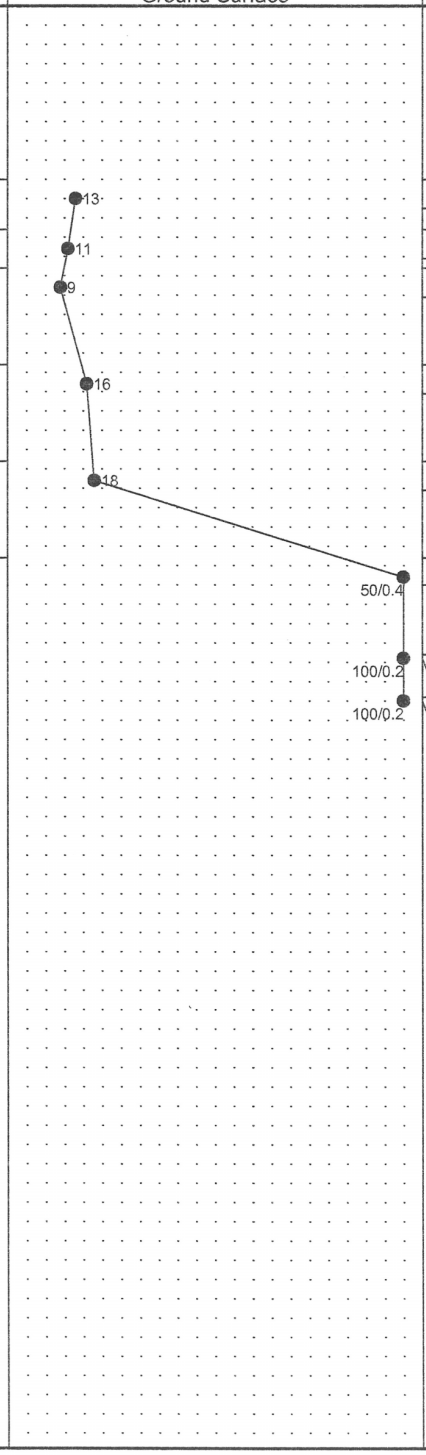
MACTEC

GEOTECHNICAL BORING LOG

Prepared By NAR Date 12/3/09
Checked By DSC Date 12-3-09

BECHTEL PROJECT NO.: 25161	MACTEC PROJECT NO.: 6468-09-2473	COUNTY: Louisa, VA	GEOLOGIST: K. Lloyd
SITE DESCRIPTION: North Anna Power Station, Unit 3		DRILLER: D. Rhodes/P. Pitts	FLUID LEVEL (ft)
BORING NO.: W-3	DRILL METHOD: Mud Rotary/Rock Core	DRILL MACHINE: CME-55 Track (RAL)	0 HR. NA
GROUND ELEV.: 312.3 ft (NAVD88)	NORTHING: 3,909,715 US ft (NAD83)	EASTING: 11,685,899 US ft (NAD83)	24 HR. 27.2
TOTAL DEPTH: 150.7 ft	SAMPLE METHODS: ASTM D 1586-08a; 2488-09a; 2113-08; 6032-08	ROD TYPE: AWJ	HAMMER (ID):140-lb. Auto (MEC-21)
DATE STARTED: 10/13/09	COMPLETED: 10/20/09	HOLE DIA.: 4"	CASING DEPTH: 36.8 ft	CORE SIZE: HQ3	BITS USED: 3-7/8" Tri-Cone



