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-114
SHEET 1 of 12
FILE NO. 48138.27
CHKD. BY J. Trottier

Boring Co.	Warren George, Inc.	Boring Location	northing 2696166 easting 814321
Driller	E. Thomas	Mudline El.	-20.28 Datum NGVD
Logged By	E. Thibodeau	Date Start	1/2/01 Date End 1/5/01

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. Spin and wash.

Groundwater Readings Not Applicable for Offshore Borings

Date	Time	Depth	Elev.	Stabilization Time

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-1	4/1	0-0.3	50/4"	—	Casing resting on mudline, very hard bottom, attempt split barrel sample.		
							S-1: Spoon refusal. Rock fragment noted in tip of sampler.	BOULDER/	
							Advance 4-7/8 in. roller bit to 1.2 ft.	DEBRIS	
1	SPIN						Probable boulder or piece of debris		
							Telescope HW drill casing to 2 ft. (spin and wash)	1.2 ft	
2	SPIN								
		S-2	24/6	2-4	1-1-3-6	4	Clayey sand (SC); loose, 20% organic clay/silt, 40% medium sand, 30% fine sand, 5%		
							coarse sand, 5% shell fragments, strong organic odor, black.		
							Advance HW drill casing to 4 ft.		
3	SPIN						Advance 3-7/8 in. roller bit to 4 ft.	ORGANIC	
								CLAY	
4	SPIN							4.0 ft.	
		S-3	24/6	4-6	7-5-5-11	10"	Poorly graded sand with gravel (SP); loose, 15% coarse sand, 35% medium sand, 20%		1
							fine sand, 25% gravel, 5% silt, subrounded to subangular sand and gravel, slight organic		
							odor, gray. Several pieces of gravel were flat and elongated.	MARINE	
5	SPIN						Advance HW drill casing to 6 ft.	SAND	
							Advance 3-7/8 in. roller bit to 6 ft.		
6	SPIN						Perform falling head permeability test at 6 ft.		
		S-4	24/1	6-8	8-8-7-14	15	Poorly graded sand with silt (SP-SM); medium dense, 40% medium sand, 50% fine sand		
							10% silt, gray-brown.		
							Headspace: < 1 ppm.		
7	SPIN						Advance HW drill casing to 9 ft.		
							Advance 3-7/8 in. roller bit to 9 ft.		
8	SPIN								
9	SPIN								
		S-5	24/12	9-11	13-6-1-1	7	**Silt with sand (ML); 74% silt, 3% medium sand, 23% fine sand, light brown.**		2
							Headspace: < 1 ppm.		
							Advance HW drill casing to 14 ft.		
10	SPIN						Advance 3-7/8 in. roller bit to 14 ft.		

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.

REMARKS:
1) *3-inch O.D. split-barrel sampler driven 24 inches with a 300 lb. center hole hammer free falling from a height of 24 inches.
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BORING NO. FD-114
SHEET 2 of 12
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Logged By	E. Thibodeau	Date Start	1/2/01 Date End 1/5/01

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. Spin and wash.

Groundwater Readings Not Applicable for Offshore Borings

Date	Time	Depth	Elev.	Stabilization Time

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
11	SPIN								
12	SPIN							MARINE SAND	
13	SPIN								
14	SPIN						Perform falling head permeability test at 14 ft.		
		S-6	24/12	14-16	25-22-11-11	33	**Silty sand (SM); 3% coarse sand, 14% medium sand, 56% fine sand, 4% gravel, 23% silt, brown.** Subrounded to subangular sand and gravel.		2
15	SPIN						Headspace: < 1 ppm. Advance HW drill casing to 19 ft. Advance 3-7/8 in. roller bit to 19 ft.		
16	SPIN								
								16.5 ft.	
17	SPIN								
18	SPIN							GLACIO FLUVIAL	
19	SPIN								
		S-7	24/3	19-21	13-11-7-4	18	Poorly graded sand with silt and gravel (SP-SM); medium dense, 20% coarse sand, 25% medium sand, 20% fine sand, 25% gravel, 10% silt, brown. Subrounded to subangular sand and gravel.		
20	SPIN						Advance HW drill casing to 21 ft.		

