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-902	DRILL METHOD: Mud Rotary/Core	SAMPLE METHODS: SPT/CORE	0 HR. 25.2
COLLAR ELEV. 302.2 ft (NAVD88)	NORTHING 3,909,874 US ft (NAD83)	EASTING 11,685,884 US ft (NAD83)	24 HR. 25.4
TOTAL DEPTH 201.7 ft	DRILL MACHINE CME 55LC Track	DRILLER: D. White	HAMMER TYPE 140 lbs Auto
DATE STARTED 8/28/06	COMPLETED 9/7/06	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	
302.2					Ground Surface				302.2	0.0
300.7	1.5								Silty, fine SAND (SM), strong brown (7.5YR 5/6), moist, medium dense (Residual Soil)	
298.7	3.5	8	14	12	26	902-1			299.2	3.0
295.7	6.5	8	12	10	22	902-2			Fine SAND (SP), light gray (2.5Y 7/2) and pale yellow (2.5Y 7/3) to strong brown (7.5YR 5/6), dry to moist, medium dense (Residual Soil)	
293.7	8.5	14	13	8	21	902-3			294.2	8.0
291.2	11.0	6	8	10	18	902-4			Silty, fine to medium SAND (SM), strong brown (7.5YR 5/6), moist, medium dense, gravel (Residual Soil)	
288.7	13.5	24	30	30	60	902-5			291.7	10.5
284.0	18.2	8	8	7	15	902-6			Silty, fine to medium SAND (SM), pale yellow (2.5Y 7/3) to strong brown (7.5YR 5/6, moist, very dense to medium dense, relict rock fabric (Residual Soil)	
278.7	23.5	3	39	50/0.1		902-7			283.0	19.2
		50/0.1				902-8			Weathered Rock: Light gray and brown, very severely to severely weathered, QUARTZ GNEISS with biotite	
									278.4	23.8
									Hard Rock: Light gray with orange Fe staining, slightly weathered, moderately close to wide fracturing, moderately hard, QUARTZ GNEISS with biotite and trace magnetite	
									275.4	26.8
									Hard Rock: Light gray with orange Fe staining, very slightly weathered to fresh, moderately close to wide fracturing, hard, QUARTZ GNEISS with biotite and trace magnetite	

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

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MACTEC PROJECT NO.: 6468-06-1472	COUNTY Louisa, VA	GEOLOGIST S.Lehman
SITE DESCRIPTION NORTH ANNA COL		GROUND WATER (ft)
BORING NO. B-902	DRILL METHOD: Mud Rotary/Core	SAMPLE METHODS: SPT/CORE	0 HR. 25.2
COLLAR ELEV. 302.2 ft (NAVD88)	NORTHING 3,909,874 US ft (NAD83)	EASTING 11,685,884 US ft (NAD83)	24 HR. 25.4
TOTAL DEPTH 201.7 ft	DRILL MACHINE CME 55LC Track	DRILLER: D. White	HAMMER TYPE 140 lbs Auto
DATE STARTED 8/28/06	COMPLETED 9/7/06	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
227.4					Continued from previous page				
									Hard Rock: Light gray with orange Fe staining, very slightly weathered to fresh, moderately close to wide fracturing, hard, QUARTZ GNEISS with biotite and trace magnetite *(continued)*
									220.4 — 81.8
									Hard Rock: Light gray to dark gray, fresh, moderately close to wide fracturing, hard, QUARTZ-BIOTITE GNEISS
									190.5 — 111.7
									Hard Rock: Light gray to bluish gray with orange Fe staining, fresh to moderately weathered, close to wide fracturing, hard, QUARTZ-BIOTITE GNEISS
									180.5 — 121.7
									Hard Rock: Light gray with orange Fe staining, slight to moderately severe weathering, close fracturing, hard to moderately hard, QUARTZ GNEISS with biotite, feldspar, and trace magnetite
									175.5 — 126.7
									Hard Rock: Light gray, fresh, close to wide fracturing, hard, QUARTZ GNEISS with biotite with trace pyrite