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
312.3					Ground Surface				312.3 — 0.0
									No sampling from 0.0 to 9.0 feet due to soft dig utility clearance by Dominion Personnel
303.3	9.0								303.3 — 9.0
		3	6	7	13	SS-1			RESIDUAL SOIL: Silty SAND (SM), yellow (10YR 7/6), medium dense, moist, fine to coarse grained sand, trace mica, relict rock fabric
300.7	11.6								
		4	6	5	11	SS-2			
298.7	13.6								
		4	4	5	9	SS-3			13.6 ft: Very pale brown (10YR 8/2), loose
293.7	18.6								
		5	7	9	16	SS-4			18.6 ft: Very pale brown (10YR 7/3), medium dense
288.7	23.6								
		7	6	12	18	SS-5			23.6 ft: Very pale brown (10YR 7/4)
283.7	28.6								
		35	39	50/0.4	50/0.4	SS-6			282.3 — 30.0
									WEATHERED ROCK: Severely weathered QUARTZ GNEISS (Sampled as Silty SAND (SM), very pale brown (10YR 7/4) and yellow (10YR 7/6), very dense, moist, fine to coarse grained sand, few mica)
278.7	33.6								
		100/0.2			100/0.2	SS-7			
276.5	35.8								276.3 — 36.0
		100/0.2			100/0.2	SS-8			WEATHERED ROCK and HARD ROCK: Light yellowish tan to light tan, with some orange staining, severely to moderately severely weathered, very close to close fracturing, medium to moderately hard, QUARTZ GNEISS
									251.7 — 60.6
									WEATHERED ROCK and HARD ROCK: Brown, severely to moderately severely weathered, close fracturing, medium hard, BIOTITE GNEISS with quartz vein
									246.7 — 65.6
									WEATHERED ROCK and HARD ROCK: Grayish brown and brown, severely to moderately weathered, close fracturing, medium hard, BIOTITE QUARTZ GNEISS

NORTH ANNA 3 BORE NORTH ANNA 3 PROJECT.GPJ NORTH ANNA 3.GDT 12/3/09

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CORE SIZE: HQ3	BITS USED: 3-7/8" Tri-Cone		

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
237.5					Continued from previous page				
									236.6 — 75.7 HARD ROCK: Grayish brown to gray, with orange staining, moderately to slightly weathered, close to moderately close fracturing, moderately hard to hard, BIOTITE QUARTZ GNEISS
									211.6 — 100.7 HARD ROCK: Gray to dark gray, very slightly weathered to fresh, moderately close to wide fracturing, hard to very hard, BIOTITE GNEISS
									199.0 — 113.3 HARD ROCK: Light gray with orange staining, moderately to slightly weathered, close to moderately close fracturing, hard, QUARTZ GNEISS with biotite (1 joint at 10°, open with orange staining; 3 joints at 30-40°, open with orange staining)
									194.0 — 118.3 HARD ROCK: Dark gray and gray, with orange staining, moderately weathered to fresh, close to wide fracturing, moderately hard to very hard, BIOTITE QUARTZ GNEISS with trace magnetite

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TOTAL DEPTH: 150.7 ft	SAMPLE METHODS: ASTM D 1586-08a; 2488-09a; 2113-08; 6032-08	ROD TYPE: AWJ	HAMMER (ID):140-lb. Auto (MEC-21)
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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
162.7					Continued from previous page				
									161.6 / 150.7

Boring and coring terminated at 150.7 feet.

Boring closed by tremie method with cement-bentonite grout.

24 hour water level measured on 10/16/2009 prior to drilling. Borehole was at a depth of 70.7 feet.

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TOTAL DEPTH: 150.7 ft	SAMPLE METHODS: ASTM D 1586-08a; 2488-09a; 2113-08; 6032-08		HAMMER (ID): 140-lb. Auto (MEC-21)
DATE STARTED: 10/13/09	COMPLETED: 10/20/09	CASING DEPTH: 36.8 ft	CORE BARREL TYPE: Wireline HQ3 Triple Tube, series 6 & 10 bits

