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NEW BEDFORD HARBOR DEVELOPMENT COMMISSION
STATE ENHANCED REMEDY
TASK NO. 1

WORK PLAN
Rev.2

FOR

NEW BEDFORD HARBOR DREDGE – PHASE II
NORTH TERMINAL MAINTENANCE DREDGE

New Bedford, Massachusetts

December 2004

Prepared for

The New Bedford Harbor Development Commission
New Bedford, Massachusetts

SDMS DocID 517961

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ABBREVIATIONS AND ACRONYMS

APEX	Apex Environmental, Inc
ARAR's	Applicable, Relevant and Appropriate Regulations
CAD	Confined Aqueous Disposal
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cy	cubic yards
CZM	The Office of Coastal Zone Management
DMMP	Dredged Material Management Plan
EFHA	Essential Fish Habitat Assessment
ESA	Endangered Species Act
ESD	Explanation of Significant Differences
HASP	Health and Safety Plan
HTRW	Hazardous, Toxic, Radioactive Waste
iscy	in situ cubic yards
MADEP	Massachusetts Department of Environmental Protection
MADMF	Massachusetts Division of Marine Fisheries
MA EOEA	Massachusetts Executive Office of Environmental Affairs
MLLW	mean lower low water
MOA	Memorandum of Agreement
NBH	New Bedford Harbor
NBHDC	New Bedford Harbor Development Commission
NBRA	New Bedford Redevelopment Authority
NCP	National Contingency Plan
NGVD	National Geodetic Vertical Datum
NHESP	Natural Heritage and Endangered Species Program
NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration
NPL	National Priorities List
O&MP	Operations and Maintenance Plan
OU	Operable Unit
PCB	polychlorinated biphenyls
ppm	parts per million
QA	Quality Assurance
QA/QCP	Quality Assurance/Quality Control Plan
QC	Quality Control
RFQ	Request for Qualifications
ROD	Record of Decision
SAP	Sampling and Analysis Plan
SER	State-Enhanced Remedy
TSCA	Toxic Substance Control Act
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency

1.0 GENERAL INFORMATION

1.1 Introduction

The New Bedford Harbor Development Commission (NBHDC) and its consultant, Apex Environmental, Inc. (Apex) has prepared this Work Plan for the dredging, transport and disposal of contaminated and non-contaminated sediments from the New Bedford Harbor Dredge – Phase II (North Terminal dredge areas) as well as the construction of confined aqueous disposal (CAD) cells in the harbor. This work is to be performed as Task 1 under the State Enhanced Remedy (SER). See Section 2.0 for a description of the SER. See Figure 1-1 for Site Locus Map showing site layout, locations of the New Bedford Harbor Dredge – Phase II dredge areas and proposed CAD cell(s).

The New Bedford/Fairhaven Harbor Plan, approved by the Secretary of the Massachusetts Executive Office of Environmental Affairs (EOEA) on September 24, 2002, represents the City of New Bedford's and Town of Fairhaven's joint harbor maintenance and future development plans. The work scope for this project (Task 1) represents one of the high-priority areas requiring dredging under the Harbor Plan. The North Terminal pier and terminal facilities are critical to the future of commerce in New Bedford Harbor, and dredging of these areas represents the next step in implementing the Harbor Plan.

As indicated by the New Bedford Redevelopment Authority (NBRA) and the NBHDC, the proposed dredge areas are located adjacent to the Maritime Terminal, White's Pier, Norpel Terminal/Fish Island and a portion of the New Bedford Harbor Channel south of the Route 6 swing bridge. The New Bedford Harbor Dredge - Phase II (Task 1) will be conducted in harbor areas within and adjacent to New Bedford's existing marine facilities. Task 1 includes the disposal of contaminated sediments into two CAD cells. Additional Tasks may be added to the Phase II work, including the dredging to start a future CAD cell from the DMMP and dredging certain areas on the Fairhaven side of the Harbor. Several of the Fairhaven areas have been identified as priority dredging sites. This Work Plan will be amended to incorporate any new Tasks. Any other dredging projects, such as the Dredged Material Management Plan (DMMP) additional CAD cell construction, will be a separate phase of work and covered under different Work Plans. Previously completed and proposed dredging projects for New Bedford and Fairhaven are as follows:

New Bedford State Pier Dredge Project – Phase I (completed 2002)

New Bedford Harbor Dredge – Phase II: New Bedford and Fairhaven Facilities
- Task 1: New Bedford North Terminal Dredge Areas and CAD Construction
- Task 2: Fairhaven Facilities Dredging and Any Additional Areas

New Bedford/Fairhaven Harbor Dredge – Phase III: DMMP Additional CAD cell construction

1.2 Project Purpose and Summary

The intent of the dredging is to restore the channel to design depth and provide increased and enhanced berthing opportunities (berths will now have correct depths) to the North Terminal areas in order to accommodate deep-draft cargo vessels during all tidal situations. To that end, the New Bedford Harbor Dredge – Phase II (Task 1) Work Plan calls for deepening of the following areas:

- Portions of the area adjacent to White's Terminal (White's Terminal Dredge Area);
- Portions of the area adjacent to Maritime Terminal (Maritime Terminal Dredge Area);
- Portions of the area on the north side of Fish Island (Fish Island Dredge Area);

- Portions of the channel south of the Route 6 swing bridge (Rt. 6 Bridge South Dredge Area); and
- Placement of the dredged sediments into CAD cell(s) designed and constructed for that purpose in an area to the north of the Route 6 swing bridge (Transitional CAD cell(s)).

In order to achieve the above-noted activities, the following work scope items will be completed as part of Task 1 under the SER:

- Perform pre-design investigations.
- Design of the New Bedford Harbor Dredge – Phase II (Task 1) dredge areas.
- Prepare and submit a Work Plan, Construction Schedule, Sampling and Analysis Plan (SAP), Health and Safety Plan (HASP), Dredge Quality Assurance/Quality Control Plan (QA/QCP), Design Documents and Operations and Maintenance Plan (O&MP).
- Dredge approximately 120,000 in-situ cubic yards (iscy) from within areas indicated on Figure 1-2 for CAD cell(s) construction.
- Management, disposal and storage of dredged sediments during CAD cell construction (including securing any necessary permits for offsite disposal).
- Dredge approximately 50,000 iscy from within areas indicated on Figure 1-3 for the New Bedford Harbor Dredge – Phase II. (Task 1)
- Transport dredged material to either the CAD cell location(s) or to other disposal/storage facilities as required.
- If required, process dredge materials for disposal.
- Perform operation and maintenance (O&M) of the CAD cell(s).