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5 to 10 - Loose	3 to 4 - Soft	2. U denotes 3-inch O.D. undisturbed sample.
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.	
9. PP denotes Pocket Penetrometer.	
10. FVST denotes field vane shear test.	
11. RQD denotes Rock Quality Designation.	
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REMARKS:
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Logged By	E. Thibodeau	Date Start	1/2/01	Date End	1/5/01

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Drill Rig: Acker AD II Truck Rig
Drilling Method: 5-inch (PW) flush joint drill casing. 4-inch (HW) flush joint drill casing. Spin and wash.

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							Advance 3-7/8 in. roller bit to 21 ft.		
21	SPIN						Perform constant head permeability test at 21 ft.		
		S-8	24/1	21-23	13-11-5-3	16	Poor recovery. Several large pieces of angular coarse gravel recovered.		
							One large angular flat and elongated piece of coarse gravel noted.		
22	SPIN						Advance HW drill casing to 23 ft.		
							Advance 3-7/8 in. roller bit to 23 ft.		
23	SPIN							GLACIO	
		S-9	24/10	23-25	22-17-22-27	39*	**Poorly graded sand with silt and gravel (SP-SM); 5% coarse sand, 38% medium sand, 17% fine sand, 34% gravel, 6% silt, brown.** Subrounded to subangular sand and gravel.	FLUVIAL	1,2
							(2 jars)		
24	SPIN						Headspace: 21 ppm. (jar #2)		
							Advance HW drill casing to 27 ft.		
							Advance 3-7/8 in. roller bit to 27 ft.		
25	SPIN								
26	SPIN								
27	SPIN								
		S-10	24/7	27-29	7-4-4-21	8*	**Poorly graded sand with silt and gravel (SP-SM); 11% coarse sand, 16% medium sand, 22% fine sand, 46% gravel, 5% silt, brown.** Rounded to subangular sand and gravel.		1,2
							(2 jars)		
28	SPIN						Headspace: 18 ppm. (jar #2)		
							Advance HW drill casing to 29 ft.		
							Advance 3-7/8 in. roller bit to 29 ft.		
							Perform constant head permeability test at 29 ft.		
29	SPIN							29.0 ft.	
		S-11	1/1	29-29.1	75/1"	—	Washed sample.		
			Interval		Time		Advance 3-7/8 in. roller bit to 29.5 ft.	BOULDER	
			29.5-30.5		7.5 min.		Advance HW drill casing to 29.7 ft.		
30	SPIN						Begin HQ rock core at 29.5 ft.		

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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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Logged By	E. Thibodeau	Date Start	1/2/01 Date End 1/5/01

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			Interval		Time				
							Core: 29.5 to 32.0 ft.		
			30.5-31.5		5 min.		Core barrel penetrated boulder at 32 ft., core run terminated.		
31	SPIN						Advance 3-7/8 in. roller bit to 32 ft.	BOULDER	
							Roller bit cuttings recovered utilizing a U.S. No. 140 sieve and preserved in sample jar. Cuttings indicate coarse to fine sand and gravel. Unable to keep hole through boulder open.		
			31.5-32.0		5 min.		Advance HW drill casing to 32 ft.		
32	SPIN							32.0 ft.	
		S-12	24/12	32-34	10-12-15-12	27	**Poorly graded sand with silt and gravel (SP-SM); 16% coarse sand, 23% medium sand, 31% fine sand, 19% gravel, 11% silt, brown.** Subrounded to angular sand and gravel.		2
							Headspace: <1 ppm.		
33	SPIN						Advance 3-7/8 in. roller bit to 37 ft.	GLACIO	
							Advance HW drill casing to 37 ft.	FLUVIAL	
							Advance 3-7/8 in. roller bit to wash out casing.		
34	SPIN								
35	SPIN								
36	SPIN								
37	SPIN								
		S-13	16/9	37-38.3	14-36-75/4"	—	S-13A: Poorly graded gravel with silt and sand (GP-GM); 65% gravel, 10% coarse sand, 10% medium sand, 5% fine sand, 10% silt, subrounded to subangular sand and gravel, brown. (3 in.)		
38	SPIN						Headspace: <1 ppm. (S-13A)		
							S-13B: Weathered bedrock / residual soil. (6 in.)		
							Headspace: <1 ppm. (S-13B)		
							Advance 3-7/8 in. roller bit to wash out casing.		
39	SPIN						Advance 3-7/8 in. roller bit to 40.5 ft.	39.0 ft.	
							Advance HW drill casing to 39.5 ft.		
							Top of competent bedrock at 40.0 ft.	WEATHERED	
							Begin HQ rock core at 40.5 ft.	BEDROCK	
40	SPIN						(boring log continued on next page)	40.0 ft.	