GEOTECHNICAL BORING LOG

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MACTEC PROJECT NO.: 6468-06-1472	COUNTY Louisa, VA	GEOLOGIST S.Lehman
SITE DESCRIPTION NORTH ANNA COL		GROUND WATER (ft)
BORING NO. B-902	DRILL METHOD: Mud Rotary/Core	SAMPLE METHODS: SPT/CORE	0 HR. 25.2
COLLAR ELEV. 302.2 ft (NAVD88)	NORTHING 3,909,874 US ft (NAD83)	EASTING 11,685,884 US ft (NAD83)	24 HR. 25.4
TOTAL DEPTH 201.7 ft	DRILL MACHINE CME 55LC Track	DRILLER: D. White	HAMMER TYPE 140 lbs Auto
DATE STARTED 8/28/06	COMPLETED 9/7/06	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
152.6					Continued from previous page				
									Hard Rock: Light gray, fresh, close to wide fracturing, hard, QUARTZ GNEISS with biotite with trace pyrite *(continued)*
									115.5 — 186.7
									Hard Rock: Light gray, moderately weathered to fresh, moderately close to wide fracturing, hard, QUARTZ GNEISS with biotite and feldspar
									109.2 — 193.0
									Hard Rock: Dark to light gray, moderately to slightly weathered, close to moderately close fracturing, medium hard, BIOTITE GNEISS with quartz and feldspar
									100.5 — 201.7
									Boring and coring terminated at 201.7 ft in Hard Rock: Medium hard, QUARTZ-BIOTITE GNEISS with feldspar

GEOTECHNICAL CORING 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-902	DRILL METHOD: Mud Rotary/Core	SAMPLE METHODS: SPT/CORE	0 HR. 25.2
COLLAR ELEV. 302.2 ft (NAVD88)	NORTHING 3,909,874 US ft (NAD83)	EASTING 11,685,884 US ft (NAD83)	24 HR. 25.4
TOTAL DEPTH 201.7 ft	DRILL MACHINE CME 55LC Track	DRILLER: D. White	HAMMER TYPE 140 lbs Auto
DATE STARTED 8/28/06	COMPLETED 9/7/06	CORE BARREL TYPE: HQ 3 triple tube-wireline	
CORE SIZE HQ3	TOTAL RUN 178.1 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 @ 23.6 ft
278.6	23.6	1.9	2:46	(1.9)	(1.4)	1				278.4 Weathered Rock: Light gray and brown, very severely to severely weathered, QUARTZ GNEISS with biotite *(continued)* 23.8
276.7	25.5		7:08/0.9	100%	74%					
275.4	26.8	1.3	0:12/0.1	(1.3)	(1.3)	2				275.4 (2 joints at 45°; 1 joint at 80° with Fe stain) 26.8
			2:29	100%	100%					
		5.0	0:06/0.2	(5.0)	(5.0)	UCS-27.3'				Hard Rock: Light gray with orange Fe staining, slightly weathered, moderately close to wide fracturing, moderately hard, QUARTZ GNEISS with biotite and trace magnetite