Figures 1-2 and 1-3 show the locations of the New Bedford Harbor Dredge - Phase II (Task 1) Maintenance dredge (North Terminal Dredge) areas and the conceptual design for the proposed Transitional CAD cell(s) area.

All work associated with the New Bedford Harbor Dredge – Phase II (Task 1) and sediment transfer operations will be managed by the NBHDC. Work will be conducted under the SER as set forth in the Memorandum of Agreement (MOA) between the NBHDC and the Massachusetts Department of Environmental Protection (MADEP) and the MOA between the U.S. Environmental Protection Agency (EPA) and the MADEP. Section 2.0 provides further detail regarding the SER process.

The proposed Task 2 under the SER will incorporate dredging of sediment in the vicinity of harbor front facilities in Fairhaven. Details for this Task will be developed as the overall program moves forward. An amendment to this Work Plan will be prepared to incorporate the Fairhaven dredging work at the appropriate time. The priority dredging of harbor front areas on the Fairhaven side of the Harbor is an integral part of the New Bedford/Fairhaven Harbor Plan and project details will be released as design specifications become available.

This Work Plan is divided into four sections. Section 1.0 provides an introduction and overview of the project, including a brief outline of the project's major work elements that affect the development of this Work Plan. Section 2.0 is a discussion of the SER approach and identification of the performance standards. Section 3.0 is the Scope of Work. Section 4.0 presents the Project Schedule for the referenced work.

Figure 1-1 Site Locus Map

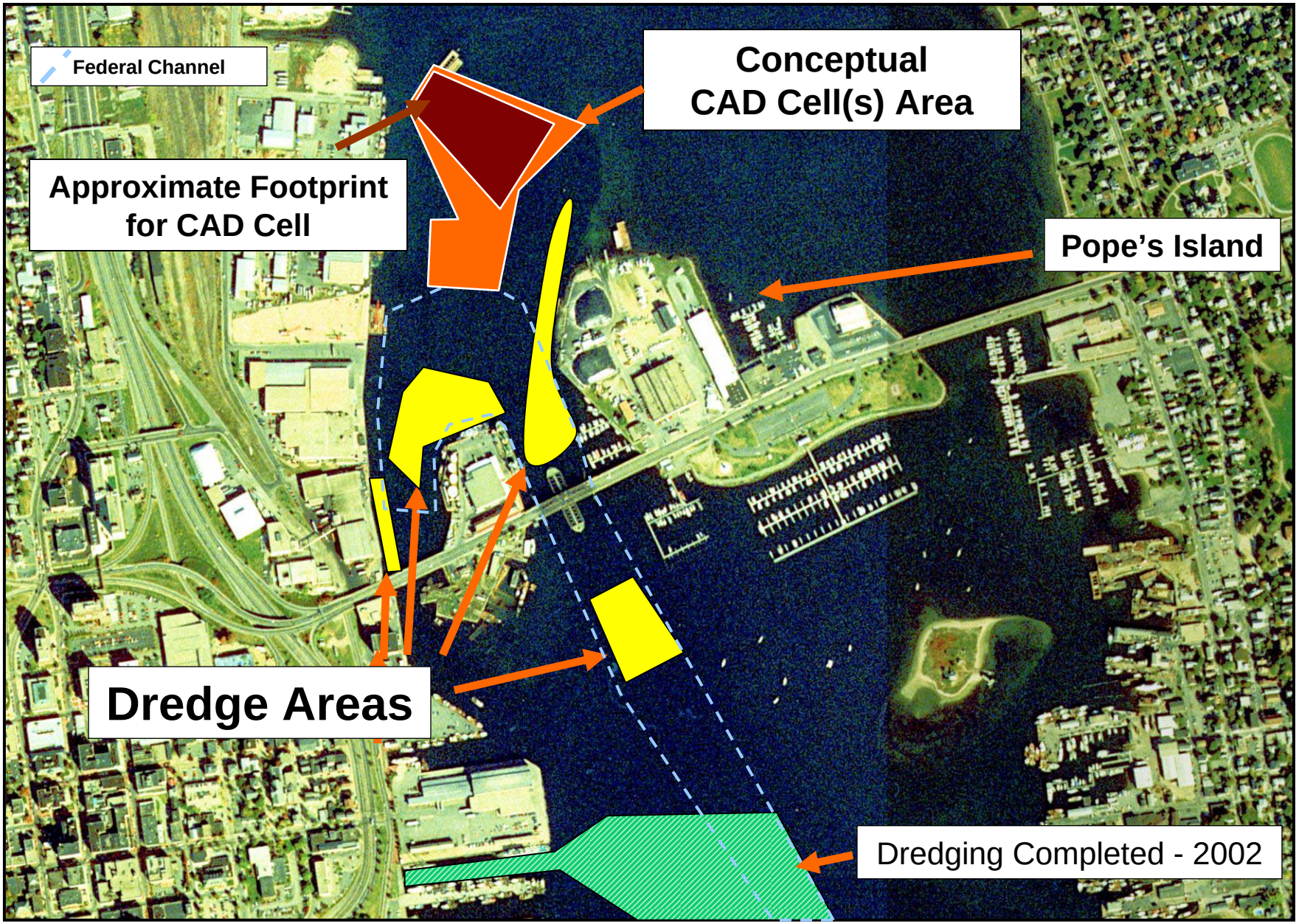


Figure 1-1: Site locus map for New Bedford Harbor Dredge – Phase II/North Terminal Dredge Areas. Yellow areas represent Phase II Navigational Dredging and red area represents conceptual transitional CAD cell(s) area.

