Nobis Engineering
18 Chenell Drive
Concord, New Hampshire 03301

PROJECT

Remedial Design For Operable Unit 01
New Bedford Harbor Superfund Site
New Bedford, Massachusetts

BORING NO. FD-113
SHEET 1 of 10
FILE NO. 48138.27
CHKD. BY J. Trottier

Boring Co.	Warren George, Inc.	Boring Location	northing 2696239	easting 814464	
Driller	E. Thomas	Mudline El.	-33.31	Datum	NGVD
Logged By	E. Thibodeau	Date Start	12/18/00	Date End	12/20/00

Sampler: 2-inch O.D. split-barrel sampler driven 24 inches with a 140 lb. automatic hammer free falling from a height of 30 inches.
Drill Rig: Acker AD II Truck Rig
Drilling Method: 5-inch (PW) flush joint drill casing. 4-inch (HW) flush joint drill casing. Casing driven with a 300 lb. center hole hammer free falling from a height of 24 inches.

Groundwater Readings Not Applicable for Offshore Borings

Date	Time	Depth	Elev.	Stabilization Time

DEPTH	Casing Blows (ft)	Type & No.	PEN/REC (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	SPT N-Value	SAMPLE DESCRIPTION (ASTM D2488)	STRATUM DESCRIPTION	REMKS
							Advance PW drill casing to 2 ft.		
1	WOC								
2	WOC								
		S-1	24/1	2-4	WOR/24	—	Organic soil (OH); 95% organic clay/silt, 5% fine sand, strong organic odor, black.		
							Advance PW drill casing to 4 ft.		
3	WOC							ORGANIC CLAY	
4	WOC								
		S-2	24/6	4-6	WOR/24	—	Organic soil (OH); similar to S-1 except black to dark gray, slight sheen noted.		
							Advance PW drill casing to 6 ft.		
							Advance 3-7/8 in. roller bit to 6 ft., no water return noted.		
5	WOC								
6	WOC								
		S-3	24/18	6-8	WOR/24	—	S-3A: Organic soil with sand (OH); very soft, 75% organic clay/silt, 25% fine sand,		
							moderate organic odor, black to dark gray. (12 in.)		
							S-3B: Poorly graded sand with silt (SP-SM); 5% coarse sand, 30% medium sand,		
7	WOC						55% fine sand, 10% silt, gray-brown. (6 in.)		
							Advance PW drill casing to 8 ft.		
							Advance 3-7/8 in. roller bit to 8 ft.	7.5 ft.	
8	WOC								
		S-4	24/12	8-10	4-3-4-3	7	S-4A: Poorly graded sand (SP); loose, 50% medium sand, 40% fine sand, 5% gravel,	MARINE SAND	
							5% silt, gray-brown. (4 in.)		
							S-4B: Poorly graded sand with gravel (SP); 15% coarse sand, 40% medium sand,		
9	11						15% fine sand, 25% gravel, 5% silt, subrounded to subangular sand and gravel, brown.		
							(8 in.)		
							Advance PW drill casing to 10 ft.	9.5 ft.	
							Mix bentonite drilling mud, specific gravity = 1.09.	GLACIO FLUVIAL	
10	13						Advance 3-7/8 in. roller bit to 10 ft.		

GRANULAR SOILS (N-Values)	COHESIVE SOILS (N-Values)	SYMBOLS KEY	
0 to 4 - Very Loose	0 to 2 - Very Soft	1. S denotes split-barrel sampler.	7. PID denotes Photoionization Detector
5 to 10 - Loose	3 to 4 - Soft	2. U denotes 3-inch O.D. undisturbed sample.	8. PPM denotes parts per million.
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
31 to 50 - Dense	9 to 15 - Stiff	4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
Over 50 - Very Dense	16 to 30 - Very Stiff	5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
	Over 30 - Hard	6. SPT denotes Standard Penetration Test.	12. R denotes core run number.

