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-102
SHEET 1 of 12
FILE NO. 48138.27
CHKD. BY S. Bonis

Boring Co.	Warren George, Inc.	Boring Location	northing 2697476 easting 814636
Driller	S. Laurenza	Mudline El.	-15.11 Datum NGVD
Logged By	A. Juneau	Date Start	11/30/2000 Date End 12/8/2000

Sampler: 2-inch O.D. split-barrel sampler driven 24 inches with a 140 lb. center hole hammer free falling from a height of 30 inches.
Drill Rig: Failing 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)	SAMPLE INFORMATION Type & No.	PEN/REC (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	SPT N-Value	SAMPLE DESCRIPTION (ASTM D2488)	STRATUM DESCRIPTION	REMKS
1	WOC								
2	WOC								
		UO-1	24/24	2-4	————	—	Sandy organic soil (OH); 60% organic clay/silt, 10% medium sand, 30% fine sand, organic odor, dark gray.	ORGANIC CLAY	
3	WOC								
4	WOC								
5	WOC							5.0 ft.	
		UO-2	24/24	5-7	————	—	Clayey sand (SC); 45% organic clay/silt, 20% medium sand, 25% fine sand, 10% coarse sand, organic odor, dark gray.	CLAYEY SAND	
6	WOC								
7	WOC								
8	WOC								
		UO-3	12/11	8-9	————	—	Similar to UO-2, except light gray to black. Osterberg sampler did not fully extend due to density of soils.		
9	WOC								
		S-1	24/11	9-11	26-12-12-14	24	S-1A: Clayey sand (SC); very stiff, 10% coarse sand, 20% medium sand, 25% fine sand, 45% organic clay/silt, organic odor, dark gray. (3 in.)	9.5 ft.	
10	44						S-1B: Poorly graded sand (SP); medium dense, 10% medium sand, 85% fine sand, 5% silt, olive brown. (8 in.)	MARINE SAND	

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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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11	42								
							Perform falling head permeability test at 11.5 ft.		
		S-2	24/14	11.5-13.5	5-3-4-15	7	S-2A: Poorly graded sand (SP); loose, 10% medium sand, 85% fine sand,		
12	NR						5% silt, light gray. (9 in.)		
							S-2B: Poorly graded sand with gravel (SP); loose, 40% coarse sand, 30% medium sand,		
							25% gravel, 5% fine sand, shells, angular to subangular sand and gravel, dark		
							olive-gray. (5 in.)		
13	39						Advance PW drill casing to 13.5 ft.		
							Mix bentonite drilling mud, specific gravity = 1.07.		
	47						Advance 4-7/8 in. roller bit to 13.5 ft.		
		S-3	24/15	13.5-15.5	9-4-5-5	9	S-3A: Silty sand (SM); loose, 80% fine sand, 5% medium sand, 15% silt,		
14							organic odor. (4 in.)		
							S-3B: Silty sand (SM); 50% fine sand, 1% medium sand, 49% silt, gray.		1
	45						(11 in.)		
15								MARINE	
							Advance PW drill casing to 15.5 ft.	SAND	
	42						Advance 4-7/8 in. roller bit to 15.5 ft.		
		S-4	24/17	15.5-17.5	6-3-4-2	7	Similar to S-3B, except olive gray. 1/16 in. seams of silt noted.		
16							Advance PW drill casing to 17.5 ft.		
							Advance 4-7/8 in. roller bit to 17.5 ft.		
	38								
17									
	36								
		S-5	24/20	17.5-19.5	8-5-5-4	10	**Silt with sand (ML); 28% fine sand, 72% silt, gray.**		1
18							1/16 to 1/4 in. seams of silt noted.		
							Advance PW drill casing to 20 ft.		
							Advance 4-7/8 in. roller bit to 20 ft.		
19	20								
20	21							20.0 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.
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		S-6	24/18	20-22	5-1-1-7	2	**S-6A: Silty clay (CL-ML); 10% fine sand, 1% medium sand, 89% silt/clay, grayish brown.**		1
							Fine sand lenses (1/16 in.), high plasticity. (14 in.)	MARINE	
21	21						S-6B: Silty sand (SM); very loose, 55% fine sand, 30% silt, 15% clay, yellow brown.	SAND	
							Slight to moderate plasticity. (4 in.)		
22	24								
		S-7	24/13	22-24	11-13-12-12	25	**S-7A: Silt with sand (ML); 27% fine sand, 2% medium sand, 71% silt, grayish brown.** (8 in.)		1
							S-7B: Poorly graded sand with gravel (SP); medium dense, 5% coarse sand,		
23	41						40% medium sand, 40% fine sand, 15% gravel, subangular to round gravel,	23.0 ft.	
							subangular to subround sand, oxidized 2 in. horizon at soil interface. (5 in.)		
24	45								
								GLACIO	
								FLUVIAL	
25	44						Perform falling head permeability test at 25 ft.		
		S-8	24/11	25-27	26-36-38-28	74	S-8A: Silty sand (SM); very dense, 75% fine sand, 25% silt, yellow brown. (4 in.)		
							S-8B: Well-graded gravel with sand (GW); 10% coarse sand, 13% medium sand, 9% fine sand, 66% gravel, 2% silt, yellowish-brown. (7 in.)		1
26	50						Advance PW drill casing to 30 ft.		
							Advance 3-7/8 in. roller bit to 30 ft.		
27	41								
28	34								
29	26								
30	13								