			3:29	100%	100%					-No Joints
			4:08							
			5:24							
270.4	31.8		6:12							
		2.1	7:25	(2.1)	(1.9)	4				Hard Rock: Light gray with orange Fe staining, very slightly weathered to fresh, moderately close to wide fracturing, hard, QUARTZ GNEISS with biotite and trace magnetite
268.3	33.9		4:46	100%	90%					
			11:49							
267.5	34.7	0.8	7:04/0.1	(0.6)	(0.6)	5				-No Joints
		2.1	12:04/0.8	75%	75%	6				(2 joints at 45° with Fe staining)
265.4	36.8		0:15/0.1	(2.1)	(2.1)					(1 joint at 20° with clay)
		4.9	2:11	100%	100%	7				-No Joints
			2:44	(4.9)	(4.9)					-No Joints
			3:16	100%	100%					
			3:36							
260.5	41.7		4:10							
		5.1	6:09	(5.0)	(5.0)	8				-No Joints
			9:09/0.9	98%	98%					
			1:59							
			3:21							
			2:53							
255.4	46.8		3:54							
		4.7	3:43/1.1	(4.6)	(4.6)	UC-47.4'				-No Joints
			4:06	98%	98%					
			6:05							
			7:08							
250.7	51.5		9:58							
		5.3	10:04/0.7	(4.6)	(4.2)	10				(3 joints at 20°)
			2:38/1.3	87%	79%					
			2:29							
			1:23							
			1:56							
245.4	56.8		2:19							
		5.0	2:46	(4.6)	(4.6)	11				(Moderately to slightly weathered from 58.8-60.4 ft; 2 joints at 20°)
			2:57	92%	92%					
			2:08							
			2:03							
240.4	61.8		1:43							
		5.0	2:57	(5.0)	(5.0)	12				(1 joint at 45° with moderate weathering and Fe staining)
			2:25	100%	100%					
			2:43							
			3:30							
235.4	66.8		4:08							
		5.0	5:08	(5.0)	(5.0)	13				-No Joints
			7:04	100%	100%					
			11:15							
			3:54							
230.4	71.8		2:59							
		5.0	2:39	(4.7)	(4.7)	UC-72.3'				-No Joints
			3:14	94%	94%					
			3:45							
			4:59							
225.4	76.8		3:46							
		5.0	4:41	(5.0)	(5.0)	15				-No Joints
			5:02	100%	100%					
			5:09							
			4:10							
220.4	81.8		2:50							220.4 81.8
		4.7	5:06	(4.7)	(4.7)	16				Hard Rock: Light gray to dark gray, fresh, moderately close to wide fracturing, hard, QUARTZ-BIOTITE GNEISS
			7:00	100%	100%					(1 joint at 75°)
			7:43							
			6:01							
215.7	86.5		5:58							
		5.2	1:20	(5.2)	(5.2)	17				(2 joints at 60°)
			1:30	100%	100%					
			1:38							
			1:26							
210.5	91.7		1:34/1.2							
		5.0	1:19	(5.0)	(5.0)	UCS-92.8'				-No Joints
			1:26	100%	100%					
			1:23							
			1:28							
205.5	96.7		1:39							
		5.0	1:33	(4.0)	(4.0)	19				-No apparent joints. abundant mechanical fractures

