Nobis Engineering
PO Box 2890
Concord, New Hampshire 03302

PROJECT

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

BORING NO. FD - 18
SHEET 1 of 7
FILE NO. 48138.07
CHKD. BY J. Trottier

Boring Co. Atlantic Testing Laboratories, Limited
Driller A. Carter
Logged By E. Thibodeau

Boring Location northing 2696322.5 easting 814282.0
Mudline El. -7.85 Datum NGVD
Date Start 10/13/99 Date End 10/15/99

Sampler: 2-inch O.D. split-barrel sampler driven 24 inches with a 140 lb safety hammer free falling from a height of 30 inches.
Drill Rig: Acker AD2 truck mount
Drilling Method: 4-inch I.D. (HW) flush-joint 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
	Hyd.						Advance HW drill casing to 1 ft. (hydraulic push)		
1	Push						Advance 3-7/8 in. button bit from 0 to 1 ft.		
	Hyd.	UO-1	24/24	1-3	———	—	Sandy organic clay (OH); 65% organic clay, 23% fine sand, 7% medium sand, 2%	OH	1
2	Push						coarse sand, 3% gravel, strong organic odor, dark gray. Traces of shell fragments		
	Hyd.						noted.		
3	Push						Advance HW drill casing to 4 ft. (hydraulic push)		
	Hyd.						Advance 3-7/8 in. button bit from 1 to 4 ft.		
4	Push								2
	Hyd.	UO-2	24/24	4-6	———	—	Clayey sand (SC); 33% fine sand, 14% medium sand, 4% coarse sand, 3% gravel,	SC	1
5	Push						46% inorganic clay, strong organic odor, dark gray. Traces of shell fragments noted.		
	Hyd.						Advance HW drill casing to 7 ft. (hydraulic push)		
6	Push						Advance 3-7/8 in. button bit from 4 to 7 ft.		
	Hyd.								
7	Push								
	Hyd.	UO-3	24/24	7-9	———	—	Top: Silty sand (SM); 55% fine sand, 10% medium sand, 30% silt, 5% shell fragments,	SM	
8	Push						gray.		
	Hyd.						Bottom: Sandy silt (ML); 70% silt/clay, 30% fine sand, light gray.	ML	
9	Push						Advance HW drill casing to 9 ft. (hydraulic push)		
		S-1	24/12	9-11	2-7-12-12	19	Advance 3-7/8 in. button bit from 7 to 9 ft.	ML	
10	Spin						S-1: Silt with sand (ML); very stiff, 80% silt/clay, 20% fine sand, light gray. Traces of		
							iron staining.		
11	Spin						Advance HW drill casing to15 ft.		
12	Spin								
13	Spin								
14	Spin								
15	Spin								
		S-2	24/18	15-17	7-7-8-6	15	Sandy silt (ML); stiff, 65% silt/clay, 35% fine sand, olive brown.	ML	
16	Spin						Advance HW drill casing to 20 ft.		
17	Spin								
18	Spin								
19	Spin								
20	Spin								

Relative Density	Consistency	Notes
0 to 4 - Very Loose	0 to 2 - Very Soft	1. S denotes split-barrel sampler.
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.
		12. R denotes core run number.

REMARKS:
1) Sample description based on laboratory test data and ASTM D2487. Refer to Test Report No. 6, prepared by GeoTesing Express, dated December 23, 1999.
2) Strata break changed from 7 ft. (shown on the field log) to 4 ft. based on the laboratory test data.
3) Fractured rock/gravel noted in top of recovered sample; therefore, N-value may be biased high.
4) Button bit cuttings samples obtained utilizing an 8 in. diameter #100 U.S. sieve.

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New Bedford, Massachusetts

BORING NO. FD - 18
SHEET 2 of 7
FILE NO. 48138.07
CHKD. BY J. Trottier

Boring Co.	Atlantic Testing Laboratories, Limited	Boring Location	northing 2696322.5	easting 814282.0	
Driller	A. Carter	Mudline El.	-7.85	Datum	NGVD
Logged By	E. Thibodeau	Date Start	10/13/99	Date End	10/15/99