This Work Scope is intended to present an outline of the project flow and process that will be undertaken in order to achieve the stated project goals. Project-specific design elements, field data collection, and construction activities will be determined and detailed in subsequent design documents as the project progresses.

1.3 Site Description and Background Information

The New Bedford Harbor Superfund Site consists of approximately: 1,000 acres of urban tidal estuary and shoreline areas along the Acushnet River Estuary and New Bedford Harbor; and approximately 17,000 acres in Buzzards Bay. From the 1940's until the mid 1970's, PCBs were discharged into the Estuary, Harbor, and Bay by direct discharges and the sewer system of the City of New Bedford. These discharges contaminated the sediments at levels ranging from a few part per million (ppm or mg/Kg) to over 200,000 mg/Kg PCBs. Other contaminants (such as heavy metals and PAHs) have also been discharged into the Site at various times since the 1800's. There are PCB contaminated wetland/salt marsh areas in the Estuary next to the shoreline of the Towns of Acushnet and Fairhaven. The current human health risks from the site are from direct contact with PCBs in the sediments, and ingestion of fish and shellfish.

In addition to the public health and environmental impacts, contamination of the harbor area has had tremendous economic impacts on the local communities. The commercial fishing industry has suffered due to the lack of ability to build new piers, inability to upgrade infrastructure, and contamination of the sediments has made it difficult to conduct any maintenance dredging for navigational purposes. Lack of maintenance dredging has resulted in limiting the size of commercial ships that can enter the harbor, thus limiting its use as a regional port facility. Additionally, new regulations affecting fishing times has increased pressure on the infrastructure due to the increased frequency of boats in port and the number of hours that are spent in port.

The Superfund related dredging will remove contamination down to a level that no longer poses a risk to human health and the environment. This work is anticipated to cost up to $300 million and take more than 20 years to complete, depending on EPA's funding. Even with the Superfund dredging, the maintenance dredging would still have to be done and the problems with handling and disposal of large amounts of lightly contaminated sediments would remain.

Surveys of the New Bedford Harbor Channel area conducted by the NBHDC (supported by information contained on the U.S. Army Corps of Engineers [USACE] charts), have shown that portions of the harbor (areas adjacent to maritime Terminal, White's Terminal, Fish Island and a portion of the Federal Navigational Channel south of the Route 6 swing bridge) cannot safely accommodate large vessels including some cargo ships. These large vessels, typically vessels drawing between 27 – 28 feet, are regularly servicing New Bedford Harbor and the North Terminal areas (piers and wharfs). The NBHDC, in concert with the Northeast Pilots Association have indicated that in most areas 30 feet below mean low water (mlw) is the prescribed "safe" transit depth (with the exception of a few areas next to piers and wharfs that may be shallower depending on specific safe construction issues. Currently, there are several cargo vessels that routinely dock at these terminals that can only be partially loaded due to shallow conditions. As this situation poses a threat to deep-draft vessels as well as the environment, the NBRA and the NBHDC, in cooperation with the Northeast Pilots Association, have identified the need for dredging a portion of New Bedford Harbor.

Pre-design work completed to date (not under the SER) in the New Bedford Harbor Dredge – Phase II (Task 1) has included bathymetric surveys of the dredge and CAD cell(s) areas, soft sediment sampling and analysis for metals and PCB's, geotechnical borings, dredge and CAD cell footprint identification and rough volume calculations. Previous sediment sampling results in the New Bedford Harbor Dredge –

Phase II dredge areas have identified sediments with total PCB concentrations ranging from non-detect to +/- 80 ppm. See Figures 1-2 and 1-3 for previous sediment sampling locations. Table 1-1 provides a summary of sediment chemistry data from the New Bedford Harbor Dredge – Phase II dredge areas. Geotechnical boring logs from the New Bedford Harbor Dredge – Phase II dredge areas and CAD cell(s) area are presented in Attachment A.

Also, a Dredged Material Management Plan (DMMP). EOEA No. 11669 Final Environmental Impact Report (FEIR) was prepared for the Office of Coastal Zone Management (CMZ) and the Cities of New Bedford and Fairhaven, MA. This report was prepared by the Maguire Group Inc. in association with Apex Environmental, Inc, ASA, Inc., ENSR International and SAIC. The purpose of the FEIR was to provide a state designation of a disposal site in New Bedford/Fairhaven Harbor for dredged material determined to be unsuitable for open-water disposal due to contamination. The FEIR identifies the Popes Island North site (one of the areas to north of the Route 6 Bridge in New Bedford Harbor) as the preferred alternative disposal site, as well as the least environmentally damaging practicable alternative (LEDPA) under the Clean Water Act. The City of New Bedford has filed a Notice of Project Change for the DMMP with the Massachusetts Executive Office of Environmental Affairs (EOEA) in order to more clearly identify the proposed project CAD cells and the Borrow Pit CAD cell.

1.4 Summary of Scope of Work

The total approximate dredge volume is anticipated to be 120,000 in-situ cubic yards (iscy) for CAD cell(s) and 50,000 iscy for dredge areas. Mean lower low water (MLLW) is at Elevation –1.44 NGVD.