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		S-9	24/6	30-32	11-9-15-7	24	Well-graded sand (SW); medium dense, 25% coarse sand, 35% medium sand,		
							30% fine sand, 5% gravel, 5% silt, subangular to subround sand and gravel,		
							yellow brown.		
31	NR						Advance PW drill casing to 35 ft.		
							Advance 3-7/8 in. roller bit to 35 ft.		
32	26								
33	35								
34	30								
35	35							GLACIO	
		S-10	24/7	35-37	6-7-24-35	31	**S-10A: Silt (ML); 4% fine sand, 1% medium sand, 95% silt, light brown.** (2 in.)	FLUVIAL	1
							S-10B: Silty sand (SM); 85% fine sand, 15% silt, yellow orange iron stained. (3 in.)		
							S-10C: Poorly graded sand (SP); 60% fine sand, 25% medium sand, 5% coarse sand,		
36	11						5% gravel, 5% silt, subround to angular sand and gravel, yellow brown. (2 in.)		
							Advance PW drill casing to 40 ft.		
							Advance 3-7/8 in. roller bit to 40 ft.		
37	17								
38	71								
39	61								
40	42						Perform falling head permeability test at 40 ft.		

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		S-11	24/12	40-42	24-54-39-11	93*	**Poorly graded gravel with silt and sand (GP-GM); 13% fine sand,**		1,2
							17% medium sand, 11% coarse sand, 50% gravel, 9% silt, brown.		
							Coarse (1-1/2 to 2 in.) angular to subrounded gravel.		
41	12						Obstruction passed at 41.3 ft. during sampling.		
							Advance PW drill casing to 45 ft.		
							Advance 3-7/8 in. roller bit to 45 ft.		
42	67								
43	104								
44	88								
45	106							GLACIO	
		S-12	24/2	45-47	28-11-9-8	21	Washed sample. Sample consists predominantly of coarse wash (disturbed sample).	FLUVIAL	
							Sample anticipated to be similar to S-11 (ball check clogged in spoon).		
							Advance PW drill casing to 50 ft.		
46	60						Advance 3-7/8 in. roller bit to 50 ft.		
47	60								
48	66								
49	112								
50	242								

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		S-13	24/14	50-52	32-36-35-24	71	Poorly graded sand with gravel (SP); very dense, 60% medium sand, 25% fine sand,	GLACIO	
							15% gravel, angular to subangular sand, subrounded to subangular gravel, light olive	FLUVIAL	
							brown.		
51	122						Advance PW drill casing to 53.2 ft.		
52	132								
53	152							53.2 ft.	
	232/						Top of bedrock at 53.2 ft.		
	3"						Advance 3-7/8 in. roller bit to 54.2 ft.	BEDROCK	
							Telescope HW casing to 54.2 ft.		
54							Begin HQ rock core at 54.2 ft.		
							(boring log continued on next page)		
55									
56									
57									
58									
59									
60									

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DEPTH (feet)	VISUAL REPRESENTATION	CORE INFORMATION: CORE RUN	CORE INTERVAL	CORE TIME	ROCK CORE DESCRIPTION	REMKS
		R1	54.2-55.2	30.5 min.	Begin R1 at 54.2 ft.	
54.5					Fresh, very hard, gray, fine to medium grained GNEISS. No natural joints/fractures observed in recovered pieces, semi-planar, low angle biotite foliation (approx. 15 to 25 degrees), no discontinuities or weathered zones observed in recovered pieces of core.	
					REC = 70%; RQD =70%	
55.0					Water return color: milky white. Drive head pressure not used during first foot of core run R1 (54.2 - 55.2 ft.). No recovery obtained during core run R1 and first overcore of R1, three consecutive overcores of R1	
			55.2-56.2	13.8 min.	yielded recoveries of 14, 12 and 16 in., respectively; with a total recovery of 42 in. Core recovery and RQD for core run R1 low due to core grinding during numerous overcores.	
55.5					Rock integrity is estimated to be similar to R2. RQD based upon Geologist interpretation of rock core and total recovery of 70%.	
56.0						
			56.2-57.2	12.25 min.		
56.5						
57.0						
			57.2-58.2	18.25 min.		
57.5						
58.0						
			58.2-59.2	16 min.		
58.5						
59.0					End R1 at 59.2 ft.	