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Logged By	E. Thibodeau	Date Start	1/2/01	Date End	1/5/01

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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	40.5-41.5	4.5 min.	Begin R1 at 40.5 ft. Slightly weathered, medium to moderately hard, gray, fine to medium grained GNEISS. Low angle (approx. 10-30 degrees) foliation. REC. = 95%; RQD = 45% (poor). Water return color: rust. 40.5 to 42.1 ft.: Weathered zone. Rock notably discolored. Rock structure still intact. Rock is slightly friable from 41 to 41.2 ft.	
41.0						
41.5			41.5-42.5	6 min.	41.6 ft.: Mechanical break in rock core. 41.6 to 43.0 ft.: Set of three high angle to vertical healed joints or fractures.	
42.0						
42.5			42.5-43.5	5.5 min.	42.5 ft.: Loss of water return.	
43.0						
43.5			43.5-44.5	4 min.	43.3 to 45.5 ft.: High angle to vertical joint. Joint is intact from 43.3 to 43.5 ft. Possible machine break from 43.5 to 45.5 ft. joint is smooth, planar, discolored, and tight. 43.5, 43.6, 43.9, 44.2, 44.4, 44.6, 44.7, 44.9, 45.0, and 45.2 ft.: Mechanical break in rock core along foliation and perpendicular to high angle joints. 43.5 to 45.0 ft.: High angle to vertical joint. Joint runs parallel to other high angle joint and the two joints appear to merge at 44.7 ft. Joint is rough, undulating, discoloration noted from 43.5 to 44.3 ft. Joint becomes open but infilled from 44.3 to 45.5 ft. Infilling material is dark gray in color.	
44.0						
44.5			44.5-45.5	5 min.	Perform packer test from 43 to 45.5 ft. End R1 at 45.5 ft.	
45.0						
45.5						

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DEPTH (feet)	VISUAL REPRESENTATION	CORE INFORMATION: CORE RUN	CORE INTERVAL	CORE TIME	ROCK CORE DESCRIPTION	REMKS
		R2	45.5-46.5	4 min	Begin R2 at 45.5 ft.	
					Fresh, hard, gray, fine to medium grained GNEISS. No distinct foliation noted.	
46.0					REC. = 100%; RQD = 17% (very poor). RQD biased low due to the presence of high angle/vertical joints	
					No water return noted.	
					45.5 to 47.6 ft.: High angle to vertical joint/fracture. Joint is rough, undulating, and infilled. Joint is	
46.5					intact from 46.7 to 47.6 ft. Several mechanical breaks noted throughout zone. All breaks may be	
					mechanical / broken during coring. Infilling material is dark gray in color. Appears to be comprised	
					mostly of sand.	
			46.5-47.5	4 min		
47.0						
47.5						
			47.5-48.5	4.5 min		
48.0					47.8 to 50.2 ft.: High angle to vertical joint/fracture. Joint is healed and intact with calcite or quartz	
					infilling. Joint runs parallel to another high angle / verticle joint. Joints intersect at 49.2 ft. then split	
					again. Several mechanical breaks noted across joint.	
48.5					48.4 to 50.0 ft.: High angle to vertical joint/fracture. Joint is infilled and intact. Intersects	
			48.5-49.5	5.5 min	aforementioned joint at 49.2 ft. then splits again. Infilling material appears to be comprised mostly	
49.0					of sand.	
49.5						
			49.5-50.5	6 min	49.5 to 49.7 ft.: Quartz/feldspar zone. Pink/dark gray in color. Pegmatic.	
50.0					49.8 to 50.2 ft.: Quartz/feldspar zone. Pink/dark gray in color. Pegmatic.	
					50.2 ft.: Mechanical break in rock core.	
					50.2 to 50.5 ft.: High angle/vertical joint. Distinct discoloration and weathering noted on joint	
50.5					surface. End R2 at 50.5 ft.	