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 @ 33.8 ft
278.5 276.5	33.8 35.8	2.0	1:13 1:08	(0.0) 0%	(0.0) 0%	RUN 1	(0.0) 0%	(0.0) 0%		WEATHERED ROCK: Severely weathered QUARTZ GNEISS (Sampled as Silty SAND (SM), very pale brown (10YR 7/4) and yellow (10YR 7/6), very dense, moist, fine to coarse grained sand, few mica) *(continued)* 276.3 — 36.0
276.3	36.0	4.4	N=100/0.2 1:38 1:23 1:03 1:01 0:45/0.4	(3.5) 80%	(2.8) 64%	SS-8 RUN 2	(13.9) 57%	(6.2) 25%		WEATHERED ROCK and HARD ROCK: Light yellowish tan to light tan, with some orange staining, severely to moderately severely weathered, very close to close fracturing, medium to moderately hard, QUARTZ GNEISS
271.9	40.4	5.0	1:23 1:09 2:13 1:45 2:05	(2.5) 50%	(1.6) 32%	RUN 3				(3 joints at 0-10°, open with orange staining and clay; 2 joints at 60°, open to tight with orange staining and clay) (3 joints at 0-15°, open with orange staining; 1 joint at 70°, open with clay, orange staining, weathered)
266.9	45.4	2.7	1:38 2:02 2:52/0.7	(1.6) 59%	(0.5) 19%	RUN 4				(3 joints at 0-15°, open with orange staining, weathered)
264.2	48.1	2.5	0:25/0.5 1:31 1:46	(2.5) 100%	(1.3) 52%	RUN 5				(7 joints at 0-15°, open with orange staining, weathered)
261.7	50.6	5.0	1:25 1:28 2:09 1:22 1:37	(2.6) 52%	(0.0) 0%	RUN 6				(very fractured, open with orange staining)
256.7	55.6	5.0	1:23 0:48 1:03 1:10 1:48	(1.2) 24%	(0.0) 0%	RUN 7				(very fractured, open with orange staining)
251.7	60.6	5.0	1:18 1:24 1:32 1:04 1:01	(2.9) 58%	(0.8) 16%	RUN 8	(2.9) 58%	(0.8) 16%		251.7 — 60.6 WEATHERED ROCK and HARD ROCK: Brown, severely to moderately severely weathered, close fracturing, medium hard, BIOTITE GNEISS with quartz vein (very fractured, tight, trace clay, orange staining)
246.7	65.6	5.1	1:23 1:02 1:10 1:38 1:21/1.1	(4.6) 90%	(1.4) 27%	RUN 9	(7.1) 70%	(3.4) 34%		246.7 — 65.6 WEATHERED ROCK and HARD ROCK: Grayish brown and brown, severely to moderately weathered, close fracturing, medium hard, BIOTITE QUARTZ GNEISS (3 joints at 0-10°, tight; 6 joints at 10-20°, tight, trace clay, orange staining)
241.6	70.7	5.0	3:23 4:27 4:37 4:35 8:02	(2.5) 50%	(2.0) 40%	RUN 10				(1 joint at 10°, open with clay, orange staining; 2 joints at 60-70°, open with clay, orange staining)
236.6	75.7	5.0	4:53 4:01 4:08 8:01 7:27	(5.0) 100%	(3.9) 78%	RUN 11	(24.5) 98%	(22.6) 90%		236.6 — 75.7 HARD ROCK: Grayish brown to gray, with orange staining, moderately to slightly weathered, close to moderately close fracturing, moderately hard to hard, BIOTITE QUARTZ GNEISS (4 joints at 10-20°, tight with trace clay, orange staining; 5 joints at 50-60°, tight with trace clay, orange staining)
231.6	80.7	5.0	3:57 7:43 4:56 5:49 6:00	(5.0) 100%	(4.7) 94%	RUN 12				(4 joints at 30-40°, tight with trace clay, orange staining; 1 joint at 70°, tight with trace clay, orange staining; 1 joint at 90°, tight with trace clay, orange staining)
226.6	85.7	5.0	4:27 4:47 5:54 5:55 4:51	(5.0) 100%	(5.0) 100%	RUN 13				(2 joints at 30°, tight with trace clay; 1 joint at 90°, tight, trace clay, orange staining)
221.6	90.7	5.0	5:17 5:12 5:15 6:21 11:31	(4.5) 90%	(4.2) 84%	RUN 14				(2 joints at 30°, open with clay, orange staining; 2 joints at 50-60°, tight with trace clay, orange staining)
216.6	95.7	5.0	7:28 8:34 7:18 6:19 6:23	(5.0) 100%	(4.8) 96%	RUN 15				(2 joints at 10-20°, open with clay, orange staining; 3 joints at 60-70°, tight with trace clay, orange staining)
211.6	100.7	5.0	5:03 5:39 7:17 7:15 6:45	(5.0) 100%	(5.0) 100%	RUN 16	(12.6) 100%	(12.6) 100%		211.6 — 100.7 HARD ROCK: Gray to dark gray, very slightly weathered to fresh, moderately close to wide fracturing, hard to very hard, BIOTITE GNEISS (2 joints at 40-50°, tight; 2 joints at 50-60°, tight)
206.6	105.7	5.0	5:19 6:12 6:28	(5.0) 100%	(5.0) 100%	RUN 17				(1 joint at 60°, tight)