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DEPTH	Casing Blows (ft)	SAMPLE INFORMATION Type & No.	PEN/REC (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	SPT N-Value	SAMPLE DESCRIPTION (ASTM D2488)	STRATUM DESCRIPTION	REMKS
		S-5	24/12	10-12	3-3-3-3	6	**Poorly graded sand with silt (SP-SM): 11% coarse sand, 26% medium sand, 42% fine sand, 13% gravel, 8% silt, yellowish brown.** Subrounded to subangular sand and gravel.		1
11	DROP						PW drill casing dropped to 12 ft.		
							Advance 3-7/8 in. roller bit to 12 ft.		
12	DROP								
		S-6	24/6	12-14	7-4-3-5	7	Poorly graded sand with gravel (SP); loose, 35% coarse sand, 30% medium sand, 10% fine sand, 20% gravel, 5% silt, subangular to angular sand and gravel, brown.		
13	26						Advanced PW drill casing to 14 ft.		
							Advance 3-7/8 roller bit to 14 ft.		
14	28								
		S-7	24/10	14-16	6-5-6-6	11	**Silty sand with gravel (SM); 13% coarse sand, 15% medium sand, 15% fine sand, 41% gravel, 16% silt, brown.** Subrounded to subangular sand and gravel.		1
	WOH								
15	7						Advance PW drill casing to 19 ft.	GLACIO FLUVIAL	
							Advance 3-7/8 in. roller bit to 19 ft.		
16	34								
17	43								
18	69								
19	68								
		S-8	9/6	19-19.8	9-5/3-25/0	-	Silty sand with gravel (SM); 20% coarse sand, 10% medium sand, 15% fine sand, 40% gravel, 15% silt, subrounded to subangular sand and gravel, brown.		
20	45/10						Advance PW drill casing to 19.8 ft. Casing refusal on probable cobble. Advance 4-7/8 in. roller bit to 20.5 ft. Probable cobble from 19.8 to 20.1 ft.	19.8 ft. COBBLE	

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11 to 30 - Medium Dense	5 to 8 - Medium Stiff	3. UO denotes 3-inch Osterberg undisturbed sample.
31 to 50 - Dense	9 to 15 - Stiff	4. PEN denotes penetration length of sampler.
Over 50 - Very Dense	16 to 30 - Very Stiff	5. REC denotes recovered length of sample.
	Over 30 - Hard	6. SPT denotes Standard Penetration Test.
		7. PID denotes Photoionization Detector
		8. PPM denotes parts per million.
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DEPTH	Casing Blows (ft)	Type & No.	PEN/REC (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	SPT N-Value	SAMPLE DESCRIPTION (ASTM D2488)	STRATUM DESCRIPTION	REMKS
							Advance 4-7/8 in roller bit to 20.5 ft. Telescope HW drill casing to 20.5 ft. Advance 3-7/8 in. roller bit with stabilizer to 21 ft. Probable cobble 20.5 to 21 ft.	GLACIO FLUVIAL	
								COBBLE	
21	SPIN							20.75 ft.	
		S-9	24/5	21-23	15-14-6-6	20	**Silty sand with gravel (SM); 11% coarse sand, 20% medium sand, 21% fine sand, 27% gravel, 21% silt, brown.** Subangular sand and gravel.	GLACIO FLUVIAL	1
							Advance HW drill casing to 26 ft.		
22	SPIN								
23	SPIN								
24	SPIN								
25	SPIN								
26	SPIN							26.0 ft.	
		S-10	19/14	26-27.6	11-16-21-8/1	37	S-10A: Poorly graded sand with silt and gravel (SP); dense, 60% medium sand, 20% fine sand, 15% gravel, 5% silt.	GLACIAL TILL	
					25/0		S-10B: Possible Glacial Till; 10% coarse sand, 20% medium sand, 20% fine sand, 30% gravel, 20% silt.		
27									
28								27.9 ft.	
							Advance 3-7/8 in. bit with stabilizer to 29 ft.	BEDROCK	
							Top of competent bedrock 27.9 ft.		
29							Advance HW drill casing to 28.4 ft.		
							Advance 3-7/8 in. roller bit to remove cuttings.		
							Begin HQ rock core at 29 ft.		
30							(boring log continued on next page)		

