				-No Joints
24.4	285.0	5.0	4:21 3:57 5:12 6:05 4:46	(5.0) 100%	(5.0) 100%	60				-No Joints
19.4	290.0	5.0	5:47 5:21 4:46 4:30 3:28	(5.0) 100%	(5.0) 100%	61				-No Joints
14.4	295.0	5.0	5:27 5:20 6:42 4:50 5:47	(5.0) 100%	(5.0) 100%	62				-No Joints
9.4	300.0	5.0	8:52 6:27 8:15 8:49 7:22	(4.9) 98%	(4.9) 98%					-No Joints
Coring terminated at 300.0 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-901 - Box 1

B-901 - Box 2



B-901 - Box 3

B-901 - Box 4