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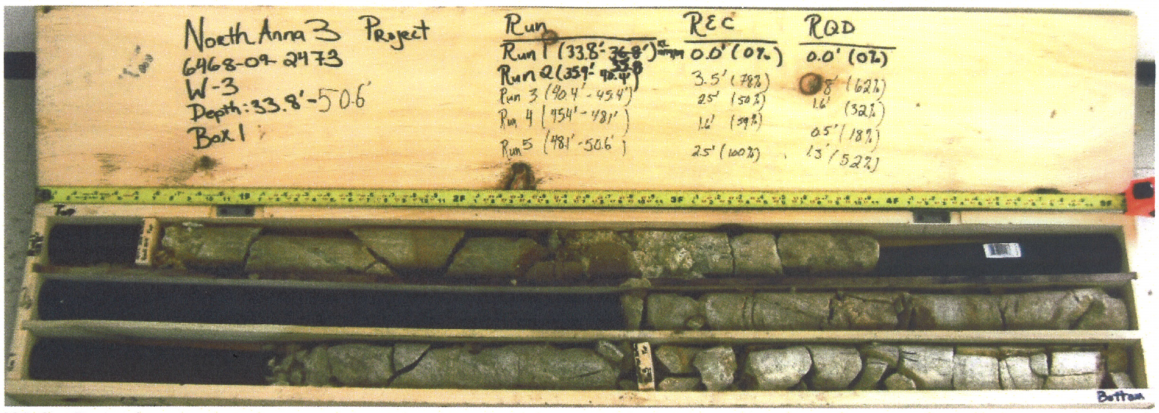
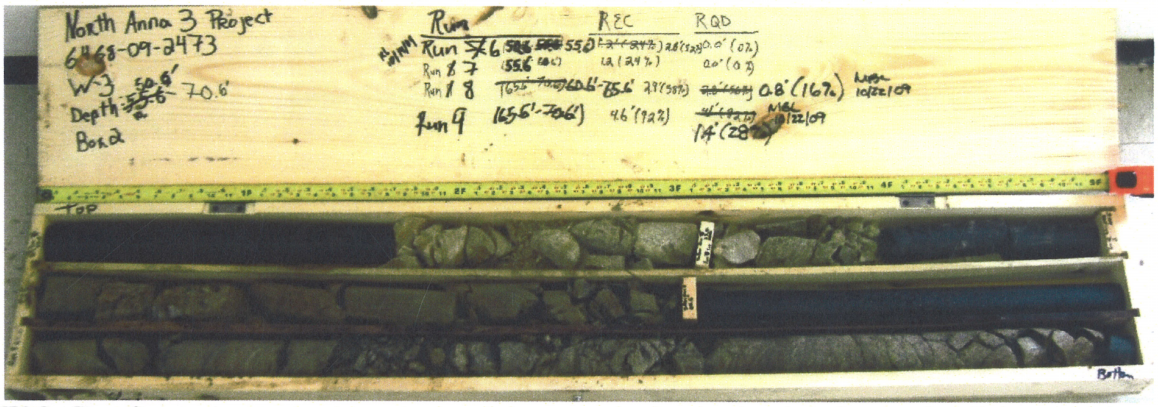
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
										Continued from previous page
201.6	110.7		6:17 6:10							HARD ROCK: Gray to dark gray, very slightly weathered to fresh, moderately close to wide fracturing, hard to very hard, BIOTITE GNEISS *(continued)* (1 joint at 60°, open with clay)
		5.0	7:31 5:58 6:13 5:15 5:16	(5.0) 100%	(4.7) 94%	RUN 18				199.0 — 113.3
196.6	115.7						(5.0) 100%	(4.7) 94%		HARD ROCK: Light gray with orange staining, moderately to slightly weathered, close to moderately close fracturing, hard, QUARTZ GNEISS with biotite (1 joint at 10°, open with orange staining; 3 joints at 30-40°, open with orange staining)
		5.0	6:06 6:09 4:52 4:40 5:59	(5.0) 100%	(5.0) 100%	RUN 19				194.0 — 118.3
191.6	120.7						(32.0) 99%	(30.5) 94%		HARD ROCK: Dark gray and gray, with orange staining, moderately weathered to fresh, close to wide fracturing, moderately hard to very hard, BIOTITE QUARTZ GNEISS with trace magnetite (2 joints at 60°, tight) (2 joints at 0-10°, open; 4 joints at 50-60°, tight)