GRANULAR SOILS (N-Values)
0 to 4 - Very Loose
5 to 10 - Loose
11 to 30 - Medium Dense
31 to 50 - Dense
Over 50 - Very Dense

COHESIVE SOILS (N-Values)
0 to 2 - Very Soft
3 to 4 - Soft
5 to 8 - Medium Stiff
9 to 15 - Stiff
16 to 30 - Very Stiff
Over 30 - Hard

SYMBOLS
1. S denotes split-barrel sampler.
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3. UO denotes 3-inch Osterberg undisturbed sample.
4. PEN denotes penetration length of sampler.
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SHEET 4 of 10
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Boring Co. Warren George, Inc.
Driller E. Thomas
Logged By E. Thibodeau

Boring Location northing 2696239 easting 814464
Mudline El. -33.31 Datum NGVD
Date Start 12/18/00 Date End 12/20/00

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Casing driven with a 300 lb. center hole hammer free falling from a height of 24 inches.

Groundwater Readings Not Applicable for Offshore Borings

Date	Time	Depth	Elev.	Stabilization Time

DEPTH (feet)	VISUAL REPRESENTATION	CORE INFORMATION: CORE RUN	CORE INTERVAL	CORE TIME	ROCK CORE DESCRIPTION	REMKS
		R1	29-30	5 min.	Begin R1 at 29 ft. Fresh, moderately hard, gray, fine-grained GNEISS. Low angle (approx. 10 degrees) foliation. REC. = 88%; RQD = 63% (fair). Water return color: milky white.	
29.5					29.6 ft.: Mechanical break in rock core. 29.8 ft.: Primary joint: low angle, rough, undulating, and open. Distinct black discoloration on fracture surface. Loss of return water at 29.8 ft.	
30.0			30-31	4.5 min.	29.9 to 30.5 ft.: Secondary joint: high angle to vertical, rough, planar, discolored, and open. Distinct black discoloration noted on fracture surface. 30.1 ft.: Mechanical break in rock core.	
30.5					30.5 and 30.7 ft.: Primary joints: low angle to horizontal, rough, planar, discolored, and open.	
31.0			31-32	5 min.	31.2 ft.: Primary joint: low angle, smooth, planer, discolored, and open. Distinct black discoloration on fracture surfaces.	
31.5					31.4 and 31.5 ft.: Primary joints: low angle, rough to smooth, planar, discolored, and open. Distinct black discoloration on fracture surfaces.	
32.0			32-33	6 min.		
32.5					32.4 ft.: Mechanical break in rock core.	
33.0					32.8 ft.: Mechanical break in rock core.	
			33-34	6 min.		
33.5					33.5 to 34.0 ft.: Rock fragments from overcore of R2. Perform packer test from 30 to 34 ft.	
34.0					End R1 at 34 ft.	

GRANULAR SOILS (N-value)
0 to 4 - Very Loose
5 to 10 - Loose
11 to 30 - Medium Dense
31 to 50 - Dense
Over 50 - Very Dense

COHESIVE SOILS (N-value)
0 to 2 - Very Soft
3 to 4 - Soft
5 to 8 - Medium Stiff
9 to 15 - Stiff
16 to 30 - Very Stiff
Over 30 - Hard

SYMBOL KEY
1. S denotes split-barrel sampler.
2. U denotes 3-inch O.D. undisturbed sample.
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4. PEN denotes penetration length of sampler.
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Date	Time	Depth	Elev.	Stabilization Time