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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	59.2-60.2	10 min.	Begin R2 at 59.2 ft. Fresh, very hard, pinkish gray, fine to medium grained GNEISS. No natural joints/fractures observed semi-planar, low angle biotite foliation (approx. 15 degrees), no discontinuities or weathered zones observed. R2 included 2.4 ft. of overcore from R1. REC = 100%; RQD =100% Water return color: milky white to light gray.	
59.5						
60.0						
			60.2-61.2	9.5 min.		
60.5						
61.0					60.8 ft.: Mechanical break in rock core, no noticeable core grinding observed.	
			61.2-62.3	10.4 min.	61.3 ft.: Mechanical break in rock core, no noticeable core grinding observed.	
61.5						
62.0						
		R3	62.2-63.2	11.2 min.	End R2 at 62.2 ft. Begin R3 at 62.2 ft. Fresh, very hard, pinkish gray, fine to medium grained GNEISS. No natural joints/fractures observed semi-planar, low angle biotite foliation (approx. 10 to15 degrees), no discontinuities or weathered zones observed. REC = 100%; RQD =100% Water return color: milky white.	
62.5						
63.0						
			63.2-64.2	11.5 min.	63.0 ft.: Mechanical break in rock core, no core grinding noted. 63.1 ft.: Mechanical break in rock core along biotite foliation, no core grinding noted.	
63.5						
					63.5 ft.: Mechanical break in rock core, no core grinding noted.	
64.0						

GRANULAR SOILS (N-Values)	COHESIVE SOILS (N-Values)	SYMBOL 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.

REMARKS:
1) Sample description based on laboratory classification. Refer to GeoTesting Express Report dated March 5, 2001. Laboratory description presented in bold.
2) *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.
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-102
SHEET 9 of 12
FILE NO. 48138.27
CHKD. BY S. Bonis

Boring Co.	Warren George, Inc.	Boring Location	northing 2697476	easting 814636	
Driller	S. Laurenza	Mudline El.	-15.11	Datum	NGVD
Logged By	A. Juneau	Date Start	11/30/2000	Date End	12/8/2000

Sampler: 2-inch O.D. split-barrel sampler driven 24 inches with a 140 lb. center hole hammer free falling from a height of 30 inches.
Drill Rig: Failing 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 (feet)	VISUAL REPRESENTATION	CORE INFORMATION: CORE RUN	CORE INTERVAL	CORE TIME	ROCK CORE DESCRIPTION	REMKS
			64.2-65.2	12.5 min.		
64.5						
65.0						
			65.2-66.2	10.7 min.		
65.5					65.4 ft.: High angle mechanical break in rock core, no noticeable core grinding noted.	
66.0						
			66.2-67.1	8.7 min.		
66.5						
					66.7 ft.: Mechanical break in rock core, no noticeable grinding noted.	
67.0					66.9 ft.: Mechanical break in rock core, no noticeable grinding noted.	
		R4	67.1-68.1	8.8 min.	End R3 at 67.1 ft. Begin R4 at 67.1 ft. Fresh, very hard, gray, fine to medium grained GNEISS,	
67.5					semi-planar, low angle biotite and feldspar foliation (approx. 15 degrees), possible minor, low angle (approx. 15 degrees) rough joint along orthoclase vein with no visible spacing and only slight discoloration (weathering), very tight.	
68.0					REC = 92%; RQD = 92%	
			68.1-69.1	7.3 min.		
68.5						
69.0						

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

BORING NO. FD-102
SHEET 10 of 12
FILE NO. 48138.27
CHKD. BY S. Bonis

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Driller	S. Laurenza	Mudline El.	-15.11	Datum	NGVD
Logged By	A. Juneau	Date Start	11/30/2000	Date End	12/8/2000

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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
69.5			69.1-70.1	6.5 min.		
70.0					69.9 ft.: Mechanical break in rock core, no noticeable grinding noted.	
70.5			70.1-71.1	6.3 min.		
71.0						
71.5			71.1-72.1	11.5 min.		
72.0						
72.5					End R4 at 72.1 ft. Bottom of exploration at 72.1 ft. Boring terminated in bedrock.	
73.0						
73.5						
74.0						

GRANULAR SOILS (N-Values)	COHESIVE SOILS (N-Values)	SYMBOL KEY	
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