		5.0	6:12 5:40 8:31 6:58 4:31	(5.0) 100%	(4.6) 92%	RUN 20				
186.6	125.7									
		5.0	7:42 6:03 5:36 6:02 4:55	(5.0) 100%	(4.6) 92%	RUN 21				(1 joint at 10°, tight; 3 joints at 50-60°, tight with trace clay, orange staining)
181.6	130.7									
		5.0	6:13 6:10 7:10 8:46 8:31	(5.0) 100%	(5.0) 100%	RUN 22				(3 joints at 30-40°, tight)
176.6	135.7									
		5.0	7:02 6:42 4:22 4:20 3:15	(5.0) 100%	(4.5) 90%	RUN 23				(3 joints at 10-20°, open with orange staining; 2 joints at 50-60°, open; 2 joints at 60-70°, tight with trace clay and orange staining)
171.6	140.7									
		5.0	5:45 4:38 4:59 5:10 4:21	(5.0) 100%	(4.8) 96%	RUN 24				(2 joints at 20-30°, tight with trace clay and orange staining; 1 joint at 40°, tight with trace orange staining; 1 joint at 80°, tight with trace clay, orange staining)
166.6	145.7									
		5.0	8:06 8:10 8:13 8:38 7:35	(4.6) 92%	(4.6) 92%	RUN 25				(No joints)
161.6	150.7									161.6 — 150.7
										Boring and coring terminated at 150.7 feet. Boring closed by tremie method with cement-bentonite grout. 24 hour water level measured on 10/16/2009 prior to drilling. Borehole was at a depth of 70.7 feet.

