



## GEOTECHNICAL BORING LOG

Prepared By JST Date 12/16/09Checked By MB Date 12/16/09

SHEET 1 OF 3

BECHTEL PROJECT NO.: 25161				MACTEC PROJECT NO.: 6468-09-2473				COUNTY: Louisa, VA		GEOLOGIST: B. Mabie					
SITE DESCRIPTION: North Anna 3 Project Supplement 2								DRILLER: D. Rhodes/K. Guy			FLUID LEVEL (ft)				
BORING NO.: M-20				DRILL METHOD: Mud Rotary/Rock Core				DRILL MACHINE: CME-45C Track (RAL)			0 HR. NA				
GROUND ELEV.: 302.6 ft (NAVD88)				NORTHING: 3,909,794 US ft (NAD83)				EASTING: 11,686,068 US ft (NAD83)			24 HR. 15.5				
TOTAL DEPTH: 151.0 ft		SAMPLE METHODS: ASTM D 1586-08a; 2488-09a; 2113-08; 6032-08						ROD TYPE: AWJ		HAMMER (ID): 140-lb. Auto (MEC-12)					
DATE STARTED: 9/21/09		COMPLETED: 9/25/09		HOLE DIA.: 3"		CASING DEPTH: 36.0 ft		CORE SIZE: NQ3		BITS USED: 2-7/8" Tri-Cone					
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION			
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100					
302.6					Ground Surface										
													302.6 302.1	0.0 0.5	ASPHALT (Roadway) to 0.5 ft No sampling from 0.0 to 8.4 feet due to soft dig utility clearance by Dominion Personnel
294.2	8.4												294.2	8.4	RESIDUAL SOIL: Well Graded SAND with Silt (SW-SM), very pale brown (10YR 7/4), medium dense, dry, fine to coarse grained sand, relict rock fabric
292.2	10.4	6	5	8											10.4 ft: Moist
289.2	13.4														13.4 ft: Light gray (10YR 7/2)
		5	6	9									287.7	14.9	RESIDUAL SOIL: Silty SAND (SM), very pale brown (10YR 7/3), medium dense, moist, fine to coarse grained sand, relict rock fabric
284.1	18.5														
		7	7	7											
279.1	23.5														23.5 ft: Wet, trace gravel sized rock fragments, trace mica
		5	6	8											
274.1	28.5														28.5 ft: Light gray (10YR 7/2), dense, moist, orange staining
		13	16	20											
269.1	33.5														33.5 ft: Gray (10YR 6/1), medium dense
		7	8	8											
264.1	38.5												265.6	37.0	WEATHERED ROCK: Severely weathered BIOTITE QUARTZ GNEISS (Sampled as Silty SAND (SM), strong brown (7.5YR 5/6), very dense, moist, fine to coarse grained sand, trace mica, trace rock fragments)
263.7	38.9												263.7	38.9	WEATHERED ROCK: Gray to brownish orange, severely weathered, very close fracturing, soft to medium hard, BIOTITE QUARTZ GNEISS
		50/0.1											257.9	44.7	HARD ROCK and WEATHERED ROCK: Dark brown and gray, with orange staining, severely to moderately severely weathered, very close to close fracturing, soft to medium hard, BIOTITE QUARTZ GNEISS
		50/0.0													
													244.3	58.3	HARD ROCK: Gray with orange staining, moderately to slightly weathered, close fracturing, medium hard to moderately hard, BIOTITE QUARTZ GNEISS