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		R3	50.5-51.5	3.5 min.	Begin R3 at 50.5 ft.	
					Fresh to slightly weathered, hard, gray, fine to medium grained GNEISS. Horizontal to low angle foliation (0 to 10 degrees).	
51.0					REC. = 100%; RQD = 30% (poor). RQD biased low due to the presence of high angle/vertical joints.	
					No water return noted.	
					50.5 to 53.6 ft.: High angle/vertical joint/fracture. Joint is rough, undulating, discolored, and weathered from 50.5 to 51.7 ft. Joint is dark gray in color and consists primarily of sand/silt. Joint is broken/heavily fractured from coring process.	
51.5						
			51.5-52.5	6 min.	51.5 ft.: Mechanical break in rock core.	
52.0						
					52.2 ft.: Mechanical break in rock core.	
52.5						
			52.5-53.5	4 min.		
53.0						
53.5						
			53.5-54.5	5.5 min.	53.6 to 53.9 ft.: Healed joint/fracture.	
					53.6 to 54.4 ft.: Healed joint/fracture.	
54.0						
					54.1 ft.: Mechanical break in rock core.	
54.5						
			54.5-55.5	4 min.		
55.0						
					55.2 ft.: Mechanical break in rock core.	
					55.2 to 55.5 ft.: Mechanical break in rock core. (vertical)	
					Perform packer test from 45.5 to 55.5 ft.	
55.5					End R3 at 55.5 ft.	

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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.

REMARKS:
1) *3-inch O.D. split-barrel sampler driven 24 inches with a 300 lb. center hole hammer free falling from a height of 24 inches.
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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-114
SHEET 8 of 12
FILE NO. 48138.27
CHKD. BY J. Trottier

Boring Co.	Warren George, Inc.	Boring Location	northing 2696166	easting 814321	
Driller	E. Thomas	Mudline El.	-20.28	Datum	NGVD
Logged By	E. Thibodeau	Date Start	1/2/01	Date End	1/5/01

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. Spin and wash.

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
		R4	55.5-56.5	2.5 min.	Begin R4 at 55.5 ft.	
					Fresh to slightly weathered, moderately hard, gray, fine to medium grained GNEISS. Low angle foliation (approx. 10 to 20 degrees).	
56.0					REC. = 100%; RQD = 82% (good).	
					No water return noted.	
					55.8 to 57.6 ft.: Slight discoloration/weathering noted.	
56.5					55.5 to 56.3 ft.: Healed joint. High angle to vertical. Some discoloration noted along joint surface.	
					56.3, 56.5, 57.0, and 57.5 ft.: Mechanical breaks in rock core.	
			56.5-57.5	3 min.	56.3 to 57.1 ft.: Healed joint. High angle to vertical. Some discoloration noted along joint surface.	
					56.3 to 56.5 ft.: Mechanical break in rock core.	
57.0					56.5 to 57.5 ft.: Secondary joint: high angle, smooth, planar, discolored, and tight. Healed from 57.0 to 57.5 ft. Possible mechanical break.	
					57.0 to 57.7 ft.: Secondary joint: high angle, smooth, planar, discolored, and tight. Possible mechanical break.	
57.5						
			57.5-58.5	3.5 min.		
58.0						
58.5						
			58.5-59.5	3 min.	58.6 ft.: Quartz/feldspar vein. Dark gray/pink in color.	
					58.7 to 58.9 ft.: Quartz/feldspar vein. Dark gray/pink in color.	
59.0						
59.5						
			59.5-60.5	3 min.		
60.0						
					End of R4 at 60.5 ft.	
					Bottom of exploration at 60.5 ft; boring terminated in bedrock.	
60.5					Grout completed boring to mudline with cement/bentonite slurry, specific gravity = 1.45.	