NORTH ANNA 3 CORE NORTH ANNA 3 PROJECT.GPJ NORTH ANNA 3.GDT 12/3/09

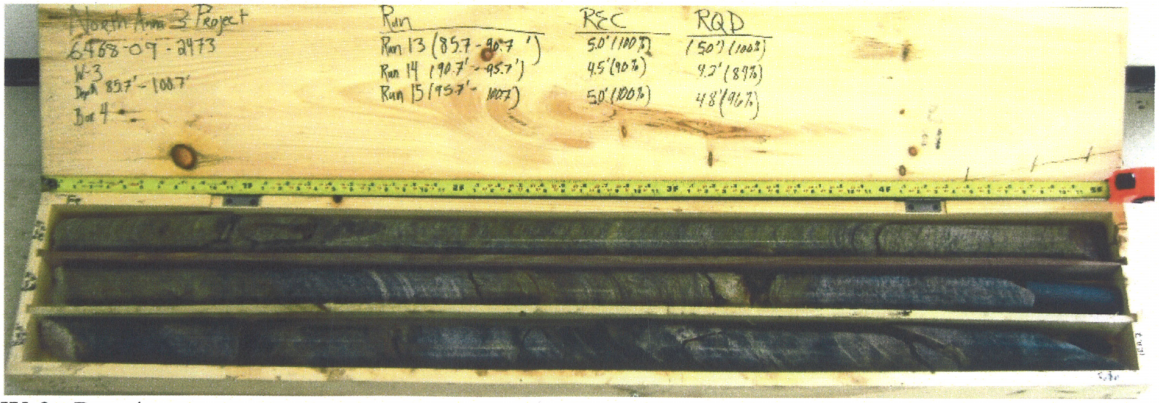


W-3– Box 1



W-3– Box 2

W-3– Box 3



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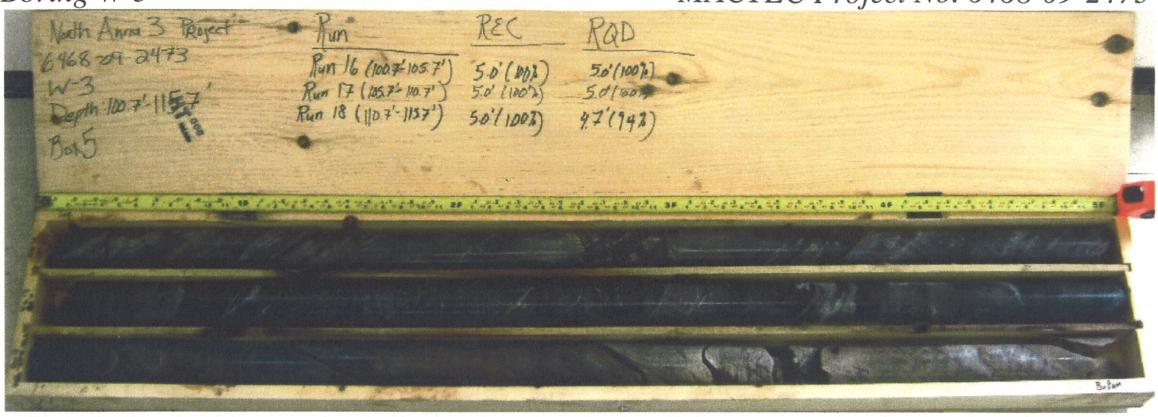