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



SHEET 2 OF 3

BECHTEL PROJECT NO.: 25161			MACTEC PROJECT NO.: 6468-09-2473			COUNTY: Louisa, VA			GEOLOGIST: B. Mabie						
SITE DESCRIPTION: North Anna 3 Project Supplement 2						DRILLER: D. Rhodes/K. Guy			FLUID LEVEL (ft)						
BORING NO.: M-20			DRILL METHOD: Mud Rotary/Rock Core			DRILL MACHINE: CME-45C Track (RAL)			0 HR. NA						
GROUND ELEV.: 302.6 ft (NAVD88)			NORTHING: 3,909,794 US ft (NAD83)			EASTING: 11,686,068 US ft (NAD83)			24 HR. 15.5						
TOTAL DEPTH: 151.0 ft			SAMPLE METHODS: ASTM D 1586-08a; 2488-09a; 2113-08; 6032-08			ROD TYPE: AWJ			HAMMER (ID):140-lb. Auto (MEC-12)						
DATE STARTED: 9/21/09			COMPLETED: 9/25/09			HOLE DIA.: 3"			CASING DEPTH: 36.0 ft						
						CORE SIZE: NQ3			BITS USED: 2-7/8" Tri-Cone						
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT						SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION		
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100					
227.8					Continued from previous page										
													HARD ROCK: Gray with orange staining, moderately to slightly weathered, close fracturing, medium hard to moderately hard, BIOTITE QUARTZ GNEISS (continued)		
													221.6	81.0	HARD ROCK: Gray, brown, and dark brown, with orange staining, moderately severe to moderately weathered, very close to close fracturing, medium hard, BIOTITE QUARTZ GNEISS
													196.6	106.0	HARD ROCK: Gray, slightly weathered to fresh, close to wide fracturing, hard to very hard, BIOTITE QUARTZ GNEISS

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



SHEET 3 OF 3

BECHTEL PROJECT NO.: 25161			MACTEC PROJECT NO.: 6468-09-2473			COUNTY: Louisa, VA			GEOLOGIST: B. Mabie						
SITE DESCRIPTION: North Anna 3 Project Supplement 2						DRILLER: D. Rhodes/K. Guy			FLUID LEVEL (ft)						
BORING NO.: M-20			DRILL METHOD: Mud Rotary/Rock Core			DRILL MACHINE: CME-45C Track (RAL)			0 HR. NA						
GROUND ELEV.: 302.6 ft (NAVD88)			NORTHING: 3,909,794 US ft (NAD83)			EASTING: 11,686,068 US ft (NAD83)			24 HR. 15.5						
TOTAL DEPTH: 151.0 ft			SAMPLE METHODS: ASTM D 1586-08a; 2488-09a; 2113-08; 6032-08			ROD TYPE: AWJ			HAMMER (ID): 140-lb. Auto (MEC-12)						
DATE STARTED: 9/21/09			COMPLETED: 9/25/09			HOLE DIA.: 3"			CASING DEPTH: 36.0 ft						
						CORE SIZE: NQ3			BITS USED: 2-7/8" Tri-Cone						
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT						SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION		
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100					
153.0					Continued from previous page										
													151.6	151.0	<p>Boring and coring terminated at 151.0 feet.</p> <p>Boring closed by tremie method with cement-bentonite grout.</p> <p>24 hour water level measured on 9/25/2009 prior to drilling. Borehole was at a depth of 126.0 feet.</p>

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



SHEET 1 OF 2

BECHTEL PROJECT NO.: 25161		MACTEC PROJECT NO.: 6468-09-2473		COUNTY: Louisa, VA	GEOLOGIST: B. Mabie	
SITE DESCRIPTION: North Anna 3 Project Supplement 2				DRILLER: D. Rhodes/K. Guy		FLUID LEVEL (ft)
BORING NO.: M-20		DRILL METHOD: Mud Rotary/Rock Core		DRILL MACHINE: CME-45C Track (RAL)		0 HR. NA
GROUND ELEV.: 302.6 ft (NAVD88)		NORTHING: 3,909,794 US ft (NAD83)		EASTING: 11,686,068 US ft (NAD83)		24 HR. 15.5
TOTAL DEPTH: 151.0 ft		SAMPLE METHODS: ASTM D 1586-08a; 2488-09a; 2113-08; 6032-08				HAMMER (ID): 140-lb. Auto (MEC-12)
DATE STARTED: 9/21/09		COMPLETED: 9/25/09	CASING DEPTH: 36.0 ft	CORE BARREL TYPE: Wireline NQ3 Triple Tube, series 6 & 10 bits		