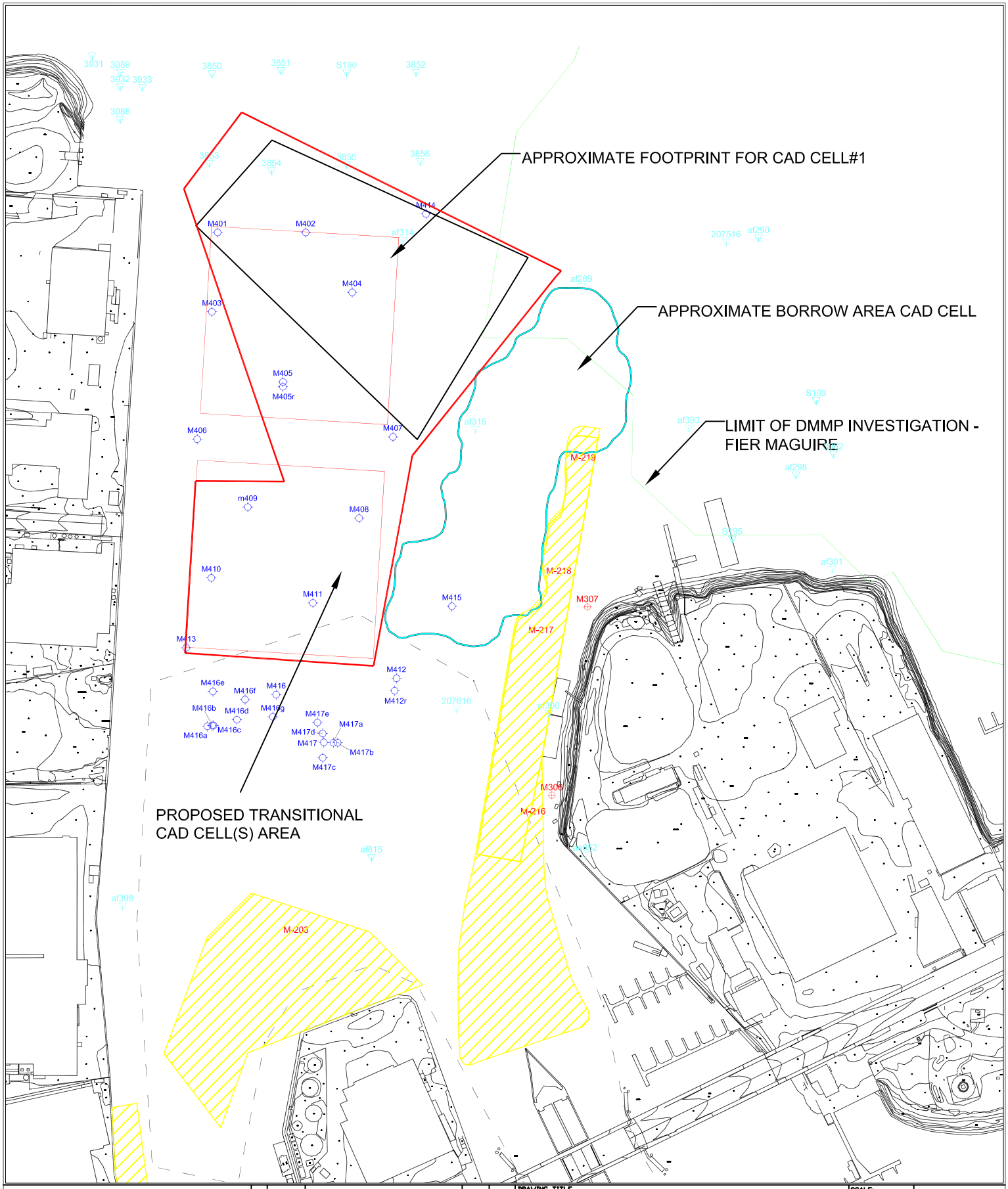
The contaminated sediments will be dredged into containers, such as scows or similar, and then transported from the dredge area to either the CAD cell or other storage or disposal areas (if necessary). The specific dredging means and methods will be determined during the engineering design phase. Dredging methods and engineering controls will be designed and implemented to minimize water quality impacts (i.e. use of environmental bucket when dredging contaminated upper sediments).

Prior to and concurrent with operations conducted by a Dredging Contractor, selected by the City, NBHDC and its agents will perform the following additional activities:

- Geotechnical investigations, sampling and analysis for CAD cell design, and characterization of clean material;
- Dredging engineering design;
- SER consultation with the MADEP Project Manager to ensure concurrence with the proposed approach;
- Management and oversight of dredging activities;
- Hydrographic Surveys including pre-dredge and post-dredge surveys;
- Water quality monitoring.

As currently anticipated, it is expected that the City of New Bedford will contract with a dredger to conduct the CAD cell dredging/construction, New Bedford Harbor Dredge – Phase II dredging, transport from dredge areas to CAD cell(s) or other disposal areas/facilities, material processing and placement/disposal in CAD cell and/or other facilities and capping of the CAD cell(s). The NBHDC will use a best-value approach in selecting a Dredging Contractor which will be based on contractor qualifications, approach, and rates (Quality-based selection).

Figure 1-2 Proposed CAD Cell Locations



LEGEND

- USACE SAMPLE LOCATIONS & PCB CONGENER CONCENTRATION
- ASBUILT SAMPLE LOCATIONS (Apex Env. April, 2003)
- FEDERAL CHANNEL LIMITS
- ASBUILT SAMPLE LOCATIONS (Apex Env. October, 2002)