DEPTH (feet)	VISUAL REPRESENTATION	CORE INFORMATION: CORE RUN	CORE INTERVAL	CORE TIME	ROCK CORE DESCRIPTION	REMKS
		R2	34-35	4.5 min	Begin R2 at 34 ft.	
					Fresh, moderately hard, gray, fine-grained GNEISS. Low angle (approx. 10 degrees) foliation.	
34.5					REC. = 97%; RQD = 85% (good). No return water noted.	
					34.2 ft.: mechanical break in rock core.	
					34.4 ft.: Primary joint: low angle, smooth, planar, discolored, and tight.	
					34.5 and 34.6 ft.: Tight joints; not fractured during coring.	
35.0					34.6 to 34.8 ft.: Highly to completely weathered zone. Discolored rock weathered to residual soil in the form of sand, silt, and gravel.	
			35-36	4 min	35.1 ft.: Mechanical break in rock core.	
35.5						
					35.6 ft.: Mechanical break in rock core.	
36.0						
			36-37	5 min		
36.5					36.3 ft.: Mechanical break in rock core.	
					36.3 to 36.5 ft.: Secondary joint: high angle, smooth, planar, slightly discolored, and tight.	
37.0						
			37-38	5.5 min		
37.5					37.4 ft.: Mechanical break in rock core.	
					37.7 ft.: Primary joint: low angle, smooth, planar, discolored, and tight.	
38.0						
			38-39	4 min		
38.5						
39.0					Perform packer test from 32 to 39 ft. End R2 at 39 ft.	

GRANULAR SOILS (N-Value)	COHESIVE SOILS (N-Value)	SAMPLE TYPE	
0 to 4 - Very Loose	0 to 2 - Very Soft	1. S denotes split-barrel sampler.	7. PID denotes Photoionization Detector
5 to 10 - Loose	3 to 4 - Soft	2. U denotes 3-inch O.D. undisturbed sample.	8. PPM denotes parts per million.
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
31 to 50 - Dense	9 to 15 - Stiff	4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
Over 50 - Very Dense	16 to 30 - Very Stiff	5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
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SHEET 6 of 10
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Driller E. Thomas
Logged By E. Thibodeau

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DEPTH (feet)	VISUAL REPRESENTATION	CORE INFORMATION: CORE RUN	CORE INTERVAL	CORE TIME	ROCK CORE DESCRIPTION	REMKS
		R3	39-40	5 min.	Begin R3 at 39 ft. Fresh, very hard, gray, fine-grained GNEISS. Low angle (approx. 10 to 20 degree) foliation. REC = 98%; RQD = 98% (excellent). No water return noted.	
39.5						
40.0			40-41	3 min.		
40.5						
41.0			41-42	3 min.		
41.5						
42.0					41.8 to 42.2 ft.: Secondary joint: moderately dipping to high angle, smooth, planar, slightly discolored, and tight. Possible mechanical break of healed joint.	
			42-43	3 min.		
42.5						
43.0						
			43-44	4 min.		
43.5					43.4 ft.: Mechanical break in rock core.	
44.0					End R3 at 44 ft.	

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DEPTH (feet)	VISUAL REPRESENTATION	CORE INFORMATION: CORE RUN	CORE INTERVAL	CORE TIME	ROCK CORE DESCRIPTION	REMKS
		R4	44-45	3 min.	Begin R4 at 44 ft. Fresh, hard, gray, fine-grained GNEISS. Low angle (approx. 20 -30 degree) foliation. REC = 100%; RQD = 100% (excellent). No water return noted.	
44.5						
45.0					44.9 ft.: Mechanical break in rock core.	
			45-46	3 min.	45.0 ft.: Primary joint: horizontal to low angle, smooth, planar, discolored, and tight.	
45.5					45.4 ft.: Primary joint: horizontal to low angle, smooth, planar, discolored and tight.	
46.0						
			46-47	3.5 min.		
46.5						
47.0						
			47-48	4.5 min.	46.9 to 47.2 ft.: Secondary joint: high angle, smooth, planar, slightly discolored, and tight. Possible mechanical break of healed joint.	
47.5						
48.0						
			48-49	6 min.		
48.5						
					Perform packer test from 39 to 49 ft. End of R4 at 49 ft. Bottom of exploration at 49.0 ft; boring terminated in bedrock. Grout completed boring to mudline with cement/bentonite slurry, specific gravity = 1.45.	
49.0						