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 @ 38.9 ft
263.7	38.9	2.1	N=50/0.0 5:07	(0.5) 24%	(0.0) 0%	RUN 1	(1.2) 21%	(0.0) 0%		263.7 WEATHERED ROCK: Gray to brownish orange, severely weathered, very close fracturing, soft to medium hard, BIOTITE QUARTZ GNEISS 38.9
261.6	41.0		2:47							
260.4	42.2	1.2	1:30/0.1	(0.6) 50%	(0.0) 0%	RUN 2				
		2.5	11:29 3:22/0.2			RUN 3				
257.9	44.7		2:01/0.8 2:54	(0.1) 4%	(0.0) 0%					257.9
256.6	46.0	1.3	2:15/0.7	(0.8) 62%	(0.0) 0%	RUN 4	(9.8) 72%	(5.1) 38%		HARD ROCK and WEATHERED ROCK: Dark brown and gray, with orange staining, severely to moderately severely weathered, very close to close fracturing, soft to medium hard, BIOTITE QUARTZ GNEISS (Many joints/fractures at 0-90°, open)
		5.0	3:35/0.3 4:29	(5.0) 100%	(2.8) 56%	RUN 5				
			6:19 2:43							
251.6	51.0	3.0	2:02 3:21 3:44	(0.7) 23%	(0.0) 0%	RUN 6				(Several fractures/joints)
			3:50							
248.6	54.0	2.0	2:15 2:31	(1.0) 50%	(0.5) 25%	RUN 7				(2 joints at 70-80°, open)
246.6	56.0	2.3	1:25 2:05	(2.3) 100%	(1.8) 78%	RUN 8				(4 joints at 0-10°, open; 2 joints at 40-50°, open)
244.3	58.3	2.7	1:52 1:29 1:52/0.3	(2.5) 93%	(2.0) 74%	RUN 9	(21.0) 93%	(15.5) 68%		244.3 HARD ROCK: Gray with orange staining, moderately to slightly weathered, close fracturing, medium hard to moderately hard, BIOTITE QUARTZ GNEISS (1 joint at 0-10°, open with orange staining; 4 at 70-80°, open with orange staining) (10 joints at 0-40°, open to tight; 5 joints at 70-80°, open) 58.3
241.6	61.0	5.0	1:04/0.7 2:42 3:01	(4.8) 96%	(2.5) 50%	RUN 10				
			2:04 2:10 2:00							
236.6	66.0	5.0	2:14 2:11	(4.1) 82%	(2.9) 58%	RUN 11				(6 joints at 20-40°, open)
			1:41 1:40 1:44 1:34 1:32							
231.6	71.0	3.8	1:36 1:35 1:31 3:02/0.8	(3.5) 92%	(2.9) 76%	RUN 12				(4 joints at 40-50°, open)
227.8	74.8		0:14/0.2	(1.2) 100%	(1.0) 83%	RUN 13				(2 joints at 60-70°, tight)
226.6	76.0	5.0	2:46	(4.9) 98%	(4.2) 84%	RUN 14				(5 joints at 0-10°, tight to open; 3 joints at 30°, open)
			1:44 1:38 1:26 1:55 1:12							
221.6	81.0	5.0	1:32 1:45 2:43 3:08 1:45	(3.1) 62%	(1.0) 20%	RUN 15	(18.2) 73%	(9.3) 37%		221.6 HARD ROCK: Gray, brown, and dark brown, with orange staining, moderately severe to moderately weathered, very close to close fracturing, medium hard, BIOTITE QUARTZ GNEISS (several joints at 0-20°, open) 81.0
216.6	86.0	5.0	1:43 1:28 1:36 2:14 2:24	(3.4) 68%	(2.0) 40%	RUN 16				(8 joints at 0-30°, open)
211.6	91.0	5.0	2:54 2:02 2:27 2:52 2:05	(3.3) 66%	(1.7) 34%	RUN 17				(5 joints at 0-10°, open; 8 at 30-40°, open)
206.6	96.0	5.0	1:57 1:21 1:28 2:46 3:58	(3.9) 78%	(2.2) 44%	RUN 18				(12 joints at 0-20°; 2 joints at 50-60°, open)
201.6	101.0	5.0	2:38 1:37 1:50 2:01 2:12	(4.5) 90%	(2.4) 48%	RUN 19				(14 joints at 0-20°, open; 3 at 20-30°, open)
196.6	106.0	3.0	3:01 4:09 4:12	(3.0) 100%	(2.0) 67%	RUN 20	(44.4) 99%	(43.3) 96%		196.6 HARD ROCK: Gray, slightly weathered to fresh, close to wide fracturing, hard to very hard, BIOTITE QUARTZ GNEISS (3 joints at 0-20°, open; 1 joint at 70°, open) 106.0
193.6	109.0	2.0	4:25 6:51	(2.0) 100%	(2.0) 100%	RUN 21				(1 joint at 10-20°, tight)
191.6	111.0	5.0	3:51 3:09	(5.0) 100%	(5.0) 100%	RUN 22				(2 joints at 20-30°, tight)