MACTEC

MACTEC PROJECT NO.: 6468-06-1472	**COUNTY** Louisa, VA	**GEOLOGIST** S.Lehman	
SITE DESCRIPTION NORTH ANNA COL			**GROUND WATER (ft)**
BORING NO. B-902	**DRILL METHOD:** Mud Rotary/Core	**SAMPLE METHODS:** SPT/CORE	**0 HR.** 25.2
COLLAR ELEV. 302.2 ft **(NAVD88)**	**NORTHING** 3,909,874 **US ft (NAD83)**	**EASTING** 11,685,884 **US ft (NAD83)**	**24 HR.** 25.4
TOTAL DEPTH 201.7 ft	**DRILL MACHINE** CME 55LC Track	**DRILLER:** D. White	**HAMMER TYPE** 140 lbs Auto
DATE STARTED 8/28/06	**COMPLETED** 9/7/06	**CORE BARREL TYPE:** HQ 3 triple tube-wireline	
CORE SIZE HQ3	**TOTAL RUN** 178.1 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
			1:37 1:43 1:33 1:28	80%	80%					Hard Rock: Light gray to dark gray, fresh, moderately close to wide fracturing, hard, QUARTZ-BIOTITE GNEISS *(continued)*
200.5	101.7	5.0	1:32 1:32 1:21 1:56 1:39	(5.0) 100%	(5.0) 100%	20				(Quartz vein from 102.1-102.4 ft; 1 joint at 70° with slight weathering and Fe staining)
195.5	106.7	5.0	1:23 1:30 1:36 1:32 1:32	(5.0) 100%	(5.0) 100%	21				-No Joints
190.5	111.7	5.0	1:39 1:35 1:29 1:26 1:25	(5.0) 100%	(4.4) 88%	22				190.5 — 111.7 Hard Rock: Light gray to bluish gray with orange Fe staining, fresh to moderately weathered, close to wide fracturing, hard, QUARTZ-BIOTITE GNEISS (Moderately to slightly weathered from 114.5-116.7 ft; 3 joints at 45° with weathering and Fe stain)
185.5	116.7	5.0	1:33 1:32 1:36 1:38 1:34	(5.0) 100%	(4.2) 84%	23				(Moderately to very slightly weathered along joints; 4 joints at 40°, 1 joint at 70°, and 1 joint at 85°-all with fe staining)
180.5	121.7	5.0	1:15 1:01 1:12 1:26 1:28	(3.0) 60%	(1.7) 34%	24				180.5 — 121.7 Hard Rock: Light gray with orange Fe staining, slight to moderately severe weathering, close fracturing, hard to moderately hard, QUARTZ GNEISS with biotite, feldspar, and trace magnetite (3 joints at 40° with Fe staining)
175.5	126.7	5.0	2:18 2:18 2:20 2:32 2:22	(4.9) 98%	(4.9) 98%	25				175.5 — 126.7 Hard Rock: Light gray, fresh, close to wide fracturing, hard, QUARTZ GNEISS with biotite with trace pyrite (1 joint at 60° and 1 joint at 20° with Fe staining)
170.5	131.7	5.0	2:13 2:28 2:34 2:53 3:17	(5.0) 100%	(5.0) 100%	26				-No Joints
165.5	136.7	5.0	4:01 4:00 4:04 4:57 4:35	(5.0) 100%	(5.0) 100%	27				(1 joint at 45° with pyrite and muscovite)
160.5	141.7	5.0	1:41 1:54 2:05 1:53 2:01	(5.0) 100%	(5.0) 100%	UC-141.9'				(1 joint at 70° and 1 joint at 45° with Fe staining)
155.5	146.7	4.9	2:43 3:45 4:25 5:27 5:13/0.9	(4.9) 100%	(4.9) 100%	29				-No Joints
150.6	151.6	5.1	1:55 2:30 2:20 2:45 3:03/1.1	(5.1) 100%	(5.1) 100%	30				(1 joint at 65° with clay and weathering)
145.5	156.7	5.0	3:22 4:14 4:24 4:52 9:30	(5.0) 100%	(5.0) 100%	31				(1 joint at 90° with clay and Fe staining; 1 joint at 45 with Fe staining)
140.5	161.7	5.0	1:55 2:53 3:44 5:31 6:11	(5.0) 100%	(5.0) 100%	32				(1 joint at 90° with trace clay)
135.5	166.7	2.6	7:05 10:18 11:20/0.6	(2.6) 100%	(2.6) 100%	33				-No Joints
132.9	169.3	2.4	0:35/0.4 2:21 2:07	(2.3) 96%	(2.0) 83%	34				(1 joint at 45° with moderate weathering and Fe stain)
130.5	171.7	5.0	1:38	(4.7)	(4.7)	35				(1 joint at 80° with trace clay)