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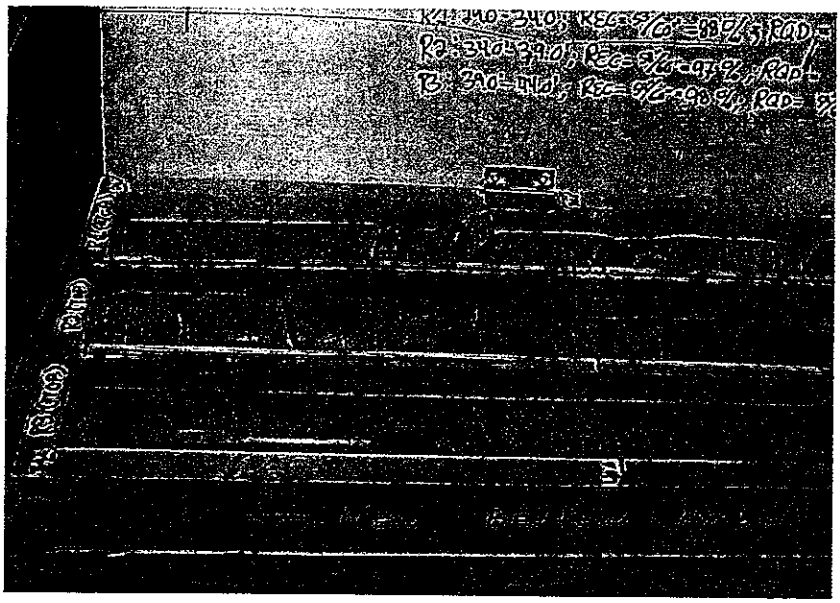
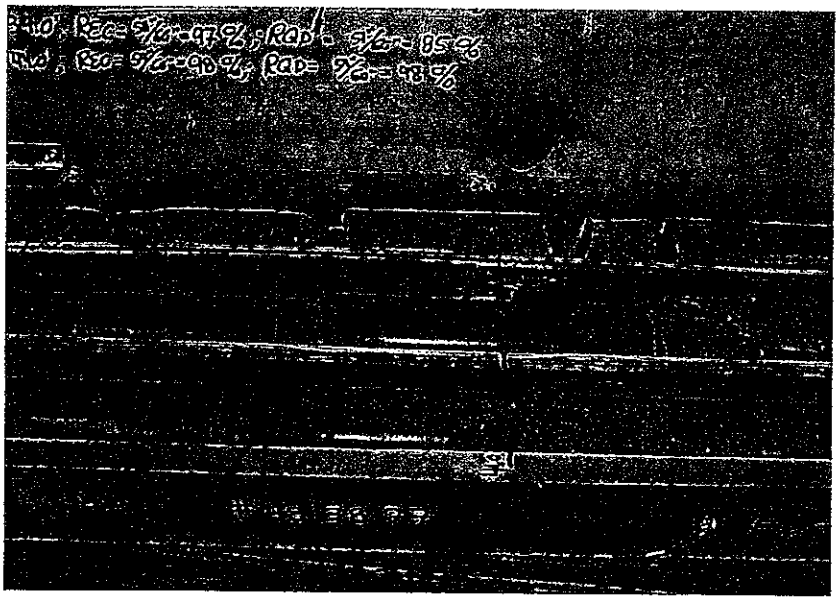
Date	Time	Depth	Elev.	Stabilization Time

ROCK CORE PICTURES



Core Runs R1 through R3



Core Runs R1 through R3

REMARKS:
1) Sample description based on laboratory classification. Refer to GeoTesting Express Report dated March 5, 2001. Laboratory description presented in bold.
2)
3)
4)

Nobis Engineering
18 Chenell Drive
Concord, New Hampshire 03301

PROJECT
Remedial Design For Operable Unit 01
New Bedford Harbor Superfund Site
New Bedford, Massachusetts