REV	DATE	DESCRIPTION	BY	APP.
1	12/9	ENLARGED VEIW	TDM	JL

DRAWING TITLE: PROPOSED CAD CELL LOCATIONS

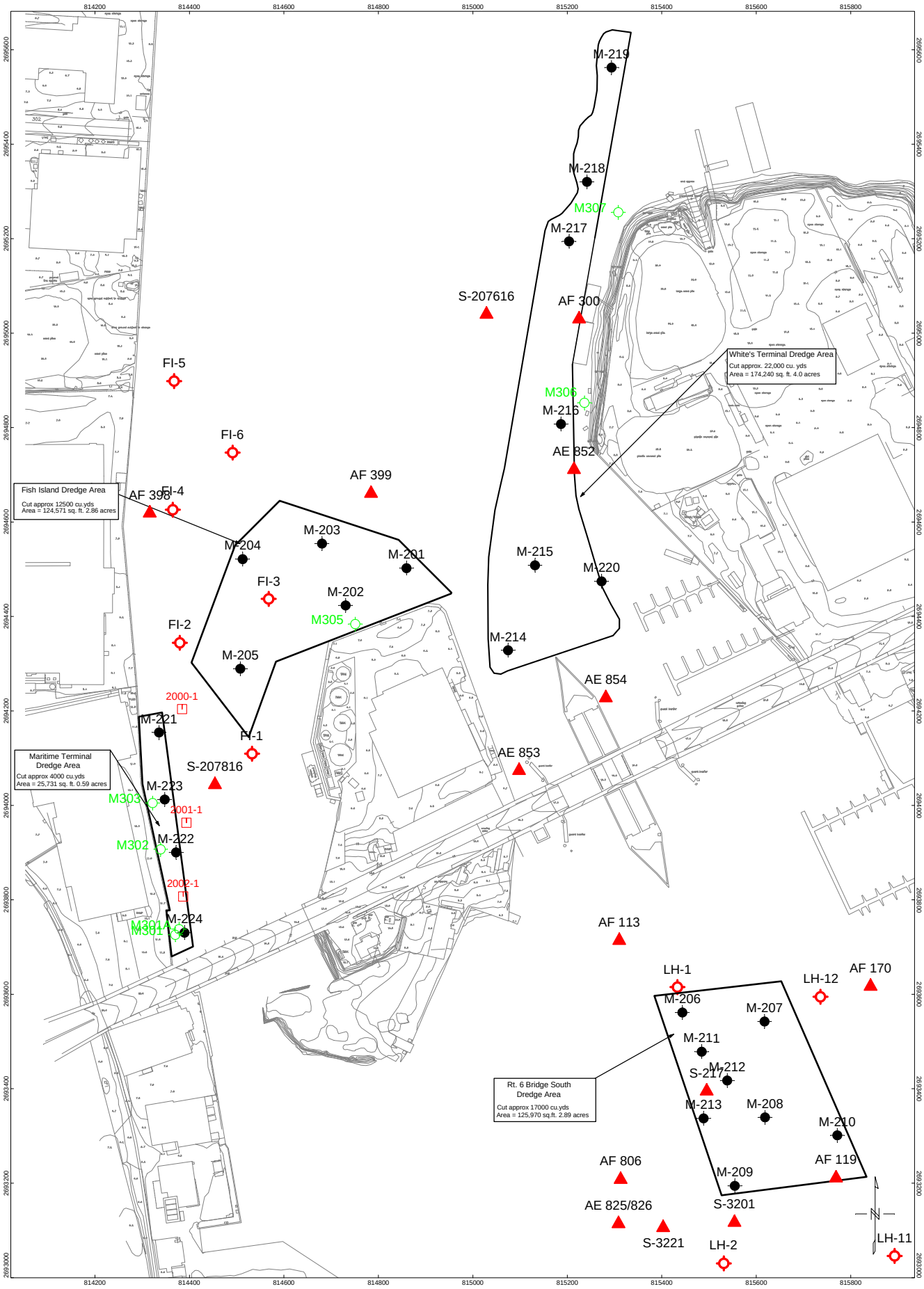
PROJECT: NEW BEDFORD HARBOR DREDGE - PHASE II

CLIENT: NEW BEDFORD HDC
NEW BEDFORD, MASSACHUSETTS

APEX ENVIRONMENTAL
374 CONGRESS ST
SUITE 508, BOSTON, MA
TEL: 617 728-0070
FAX: 617 728-0080

SCALE: AS SHOWN
DATE: 25 OCT 04
DRAWN BY: TDM
DESIGNED BY: KH
CHECKED BY: JB/KH
APPROVED BY: KH
SHEET NO. 1-2
PROJECT NO. 6545.002

Figure 1-3 Proposed New Bedford Harbor Dredge – Phase II Dredge Areas



LEGEND

- NORTH TERMINAL DREDGE PROJECT SAMPLE LOCATION
- SUPERFUND SAMPLE LOCATION
- DMMP SAMPLE LOCATION
- TEST BORING LOCATION NORTH TERMINAL DREDGE PROJECT

50 0 50 100 150 200 250 300
US Survey Feet

Figure 1-3: Existing Sampling Locations
Proposed Dredge Areas

New Bedford Harbor Dredge - Phase II/North Terminal Dredge Areas

New Bedford Harbor
Massachusetts
Harbor Development Commission

Apex Environmental, Inc.

Table 1-1 Summary of Sediment Chemistry Data

TABLE 1-1

NEW BEDFORD HARBOR DREDGE - PHASE II
Summary of Sediment Chemistry Data

Sample ID	Sample Interval (ft)	Total PCBs (ppm)	Metals (ppm)	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc	TPH (ppm)	EPH	PCB Arochlors(ppm)	Total PAH (ppm)**	Volatile Organics (ppb)***	Reactive Sulfide(ppm)	TPH Fingerprint	Pesticides	PAHs (ppb)	Napthalene	2-Methylnaphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene	Dibenzo(a,h)anthracene	Benzo(g,h,i)perylene	% moisture	Rx sulf	TOC 1	TOC 2
M201-1	0-1	35																																								
M201-2	1-2	29																																								
M201-3	2-3	1.3*																																								
M202-1	0-2	77																																								
M202-2	2-4	4.7*																																								
M203-1	0-1	27		13	4.9	360	750	260	0.8	40	2.5	540		910								U	U	U	U	U	U	U	1.7	2.2	U	U	U	U	U	U	U	U	66	25	3.3	3.4
M203-2	1-2	71		15	8.1	770	1600	370	1.2	66	2.9	740		1920								U	U	U	U	U	U	U	2.1	2.6	U	U	1.4	U	U	U	U	U	63	25	4.5	5.7
M203-3	2-3	52																																								
M203-4	3-4	0.5*																																								
M203-5	4-4.5	0.5*																																								
M204-1	0-1	32																																								
M204-2	1-2.5	59																																								
M204-3	2.5-3.5	0.5*																																								
M205-1	0-2	32																																								
M205-2	2-3	43																																								
M205-3	3-4	74																																								
M205-4	4-	43																																								
M206-1	0-1	18.72*																																								
M206-2	1-2	9.62*																																								
M206-3	2-3	0.5*																																								
M206-4	3-4	0.5*																																								
M206-5	4-5	0.5*																																								
M206-6	5-5.5	0.5*																																								
M207-1	0-1	6.73*																																								
M207-2	1-2	15.52*																																								
M207-3	2-3.2	66																																								
M207-4	3.2-4.2	0.5*																																								
M207-5	4.2-5.1	0.5*																																								
M207-6	5.1-6.1	0.5*																																								
M208-1	0-1	8.0*																																								
M208-2	1-2	37																																								
M208-3	2-3	61																																								
M208-4	3-5.4	2.5*																																								
M208-5	5.4-6	0.5*																																								
M209-1	0-1	0.5*																																								
M209-2	1-2	53																																								
M209-3	2-3	70																																								
M209-4	3-4	2.8*																																								
M209-5	4-4.8	0.5*																																								
M210-1	0-1	7.1*																																								
M210-2	1-2	44																																								
M210-3	2-3	81																																								
M210-4	3-4	49		14	2.6	270	900	290	2.3	31	2.4	500		1560								U	U	U	U	U	1.3	U	2.3	2.9	U	1.3	1.3	U	U	U	U	U	59	25	3.1	3.5
M211-1	0-1	41																																								
M211-2	1-2	54																																								
M211-3	2-3.2	0.5*																																								
M211-4	3.2-4.1	0.5*																																								
M211-5	4.1-5.1	0.5*																																								
M211-6	5.1-6.3	0.5*																																								
M211-7	6.3-	0.5*																																								