GEOTECHNICAL CORING LOG

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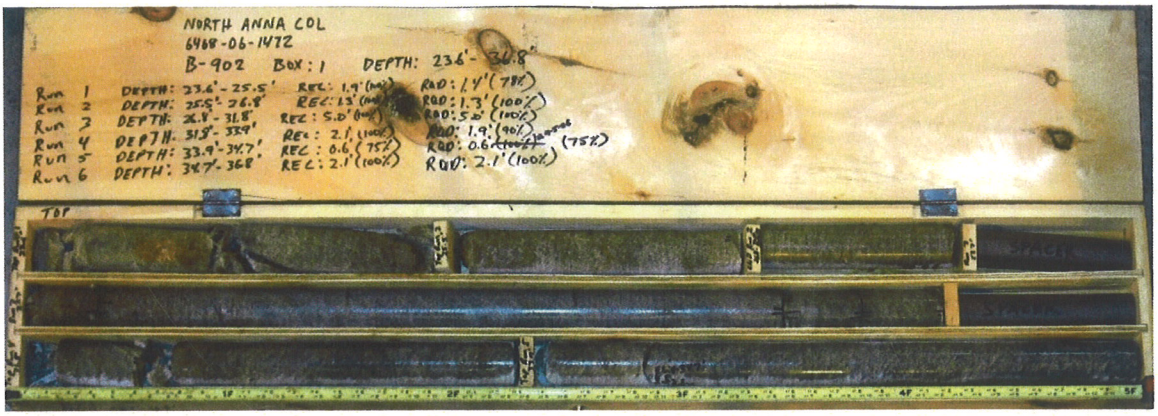
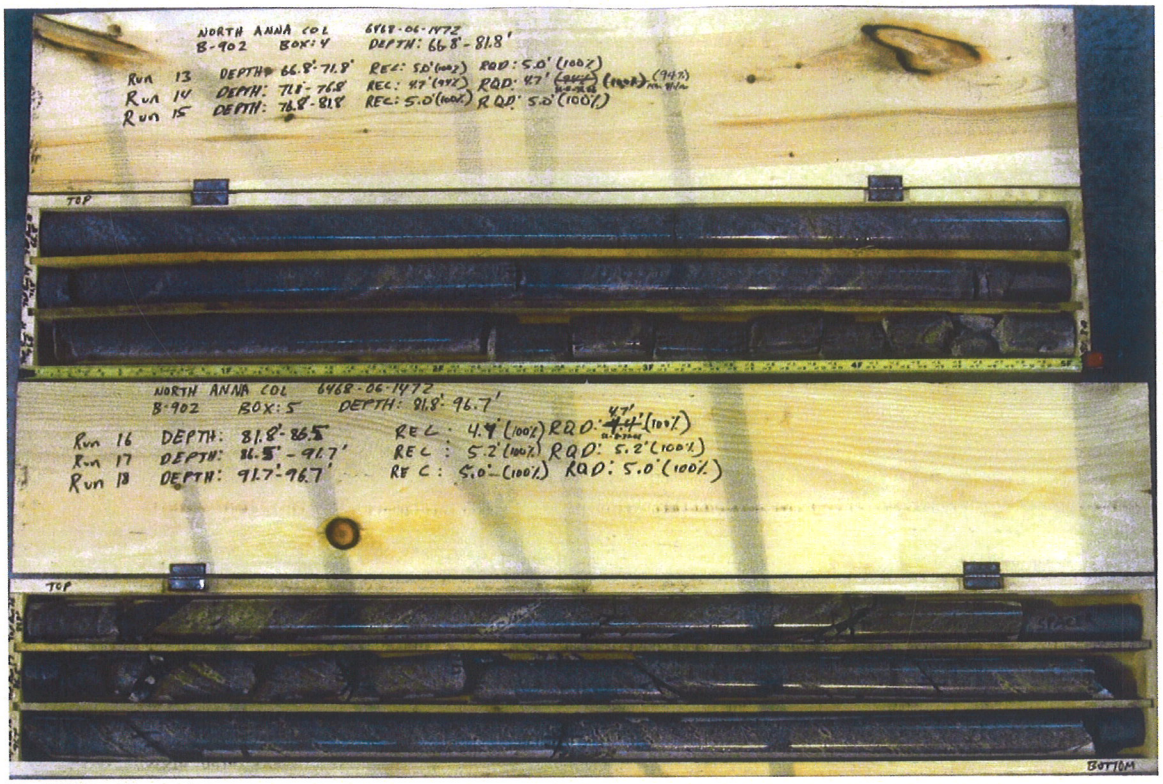
SITE DESCRIPTION NORTH ANNA COL			GROUND WATER (ft)
BORING NO. B-902	DRILL METHOD: Mud Rotary/Core	SAMPLE METHODS: SPT/CORE	0 HR. 25.2
COLLAR ELEV. 302.2 ft (NAVD88)	NORTHING 3,909,874 US ft (NAD83)	EASTING 11,685,884 US ft (NAD83)	24 HR. 25.4
TOTAL DEPTH 201.7 ft	DRILL MACHINE CME 55LC Track	DRILLER: D. White	HAMMER TYPE 140 lbs Auto
DATE STARTED 8/28/06	COMPLETED 9/7/06	CORE BARREL TYPE: HQ 3 triple tube-wireline	
CORE SIZE HQ3	TOTAL RUN 178.1 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
125.5	176.7		2:10 2:28 3:08 3:00	94%	94%					Hard Rock: Light gray, fresh, close to wide fracturing, hard, QUARTZ GNEISS with biotite with trace pyrite *(continued)*
120.5	181.7	5.0	3:46 3:51 4:21 5:46 7:54	(5.0) 100%	(5.0) 100%	36				(1 joint at 80-90°)
119.1	183.1	1.4	3:19 2:25/0.4	(1.4) 100%	(1.4) 100%	37				(1 joint at 80°)