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.
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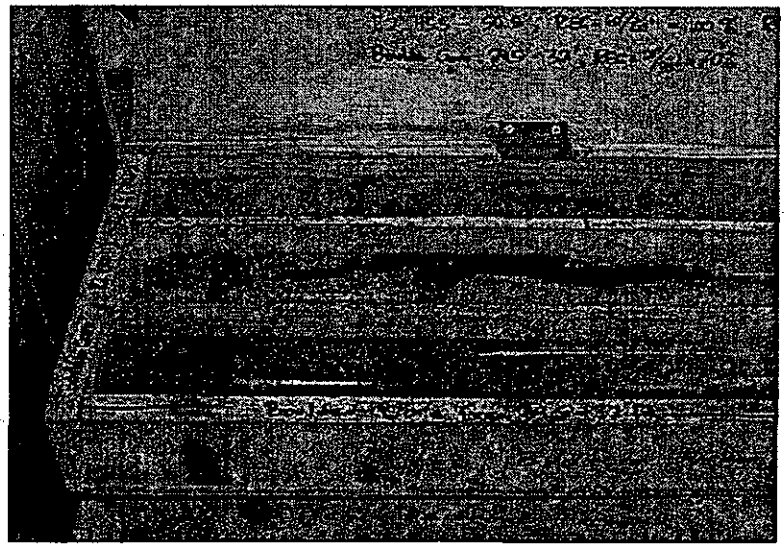
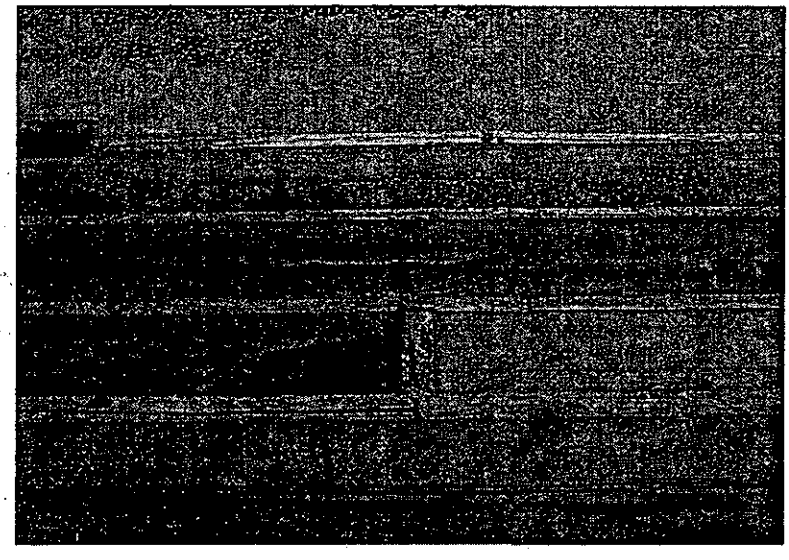
Date	Time	Depth	Elev.	Stabilization Time

ROCK CORE PICTURES



Core Runs R1, R2, and boulder core



Core Runs R1, R2, and boulder core

REMARKS:
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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-114 SHEET 10 of 12 FILE NO. 48138.27 CHKD. BY J. Trottier

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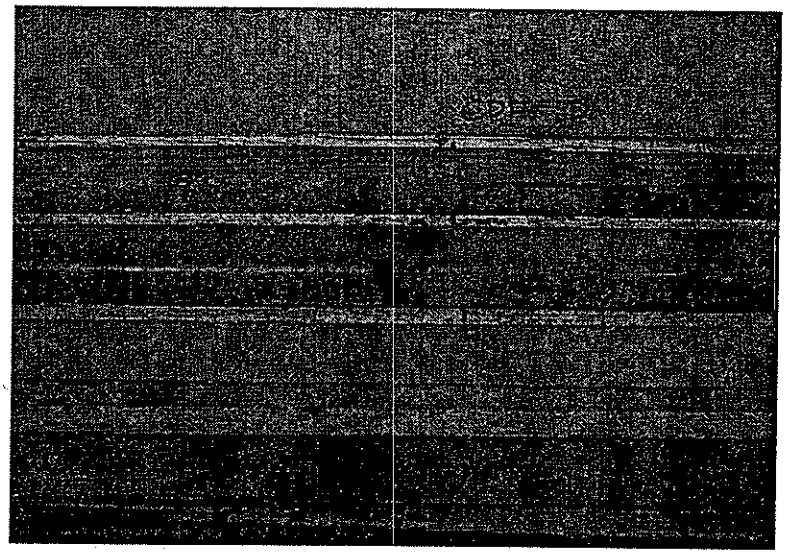
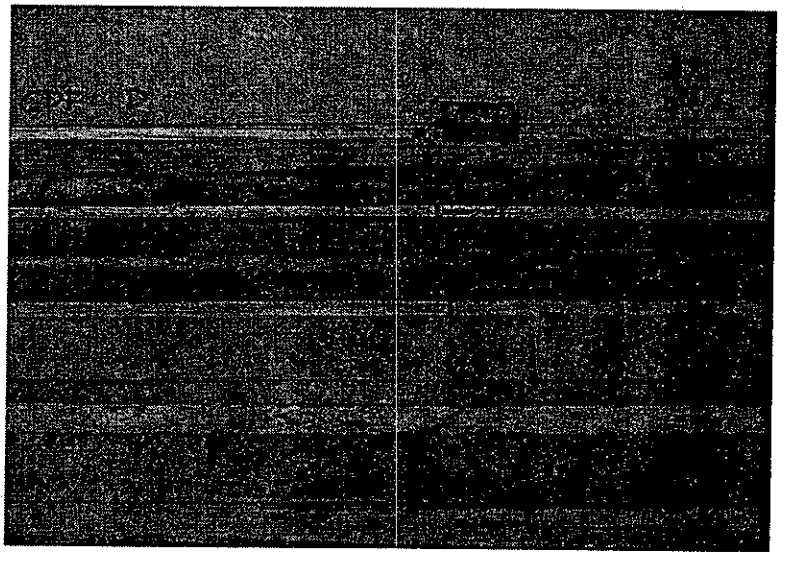
ROCK CORE PICTURES