TABLE 1-1

NEW BEDFORD HARBOR DREDGE - PHASE II
Summary of Sediment Chemistry Data

Sample ID	Sample Interval (ft)	Total PCBs (ppm)	Metals (ppm)	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc	TPH (ppm)	EPH	PCB Arochlors(ppm)	Total PAH (ppm)**	Volatile Organics (ppb)***	Reactive Sulfide(ppm)	TPH Fingerprint	Pesticides	PAHs (ppb)	Napthalene	2-Methylnaphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene	Dibenzo(a,h)anthracene	Benzo(g,h,i)perylene	% moisture	Rx sulf	TOC 1	TOC 2
M212-1	0-1	41												1070								U	U	U	U	U	U	U	U	1.5	U	U	U	U	U	U	U	U				
M212-2	1-2	75																																								
M212-3	2-3	24																																								
M212-4	3-4	0.5*																																								
M212-5	4-4.8	0.5*																																								
M212-6	4.8-5.4	0.5*																																								
M212-7	5.4-6	0.5*																																								
M212-8	6-7	0.5*																																								
M213-1	0-1	7.6*																																								
M213-2	1-2	41																																								
M213-3	3-4	7.5*																																								
M213-4	4-4.7	5.2*																																								
M213-5	4.7-6.5	0.5*																																								
M214-1	0-1.3	3.2*																																								
M216-1	0-1	43		9.5	8.8	510	850	210	0.7	37	1.5	420		1200								U	U	U	U	U	U	U	1.1	1.6	U	U	U	U	U	U	U	U	51	25	4	3.9
M216-2	1-2.5	25		7.3	2.9	240	610	180	0.7	22	1.1	280		625								U	U	U	U	U	U	U	U	1.2	U	U	U	U	U	U	U	U	43	25	3.5	3.5
M216-3	2.5-3.3	0.5*																																								
M216-4	3.3-4.2	0.5*																																								
M217-1	0-1	9.2*																																								
M217-2	1-2	36																																								
M217-3	2-3	0.9*																																								
M217-4	3-4.5	0.5*																																								
M217-5	4.5-6.9	0.5*																																								
M218-1	0-1	3.4*																																								
M218-2	1-2.2	0.57*																																								
M219-1	0-1	46																																								
M219-2	1-2	0.5*																																								
M219-3	2-3	1.3*																																								
M219-4	3-3.5	0.03*																																								
M220-1	0-1	6.4*																																								
M221-1	0-1	28																																								
M221-2	1-2.2	7.1*																																								
M222-1	0-1	24		14	5.4	360	740	310	0.9	39	2.3	630		1070								U	U	U	U	U	1.7	U	6.8	6.4	1.7	1.8	2	U	U	U	U	U	63	25	3.9	3.4
M222-2	1-2.6	39																																								
M222-3	2.6-3	5.17*																																								
M222-4	3-3.6	0.81*																																								
M223-1	0-1	23																																								
M223-2	1-2	63																																								
M223-3	2-3	68																																								
M223-4	3-4.5	1.30																																								
M223-5	4.5-5.5	0.5*																																								
M224-1	0-1	0.5*		7	0.4	51	35	32	0	21	1.5	73		U								U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	56	25	4	4.1
M-401-1	0 - 1	4.7*																																								
M 401-2	1 - 1.8	8.9*																																								
M402-1	0 - 1	4.4*																																								
M402-2	1 - 1.8	9.8*																																								
M402-3	1.8 - 3	1.7*																																								
M403-1	0 - 1	5.2*																																								
M403-2	1 - 1.9	8.1*																																								