115.5	186.7	3.6	2:02/0.6 4:05 4:40 8:30	(3.6) 100%	(3.6) 100%	UC-184.6'				(1 joint at 70° and 1 joint at 45° with weathering and Fe stain) 115.5 — 186.7
110.5	191.7	5.0	5:16 8:16 7:40 7:02 7:30	(5.0) 100%	(4.7) 94%	39				Hard Rock: Light gray, moderately weathered to fresh, moderately close to wide fracturing, hard, QUARTZ GNEISS with biotite and feldspar (1 joint at 80-90° weathered with trace clay; 2 joints at 60° weathered with Fe stain)
107.0	195.2	3.5	2:00 2:22 2:14 2:52/0.5	(3.2) 91%	(2.5) 71%	40				109.2 (4 joints at 45° weathered with trace clay) 193.0
105.5	196.7	1.5	2:46/0.5 5:36	(1.4) 93%	(1.2) 80%	41				Hard Rock: Dark to light gray, moderately to slightly weathered, close to moderately close fracturing, medium hard, BIOTITE GNEISS with quartz and feldspar (1 joint at 45° with weathering and clay)
100.5	201.7	5.0	2:59 3:34 2:45 2:23 2:10	(5.0) 100%	(4.1) 82%	42				(1 joint at 20° and 4 joints at 45° with clay) 100.5 — 201.7
										Coring terminated at 201.7 ft in Hard Rock: Medium hard, QUARTZ-BIOTITE GNEISS with feldspar