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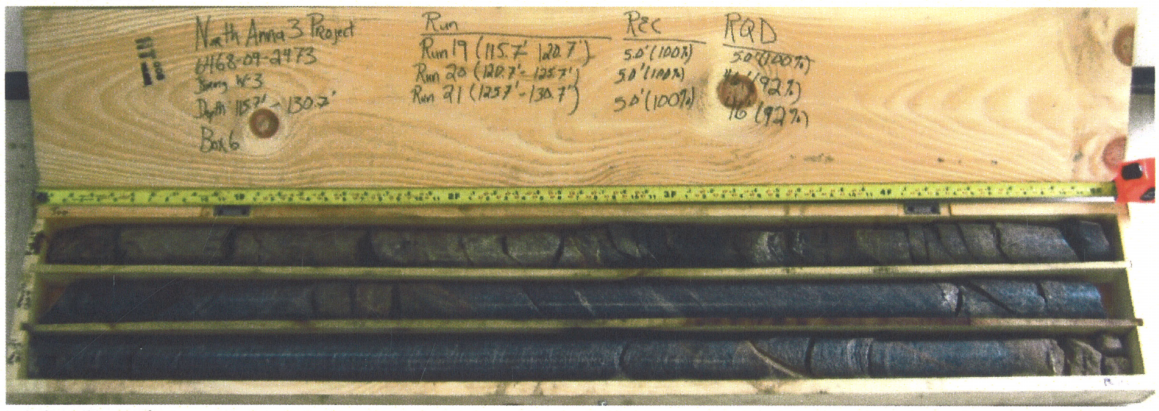
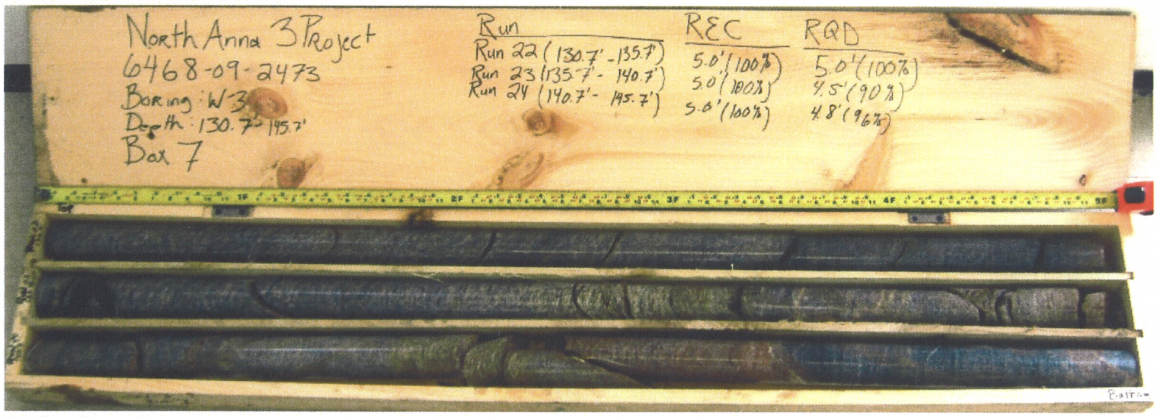
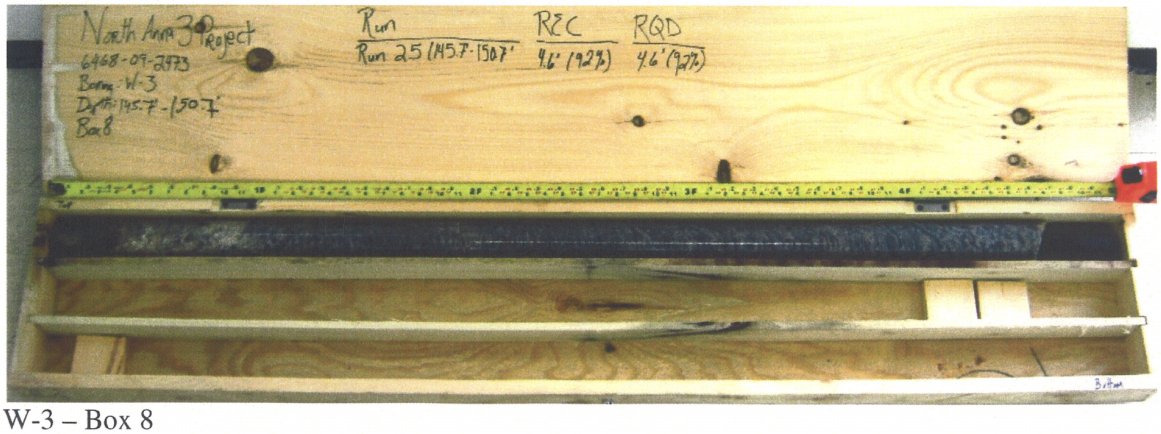


W-3 – Box 6



W-3 – Box 7



W-3 – Box 8