TABLE 1-1

NEW BEDFORD HARBOR DREDGE - PHASE II
Summary of Sediment Chemistry Data

Sample ID	Sample Interval (ft)	Total PCBs (ppm)	Metals (ppm)	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc	TPH (ppm)	EPH	PCB Arochlors(ppm)	Total PAH (ppm)**	Volatile Organics (ppb)***	Reactive Sulfide(ppm)	TPH Fingerprint	Pesticides	PAHs (ppb)	Napthalene	2-Methylnaphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene	Dibenzo(a,h)anthracene	Benzo(g,h,i)perylene	% moisture	Rx sulf	TOC 1	TOC 2
M404-1	0 - 1	4.9*																																								
M404-2	1 - 2	3.8*																																								
M404-3	2 - 3	6.7*																																								
M404-4	3 - 4	0.46*																																								
M405-1	0 - 1.2	4.7*																																								
M406-1	0 - 1.4	4.1*																																								
M406-2	1.4 - 2.4	2.5*																																								
M407-1	0 - 1	4.8*																																								
M407-2	1 - 2	4.2*																																								
M407-3	2 - 2.9	6.1*																																								
M408-1	0 - 1	3.5*																																								
M408-2	1 - 2	6.2*																																								
M408-3	2 - 3	6.3*																																								
M409-1	0 - 1	4.5*																																								
M409-2	1 - 2	6.9*																																								
M410-1	0 - 1	4.4*																																								
M410-2	1 - 2	7.2*																																								
M410-3	2 - 3	5.5*																																								
M411-1	0 - 0.8	9.2*																																								
M411-2	0.8 - 1.6	0.71*																																								
M412-1	0 - 1	6.1*																																								
M412-2	1 - 2	0.55*																																								
M413-1	0 - 1	5*																																								
M413-2	1 - 2	7.9*																																								
M414-1	0 - 1	4.2*																																								
M414-2	1 - 2.3	4.4*																																								
M414-3	2.3 - 3.1	0.44*																																								
M415-1	0 - 1.5	6.1*																																								
M416-1	0 - 0.9	6.1*																																								
M417-1	0 - 1.3	5.9*																																								
2000-1	0 - 1'	13.96		10	3.4	230	520	190	0.5	29		410		1540		250	41	29	U	U	U	U	U	U	U	U	1600	U	2200	3300	1300	1400	1800	U	2100	1700	1700	U				
1001-2	1' - 2'	0.00																																								
2001-1	0 - 1'	15.42		12	6.4	350	660	230	0.6	37		540		1970		330	39	U	U	U	U	U	U	U	U	U	2100	1400	7800	8300	3400	2900	2700	1600	2900	2600	2600	1900				
1002-2	1' - 2'	0.00																																								
2002-1	0 - 1'	10.48		8	2.8	220	380	180	0.4	21		390		1540		240	0	U	U	U	U	U	U	U	U	U	1000	1000	2100	4200	1400	1500	1400	1400	2100	1600	1600	1100				
FI-A	0 - 4' (c)	38.0		9.6	6.4	410	970	240	1	32		500	5500						U	U	U	300	250	210	140	220	1000	580	2500	3000	1600	1700	2000	690	1800	1100	160	1000				
FI-B	0 - 5' (c)	23.14		7.7	3.7	270	730	190	1.4	27		360	2900						U	U	U	260	210	210	180	200	1100	630	2600	2800	1500	1700	2000	660	1700	1000	160	950				
LH-A	0 - 2' (c)	22.70		8.4	3.6	210	480	140	1.1	22		300	3900						U	U	U	200	150	170	78	120	630	400	1400	2000	1000	1100	1400	500	1300	790	140	760				
LH-A	2 - 4' (c)	11.86		10	3.7	250	590	140	0.9	21		290	2400						U	U	U	180	150	140	80	110	550	380	1300	1600	860	880	1000	310	1000	610	100	580				
LH-A(B)	4 - 6.5' (c)	15.99		9.3	1.7	180	610	160	1.6	18		310	3600						U	U	U	310	230	220	120	190	890	550	2200	2600	1400	1500	1700	112	337	940	180	900				
S-217	0 - 1'														18																											
	1 - 2'														50																											
	2 - 3'														72																											
S-3201	0 - 1'														18																											
	1 - 2'														18																											
	2 - 3'														47																											
	3 - 4'														46																											
S-3221	0 - 1'														17																											
	1 - 2'														16																											
	2 - 3'														33																											
	3 - 4'														41																											
	4 - 5'														19																											

TABLE 1-1

NEW BEDFORD HARBOR DREDGE - PHASE II
Summary of Sediment Chemistry Data

Sample ID	Sample Interval (ft)	Total PCBs (ppm)	Metals (ppm)	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc	TPH (ppm)	EPH	PCB Arochlors(ppm)	Total PAH (ppm)**	Volatile Organics (ppb)**	Reactive Sulfide(ppm)	TPH Fingerprint	Pesticides	PAHs (ppb)	Napthalene	2-Methylnaphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene	Dibenzo(a,h)anthracene	Benzo(g,h,i)perylene	% moisture	Rx sulf	TOC 1	TOC 2
S-201616	0 - 1'														12																											
S-207818	0 - 1'														28																											
AE 852	0 - 0.5'														1.2																											
AE 853/MAC 628	0 - 0.5'					290	541	141							4.8																											
AE 854	0 - 0.5'														6.7																											
AE825/826	0 - 0.5'														22.7																											
AF 806	0.5 - 1'														59																											
AF 113/MAC 630	0 - 0.5'					271	497	179							3.6																											
AF 119/MAC 631	0 - 0.5'				5	322	608	147							3.1																											
AF 170	0 - 0.5'														5.2																											
AF 300	0 - 0.5'														29																											
AF 315	0 - 0.5'														2.6																											
AF 393	0 - 0.5'														1.4																											
AF 398/MAC 626	0 - 0.5'				11	567	1010	345							6.2																											
AF 399	0 - 0.5'														3.6																											
1020-2	1' - 3'										360				0.00																											
AF 815	0.5 - 1'														7																											
AF 400	1 - 1.5"														6.2																											
AE 851	2 - 3'														1.3																											
MAC 686	0 - 0.5'					353	662	190																																		
MAC 687	1 - 2'					255	497	118																																		
MAC 690	0 - 0.5'					420	737	272																																		
MAC 670	0 - 0.5'				5.4	269	531	99																																		

Notes:

1. M200 and M400 series explorations were performed by Apex, Environmental in October 2002 and April 2003 for the North Terminal dredge project.
   indicates PCB testing was performed by the EPA at the superfund on-site laboratory. Other chemical analyses was performed by a commercial laboratory.
2. M2000 series explorations were performed by Apex Environmental in November 2001 for the North Terminal dredge project.
3. FI and LH-series samples were collected and analyzed in conjunction with the New Bedford/Fairhaven EIR,

for the Massachusetts Dredged Material Management Plan.

All samples tested are composites as follows:

FI-A is a composite of FI-1 0-3.5' + FI-2 0-4' + FI-3 0-3.5'
FI-B is a composite of FI-4 0-5' + FI-5 0-3' + FI-6 0-4'
LH-A(0-2) is a composite of LH-1 0-2' + LH-2 0-2' + LH-11 0-2' + LH-12 0-2'
LH-A(2-4) is a composite of LH-1 2-4' + LH-2 2-4.5' + LH-11 2-4' + LH-12 2-4'
LH-A(B) is a composite of LH-11 4-4.5' + LH-12 4-6.5'

4. AF and MAC-series samples were collected and analyzed in conjunction with the FS of Remedial Alternatives

for the Estuary and Lower Harbor/Bay, NBH Superfund Project.