Sampler: 2-inch O.D. split-barrel sampler driven 24 inches with a 140 lb safety hammer free falling from a height of 30 inches.
Drill Rig: Acker AD2 truck mount
Drilling Method: 4-inch I.D. (HW) flush-joint 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-3	24/20	20-22	6-6-6-8	12	Sandy silt (ML); stiff, 55% silt/clay, 45% fine sand, olive brown.	ML	
21	Spin						Advance HW drill casing to 25 ft.		
22	Spin								
23	Spin								
24	Spin								
25	Spin								
		S-4	24/16	25-27	6-6-8-10	14	Silt with sand (ML); stiff, 75% silt/clay, 25% fine sand, olive brown.	ML	
26	Spin						Advance HW drill casing to 30 ft.		
27	Spin								
28	Spin								
29	Spin								
30	Spin								
		S-5	24/20	30-32	7-16-12-16	28	Sandy lean clay (CL); very stiff, 65% clay/silt, 35% fine sand, olive brown.	CL	
31	Spin						Approximately 1 in. thick medium to fine sand seam noted in sample, reddish-brown. Traces of black also noted in sample.		
32	Spin						Advance HW drill casing to 35 ft.		
33	Spin								
34	Spin						Change in drilling resistance at approximately 33 ft.		
35	Spin								
		S-6	24/6	35-37	22-13-8-10	21	Silty sand with gravel (SM): medium dense, 30% fine sand, 20% medium sand, 10% coarse sand, 20% gravel, 20% silt, brown.	SM	3
36	Spin						Advance HW drill casing to 37 ft.		
37	Spin								
		S-7	24/10	37-39	21-13-14-20	27	Lean clay with sand (CL); very stiff, 85% clay/silt, 15% fine sand, olive brown.	CL	
38	Spin						Approximate 1/4 in. thick medium to fine sand seam noted in bottom of sample, brown.		
39	Spin						Advance HW drill casing to 40 ft.		
40	Spin								

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:
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2) Strata break changed from 7 ft. (shown on the field log) to 4 ft. based on the laboratory test data.
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BORING NO. FD - 18
SHEET 3 of 7
FILE NO. 48138.07
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Boring Co. Atlantic Testing Laboratories, Limited
Driller A. Carter
Logged By E. Thibodeau

Boring Location northing 2696322.5 easting 814282.0
Mudline El. -7.85 Datum NGVD
Date Start 10/13/99 Date End 10/15/99

Sampler: 2-inch O.D. split-barrel sampler driven 24 inches with a 140 lb safety hammer free falling from a height of 30 inches.
Drill Rig: Acker AD2 truck mount
Drilling Method: 4-inch I.D. (HW) flush-joint 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-8	24/8	40-42	19-24-27-15	51	Poorly graded sand with silt and gravel (SP-SM); very dense, 40% fine sand, 20%	SP-SM	
41	Spin						medium sand, 5% coarse sand, 25% gravel, 10% silt, brown.		
							Advance HW drill casing to 45 ft.		
42	Spin						Very difficult drilling at 44 ft.		
43	Spin								
44	Spin								
45	Spin								
		S-9	24/0	45-47	59-16-12-15	28	No recovery.		
46	Spin						Advance HW drill casing to 47 ft.		
47	Spin								
		S-10	24/6	47-49	27-12-20-16	32	Poorly graded sand with silt and gravel (SP-SM); dense, 40% fine sand, 15% medium	SP-SM	3
48	Spin						sand, 10% coarse sand, 25% gravel, 10% silt, brown.		
							Advance HW drill casing to 50 ft.		
49	Spin								
50	Spin								
		S-11	24/2	50-52	19-11-11-15	22	Poor recovery. Piece of fractured rock lodged in tip of sampler. Possible		
51	Spin						weathered/fractured bedrock.		
							Advance HW drill casing to 52 ft.	POSSIBLE BEDROCK	
52	Spin								
		S-12	24/0	52-54	16-30-30-29	60	Poor recovery. Fractured rock. Possible weathered/fractured bedrock.		
53	Spin						Advance 3-7/8 in. button bit from 52 to 54 ft. (open hole)		
							Button bit cuttings preserved in three sample jars. Cuttings appear to be bedrock.		4
54	Spin								
		S-13	2/1	54-54.2	75/2"	—	Fractured bedrock. Appears to be less weathered/more competent than samples		
							obtained in S-11 and S-12.		
							Advance HW drill casing to 54.7 ft. for coring. (spin)		
							Fill casing with water to check casing seal; water level dropped slowly.		
							Begin HV rock core at 54.2 ft.		
							(boring log continued on next page)		

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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REMARKS:
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BORING NO. FD - 18
SHEET 4 of 7
FILE NO. 48138.07
CHKD. BY J. Trottier