BORING NO. FD-113
SHEET 9 of 10
FILE NO. 48138.27
CHKD. BY J. Trottier

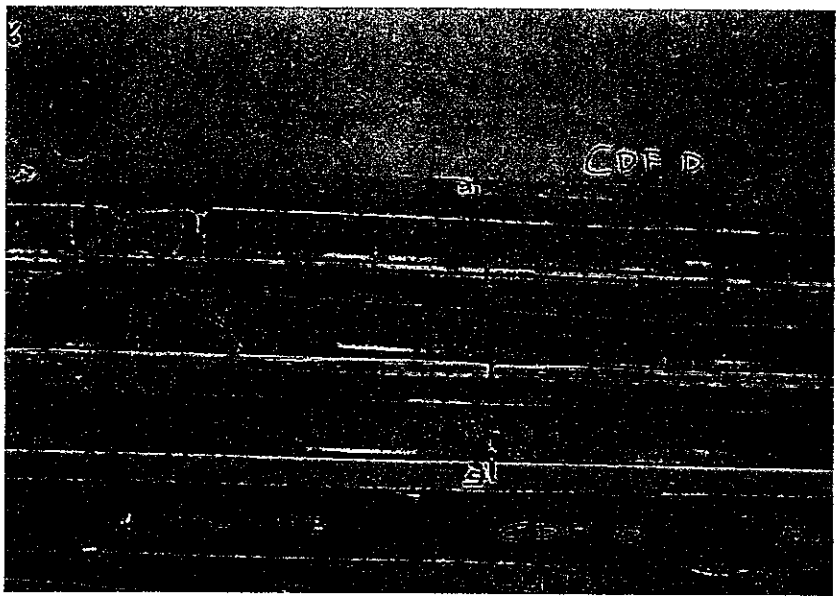
Boring Co.	Warren George, Inc.	Boring Location	northing 2696239	easting 814464	
Driller	E. Thomas	Mudline El.	-33.31	Datum	NGVD
Logged By	E. Thibodeau	Date Start	12/18/00	Date End	12/20/00

Sampler: 2-inch O.D. split-barrel sampler driven 24 inches with a 140 lb. automatic hammer free falling from a height of 30 inches.
Drill Rig: Acker AD II Truck Rig
Drilling Method: 5-inch (PW) flush joint drill casing. 4-inch (HW) flush joint drill casing.
Casing driven with a 300 lb. center hole hammer free falling from a height of 24 inches.

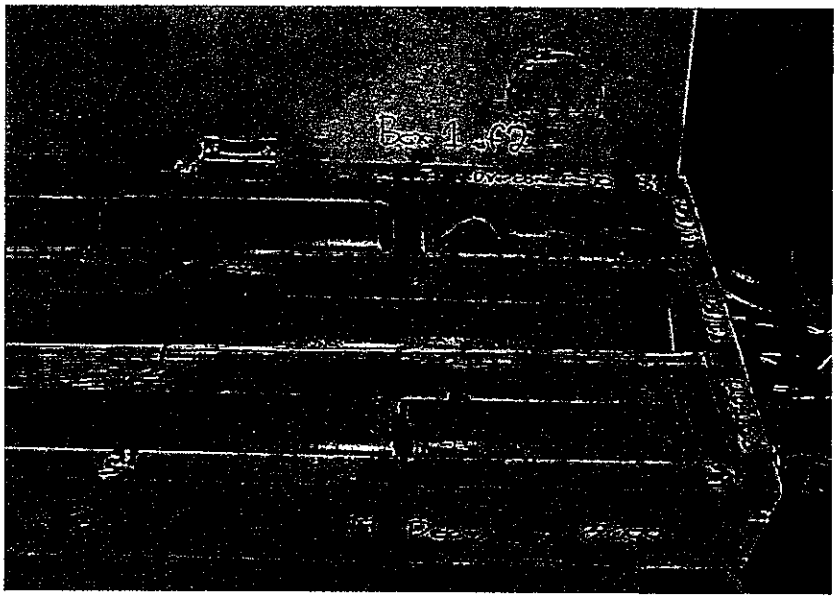
Groundwater Readings Not Applicable for Offshore Borings