Core Runs R1 and R2

END OF ROCK CORE



Core Runs R1 and R2

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BORING NO. FD-114
SHEET 11 of 12
FILE NO. 48138.27
CHKD. BY J. Trottier

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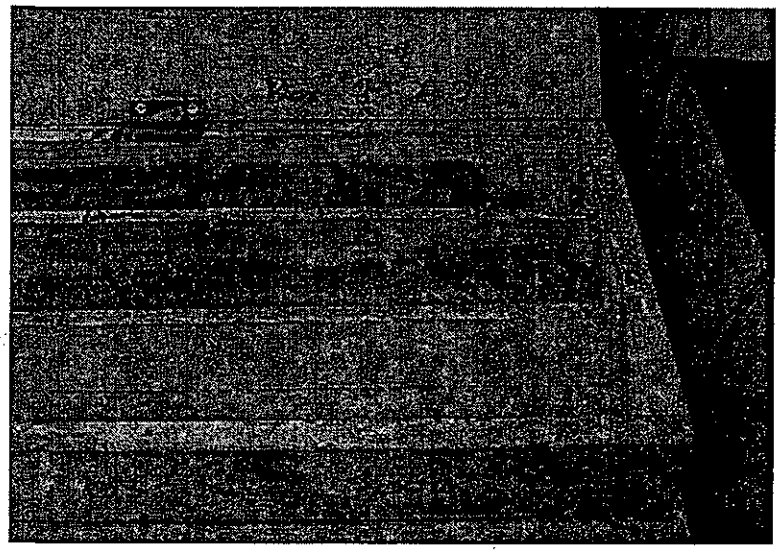
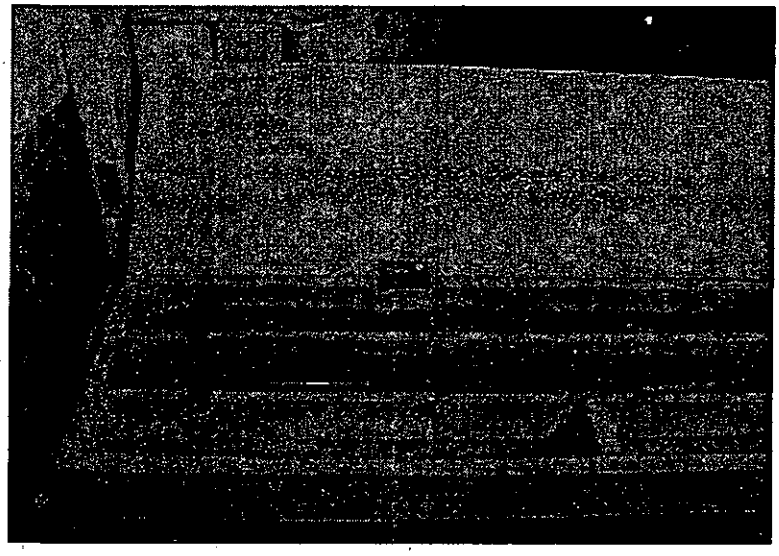
Date	Time	Depth	Elev.	Stabilization Time

ROCK CORE PICTURES



Core Runs R1 and R2



Core Runs R3 and R4

REMARKS:
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BORING NO. FD-114
SHEET 12 of 12
FILE NO. 48138.27
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Groundwater Readings Not Applicable for Offshore Borings

Date	Time	Depth	Elev.	Stabilization Time

ROCK CORE PICTURES

Core Runs R3 and R4

Core Runs R3 and R4

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