Boring Co.	Atlantic Testing Laboratories, Limited	Boring Location	northing 2696322.5	easting 814282.0	
Driller	A. Carter	Mudline El.	-7.85	Datum	NGVD
Logged By	E. Thibodeau	Date Start	10/13/99	Date End	10/15/99

Sampler: 2-inch O.D. split-barrel sampler driven 24 inches with a 140 lb safety hammer free falling from a height of 30 inches.
Drill Rig: Acker AD2 truck mount
Drilling Method: 4-inch I.D. (HW) flush-joint 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
54.5		R1	54.2 - 55.2	4 mins.	Begin R1 at 54.2 ft. (3rd gear) Water return color: milky white. Fresh to slightly weathered, moderately hard, gray, fine grained GNEISS. Appears to be high angle to vertical foliation. REC = 83%; RQD = 70% (fair) 54.2 to 54.3 ft: fractured piece of bedrock. Slightly discolored and weathered. 54.9 to 55.7 ft: core barrel dropped. Probable void. Recovered a few pieces of fractured bedrock and what appears to be fine gravel. Probably soil filled.	
55.0						
55.5			55.2 - 56.2	1.5 mins.	55.7 ft: change in foliation from high angle/vertical to low angle; approximately 10 degrees. 55.7 ft: water return color: light brown. Water return still possible after coring through void.	
56.0					56.2 ft: water return color: milky white.	
56.5			56.2 - 57.2	3.5 mins.	56.3 ft: mechanical break in rock core.	
57.0					57.2, 57.3, 57.4, and 57.5 ft: Primary joints: low angle, extremely close to moderately spaced, rough, planar, discolored, and partly open.	
57.5			57.2 - 58.2	4 mins.		
58.0					58.7 ft: Primary joint: low angle, extremely close to moderately spaced , rough, planar, discolored, and tight.	
58.5			58.2 - 59.2	5 mins.	58.9 ft: Primary joint: low angle, extremely close to moderately spaced, smooth, planar, discolored, and open. Sound corehole after completion of core run; approximately 4 ft. of material in corehole. Attempt split-barrel sample. Drive sampler from 56 to 59 ft. REC = 24 in. S-14A: Mostly core bit cuttings; piece of fractured bedrock noted. (top) S-14B: Mixture of medium to fine sand and gravel; could be void material. Advance HW drill casing from 54.7 to 56.2 ft. to seal off void. End R1 at 59.2 ft.	
59.0						

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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.
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REMARKS:
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BORING NO. FD - 18
SHEET 5 of 7
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Boring Co.	Atlantic Testing Laboratories, Limited	Boring Location	northing 2696322.5	easting 814282.0	
Driller	A. Carter	Mudline El.	-7.85	Datum	NGVD
Logged By	E. Thibodeau	Date Start	10/13/99	Date End	10/15/99

Sampler: 2-inch O.D. split-barrel sampler driven 24 inches with a 140 lb safety hammer free falling from a height of 30 inches.
Drill Rig: Acker AD2 truck mount
Drilling Method: 4-inch I.D. (HW) flush-joint 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
59.5		R2	59.2 - 60.2	5 mins.	Advance 3 7/8 in. button bit from 56 to 59.2 ft to remove cuttings. Fill casing with water to check casing seal; water level dropped slowly. Begin R2 at 59.2 ft. (3rd gear) Water return color: milky white. Fresh to weathered, hard to medium hard, gray, fine grained GNEISS. Low angle foliation; approximately 10 to 20 degrees. REC = 98%; RQD = 87% (good)	
60.0						
60.5			60.2 - 61.2	4.5 mins.	60.4 to 60.5 ft: Primary joint: low angle, extremely close to moderately spaced, rough, stepped, discolored, and partly open. 60.5 to 60.6 ft: Primary joint: low angle, extremely close to moderately spaced, rough, planar, discolored, and tight.	
61.0						
61.5			61.2 - 62.2	3 mins.	61.7 to 62.8 ft: weathered zone; discolored. 61.7 to 61.9 ft: Primary joints: low angle to horizontal, extremely close to moderately spaced, rough, planar, discolored, slightly decomposed, and partly open. Joints spaced approximately 0.1 to 0.3 in. apart. 62.1 ft: mechanical break in rock core.	
62.0						
62.5			62.2 - 63.2	3 mins.	62.3 ft: mechanical break in rock core. 62.5 ft: Primary joint: horizontal, extremely close to moderately spaced, rough, planar, discolored, and open. 62.6 to 62.8 ft: Primary joints: horizontal, extremely close to moderately spaced, rough, planar, discolored to slightly decomposed, and open. Decomposed to disintegrated (friable) zone noted from 62.6 to 62.7 ft. Traces of mud filling noted in this zone. 63.0 ft: water return color: light brown to milky white.	
63.0						
63.5			63.2 - 64.2	4 mins.	63.5 ft: Primary joint: low angle, extremely close to moderately spaced, smooth, planar, discolored, slightly decomposed, and partly open.	
64.0					64.0 ft: mechanical break in rock core. End R2 at 64.2 ft.	