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





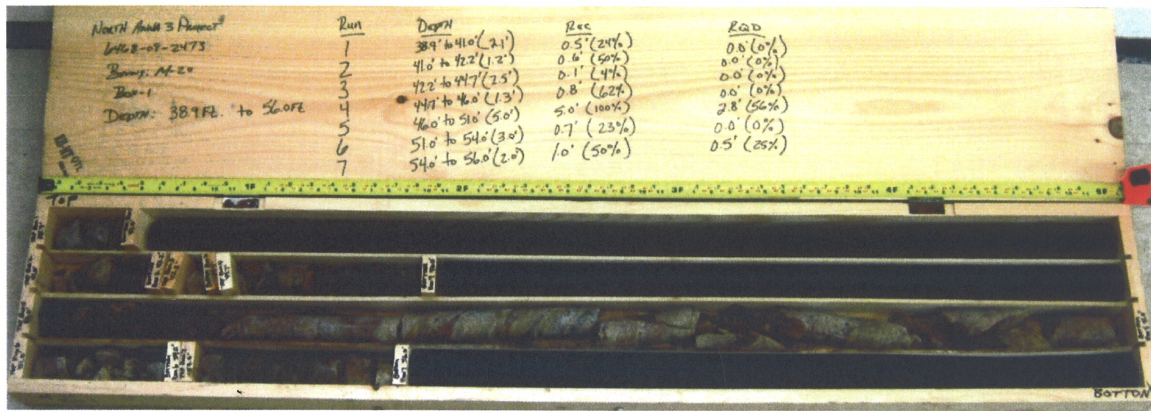
SHEET 2 OF 2

BECHTEL PROJECT NO.: 25161		MACTEC PROJECT NO.: 6468-09-2473		COUNTY: Louisa, VA		GEOLOGIST: B. Mabie	
SITE DESCRIPTION: North Anna 3 Project Supplement 2				DRILLER: D. Rhodes/K. Guy			FLUID LEVEL (ft)
BORING NO.: M-20		DRILL METHOD: Mud Rotary/Rock Core		DRILL MACHINE: CME-45C Track (RAL)			
GROUND ELEV.: 302.6 ft		(NAVD88)		NORTHING: 3,909,794		US ft (NAD83)	
EASTING: 11,686,068		US ft (NAD83)		24 HR.		15.5	
TOTAL DEPTH: 151.0 ft		SAMPLE METHODS: ASTM D 1586-08a; 2488-09a; 2113-08; 6032-08				HAMMER (ID): 140-lb. Auto (MEC-12)	
DATE STARTED: 9/21/09		COMPLETED: 9/25/09		CASING DEPTH: 36.0 ft		CORE BARREL TYPE: Wireline NQ3 Triple Tube, series 6 & 10 bits	