Date	Time	Depth	Elev.	Stabilization Time

ROCK CORE PICTURES



Core Runs R1 through R3



Core Runs R1 through R3 and overcore from bottom of R1

REMARKS:
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2)
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Nobis Engineering 18 Chenell Drive Concord, New Hampshire 03301	PROJECT Remedial Design For Operable Unit 01 New Bedford Harbor Superfund Site New Bedford, Massachusetts	BORING NO. FD-113 SHEET 10 of 10 FILE NO. 48138.27 CHKD. BY J. Trottier

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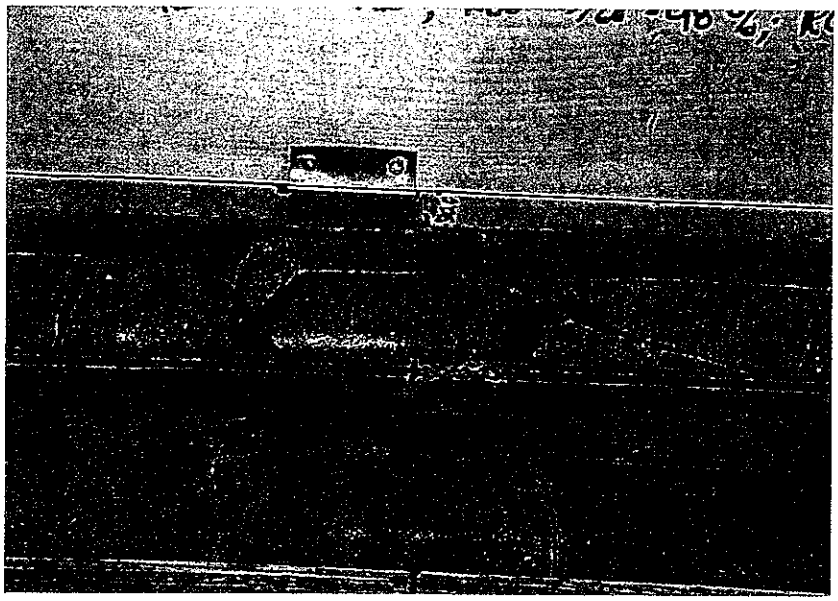
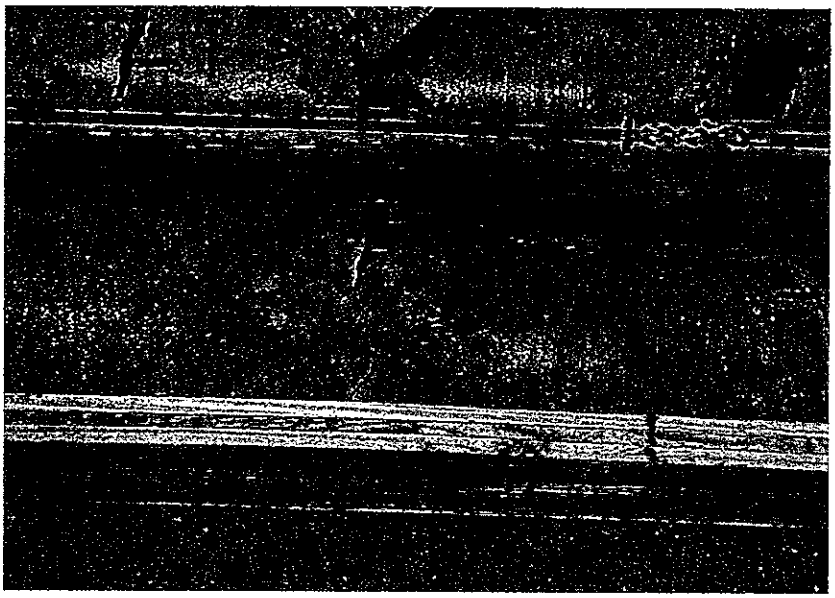
Groundwater Readings Not Applicable for Offshore Borings

Date	Time	Depth	Elev.	Stabilization Time

ROCK CORE PICTURES



Weathered/residual soil zone noted in R2



Weathered/residual soil zone noted in R2

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