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Logged By	E. Thibodeau	Date Start	10/13/99	Date End	10/15/99

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Drilling Method: 4-inch I.D. (HW) flush-joint casing; spin and wash.

Groundwater Readings Not Applicable for Offshore Borings

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DEPTH (feet)	VISUAL REPRESENTATION	CORE INFORMATION: CORE RUN	CORE INTERVAL	CORE TIME	ROCK CORE DESCRIPTION	REMKS
64.5		R3	64.2 - 65.2	5 mins.	Fill casing with water to check casing seal; water level dropped more rapidly. Begin R3 at 64.2 ft. (3rd gear) Water return color: light brown to milky white. Fresh, hard, gray, fine grained GNEISS. Low angle foliation; approximately 15 degrees. REC = 100%; RQD = 97% (excellent)	
65.0					65.1 ft: mechanical break in rock core.	
65.5			65.2 - 66.2	4 mins.		
66.0					66.1 ft: mechanical break in rock core.	
66.5			66.2 - 67.2	4 mins.	66.5 ft: Primary joint: low angle, extremely close to widely spaced, smooth, planar, slightly discolored, and open. Minor core grinding noted on fracture surface.	
67.0						
67.5			67.2 - 68.2	4.5 mins.		
68.0					67.7 ft: mechanical break in rock core.	
68.5			68.2 - 69.2	4.5 mins.	68.3 ft: Primary joint: low angle, extremely close to widely spaced, smooth, planar, slightly discolored, and open. Some core grinding noted on fracture surface.	
69.0					68.9 ft: mechanical break in rock core.	
					End R3 at 69.2 ft.	

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Boring Co.	Atlantic Testing Laboratories, Limited	Boring Location	northing 2696322.5	easting 814282.0	
Driller	A. Carter	Mudline El.	-7.85	Datum	NGVD
Logged By	E. Thibodeau	Date Start	10/13/99	Date End	10/15/99

Sampler: 2-inch O.D. split-barrel sampler driven 24 inches with a 140 lb safety hammer free falling from a height of 30 inches.
Drill Rig: Acker AD2 truck mount
Drilling Method: 4-inch I.D. (HW) flush-joint 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
69.5		R4	69.2 - 70.2	5.5 mins.	Begin R4 at 69.2 ft. (3rd gear) Water return color: milky white. Fresh, hard, gray, fine grained GNEISS. Low angle foliation; approximately 10 degrees. REC = 98%; RQD = 98% (excellent)	
70.0					70.1 ft: mechanical break in rock core.	
70.5			70.2 - 71.2	7.5 mins.		
71.0					70.9 ft: mechanical break in rock core. 71.2 ft: mechanical break in rock core.	
71.5			71.2 - 72.2	5.5 mins.		
72.0					72.1 ft: mechanical breaks in rock core.	
72.5			72.2 - 73.2	5.5 mins.		
73.0					72.8 to 72.9 ft: Quartz/feldspar inclusion; pink in color. 73.0 ft: mechanical break in rock core.	
73.5			73.2 - 74.2	4.5 mins.		
74.0					73.9 ft: mechanical break in rock core. Perform constant head permeability test from 56.2 to 74.2 ft. End R4 at 74.2 ft. Bottom of exploration at 74.2 ft.; boring terminated in bedrock. Grouted completed borehole with approximately 57 gallons of bentonite grout. (9.2 lbs/gal.)	

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) Sample description based on laboratory test data and ASTM D2487. Refer to Test Report No. 6, prepared by GeoTesing Express, dated December 23, 1999.
2) Strata break changed from 7 ft. (shown on the field log) to 4 ft. based on the laboratory test data.
3) Fractured rock/gravel noted in top of recovered sample; therefore, N-value may be biased high.
4) Button bit cuttings samples obtained utilizing an 8 in. diameter #100 U.S. sieve.