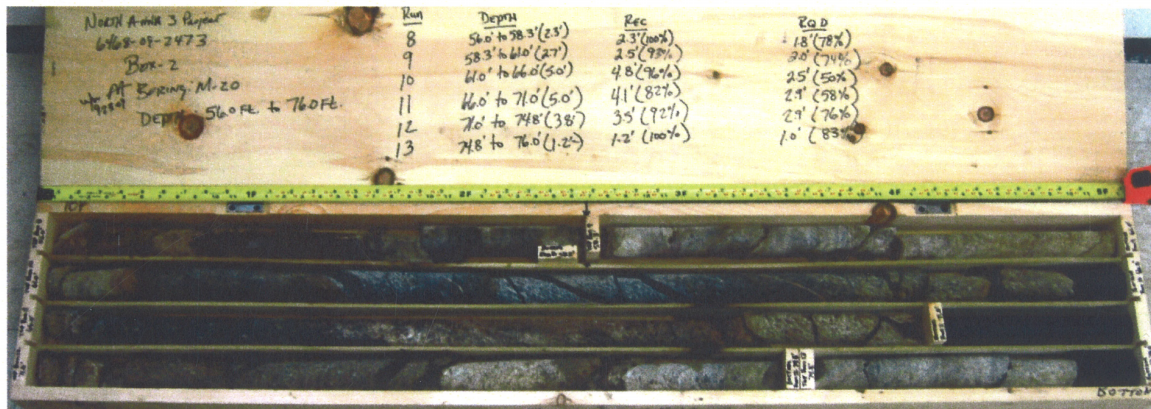
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS
				REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %		
										Continued from previous page
186.6	116.0	5.0	4:16 3:28 3:30	(4.9) 98%	(4.9) 98%	RUN 23				HARD ROCK: Gray, slightly weathered to fresh, close to wide fracturing, hard to very hard, BIOTITE QUARTZ GNEISS ( <i>continued</i> ) (3 joints at 10-20°, tight)
181.6	121.0	5.0	4:37 4:01 4:28 4:36 5:10	(5.0) 100%	(5.0) 100%	RUN 24				(4 joints at 0-20°, tight)
176.6	126.0	5.0	4:55 4:42 4:26 4:48 4:10	(5.0) 100%	(5.0) 100%	RUN 25				(1 joint at 20°, tight; 1 joint at 60-70°, tight)
171.6	131.0	5.0	2:53 3:01 3:11 3:48 3:19	(4.8) 96%	(4.7) 94%	RUN 26				
166.6	136.0	5.0	3:38 3:37 3:48 4:10 4:30	(4.7) 94%	(4.7) 94%	RUN 27				(1 joint at 70°, tight)
161.6	141.0	5.0	4:49 4:38 4:50 4:55 5:31	(5.0) 100%	(5.0) 100%	RUN 28				(1 joint at 30°, tight)
156.6	146.0	5.0	5:26 6:00 7:14 8:01 4:00	(5.0) 100%	(5.0) 100%	RUN 29				(2 joints at 60-70°, tight)
151.6	151.0		4:07 4:55 4:00 3:29 3:48							Boring and coring terminated at 151.0 feet.
										Boring closed by tremie method with cement-bentonite grout.
										24 hour water level measured on 9/25/2009 prior to drilling. Borehole was at a depth of 126.0 feet.