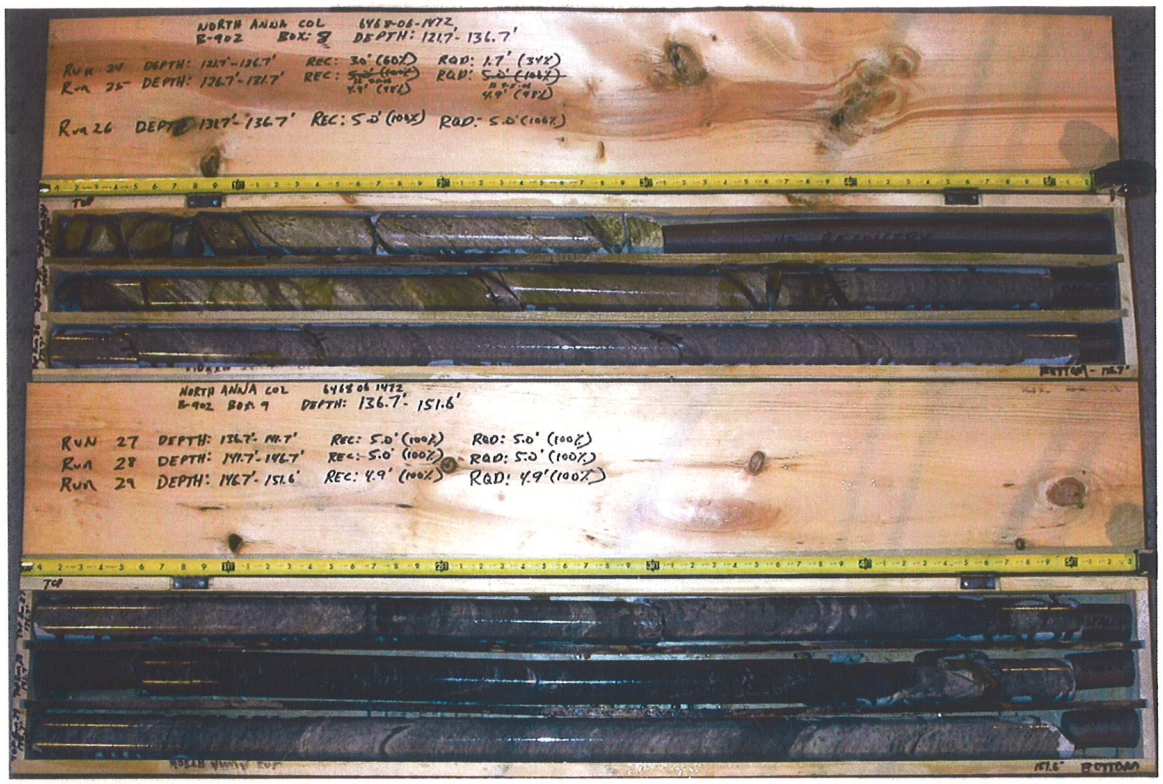
B-902 – Box 1

B-902 – Box 2
B-902 – Box 3

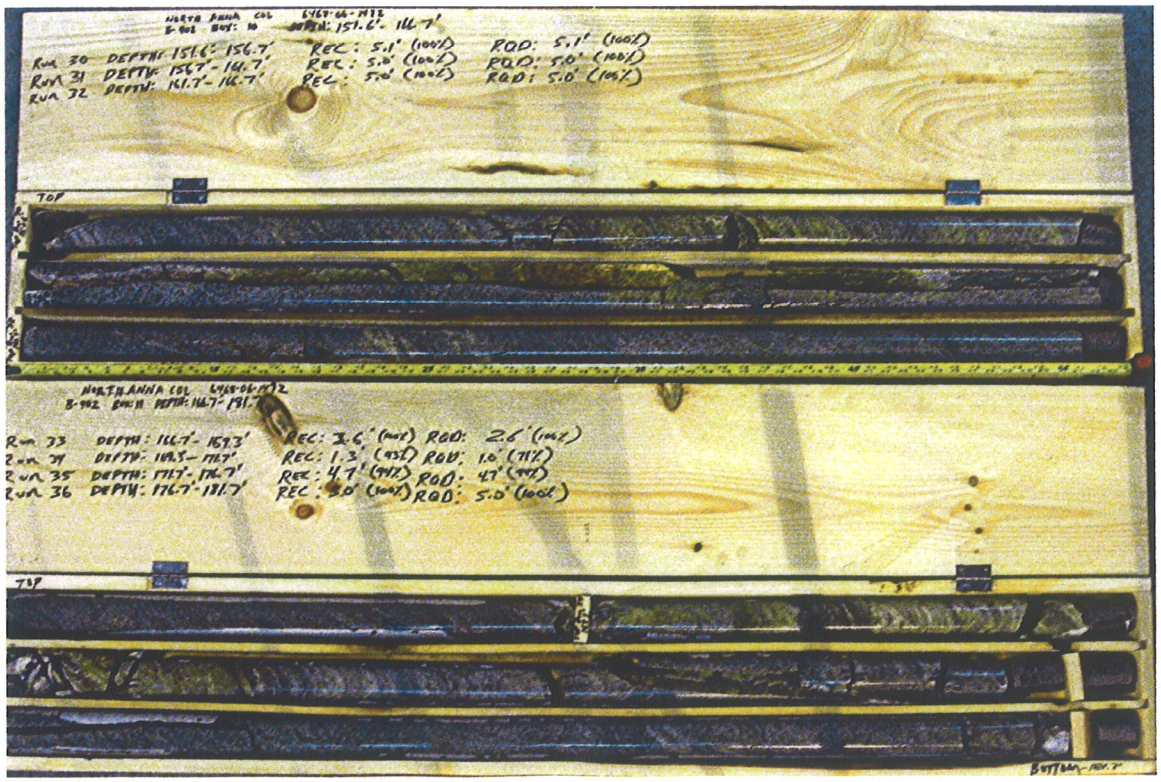


B-902 – Box 4
B-902 – Box 5

B-902 – Box 6
B-902 – Box 7



B-902 – Box 8
B-902 – Box 9



B-902 – Box 10
B-902 – Box 11

B-902 – Box 12
B-902 – Box 13