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





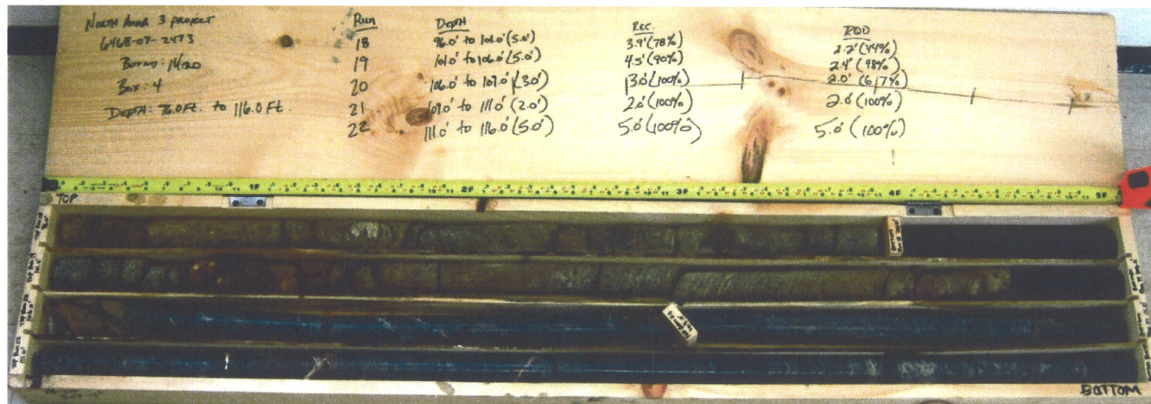
M-20 - Box 1



M-20 - Box 2

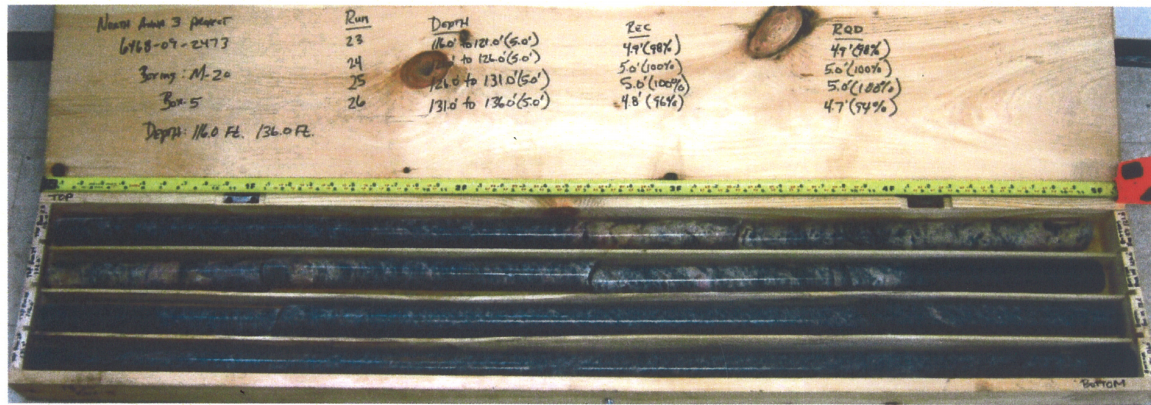


M-20 - Box 3

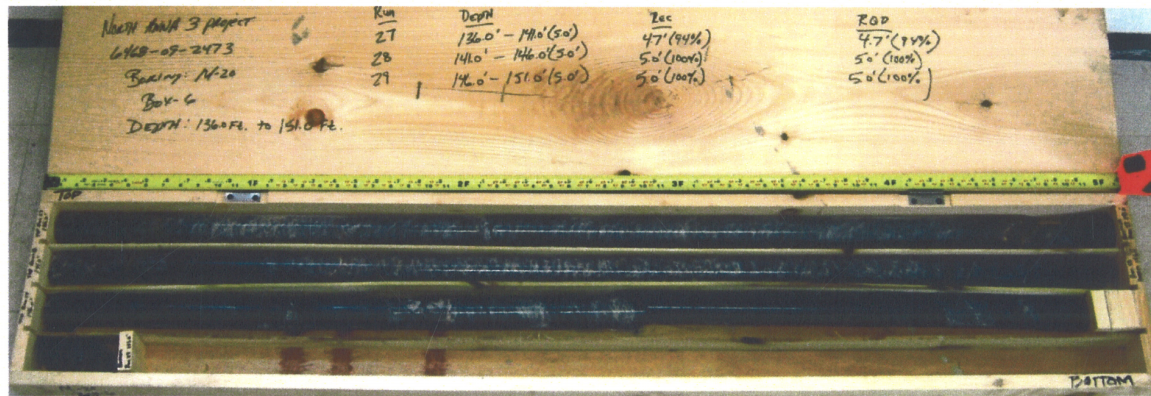


M-20 - Box 4





M-20 – Box 5



M-20 – Box 6