5. S series samples were collected and analyzed as part of the on-going NBH Superfund Project.
6. PCB results from the Superfund on-site laboratory are likely biased low.
7. U indicates the analyte was analyzed for but not detected at the sample specific level reported.
8. See Figures 1-2 and 1-3 for sample locations.

1.5 Assumptions

This section outlines major assumptions made during Work Plan preparation.

NBHDC had developed this Work Plan based upon the following assumptions:

- All contaminated material removed will be transported to the CAD cell(s) constructed as part of this task. Clean material will be either sent for reuse or disposal, or will be used for capping (assuming that after testing the "clean material" is suitable for use as cap material) depending upon the sequencing of the project and the timing of the capping activities. Reuse and/or disposal will be evaluated for excess clean material.
- An aggressive schedule will be undertaken in order to complete this project as dictated by the needs of the users of the Harbor.
- The Fish Island Dredge Area has the highest priority, and will need to be completed by January 15, 2004.
- The schedule for overall project completion will be based upon obtaining necessary stakeholder support and the Harbor needs.

2.0 STATE ENHANCED REMEDY PROCESS

The sections below discuss various decisions and/or agreements that preceded and/or are part of the implementation of the State Enhanced Remedy (SER).

2.1 Discussion of the State Enhanced Remedy Process

Attachment B presents sections from the USEPA 1998 Record of Decision (ROD) for the New Bedford Harbor Superfund Site regarding the SER.

The regulation covering Superfund, the National Contingency Plan (NCP), contains a little used provision called Enhancement of Remedy (40 CFR 300.515 (f)). This provision allows a state to propose extending the scope of a remedy to cover additional remediation, and allows the additional remediation to be included in the Superfund process. For the New Bedford Harbor Superfund remedy, MADEP requested the use of this provision to link Navigational Dredging to the Superfund process, and this enhancement is referred to as the State Enhanced Remedy (SER). While this request did not ask EPA to pay for the additional remediation, it does provide many benefits. It allows the State to coordinate certain activities with the Superfund work and utilize work already being done, thereby avoiding duplication of efforts. Since CERCLA allows for the on-site disposal of remedial contamination, the SER will also help provide options for the on-site disposal of contaminated sediments, not already being dredged by EPA's Superfund cleanup, but necessary for the navigational dredging, a major impediment to maintenance dredging in any harbor. And it will also help to reduce the administrative requirements of doing this type of dredging outside of the Superfund process. These factors together could lead to significant time and cost savings to the local communities and the Commonwealth, and help to restore the harbor economy of the New Bedford area.

MADEP, as the lead regulatory authority, will provide oversite and review of the project documents, inspections and audit functions, interpretation and coordination with other Resource Agencies and serve as technical liaison relative to State or Federal agencies. MADEP will have overall approval authority for the projects conducted by the NBHDC under the SER and will also have stop-work authority for actions that it interprets are in conflict with this agreement, the Performance Standards, or the Federal and State laws and/or regulations. MADEP will name a SER Project Manager, who will coordinate communications, approvals and MADEP oversight with other appropriate State and Federal agencies. Off-site disposal or reuse of dredged sediment will be conducted in compliance with permitting requirements of the appropriate regulatory agencies.

2.2 Memorandum of Agreement (MOA)

A NBHDC/MADEP MOA establishes a relationship between the NBHDC and MADEP, lays the framework for the SER process and establishes the roles, responsibilities and relationships between NBHDC, MADEP and the other Federal and State Agencies involved as set forth in the USEPA 1998 Record of Decision (ROD) for the New Bedford Harbor Superfund Site. Projects conducted under the auspices of the SER will be conducted as Phases (New Bedford Harbor Dredge (North Terminal Dredge) will be Phase II). (Note: Phase I was conducted by the City of New Bedford and did not fall under the SER process.) All subsequent Phases will follow the same process as that utilized for the EPA's New Bedford Harbor Superfund project, including the preparation of various guiding documents that detail the plan for the work to be conducted under this Phase.

The following agencies will be involved in the SER Process:

- U.S. Environmental Protection Agency (USEPA)
- U.S. Army Corps of Engineers (USACE)
- National Marine Fisheries Service (NMFS)

- Massachusetts Executive Office of Environmental Affairs (EOEA)
- Massachusetts Department of Environmental Protection (MADEP)
- The Office of Coastal Zone Management (CZM)
- Massachusetts Division of Marine Fisheries (MA DMF)
- National Oceanic and Atmospheric Administration (NOAA)
- Other State, Local, and/or Federal Agencies as necessary

2.2.1 Performance Standards

Under the Superfund process, section 121(e) of CERCLA exempts response actions conducted entirely on-site from having to obtain federal, state, or local permits; these actions need only comply with the substantive aspects of applicable or relevant and appropriate requirements (ARARs). ARARs are cleanup standards, standards of control or other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that either apply to the remediation at the site or address problems or situations sufficiently similar to those encountered at the site that their use is well suited to the particular site. Because the SER was included in the New Bedford Harbor Site ROD, the SER will benefit from the permit exemption for activities conducted onsite. Likewise, the substantive requirements of the regulations identified as Performance Standards must be complied with for onsite actions. For any off-site activities (such as disposal), all administrative and substantive requirements of all standard regulatory laws must be met. The NBHDC and MADEP Project Manager have met and will continue to meet with all the Resource Agencies to identify and discuss the Performance Standards for this project. Also, although permits will not be applied for or obtained, this SER dredging project will meet the substantive standards, conditions, restrictions and requirements listed below. The project Performance Standards were developed based upon the approved permits for the New Bedford Harbor State Pier Dredge Project - Phase I. A comprehensive list of Performance Standards (including ARARs) are included in Appendix C.

- <u>Clean Water Act, Sections 404, Dredge and Fill Activities, including Section 401 Water Quality Certification and State Water Quality Standards (314 CMR 4.00), Massachusetts Certification for Dredging, Dredged Material Disposal and Filling in Waters (314 CMR 9.06 (1-2)</u>:
  The substantive water quality standards identified in the Project Performance Standards (Attachment C) will be incorporated in contract documents. Dredge and fill activities will be implemented as to minimize to the maximum extent possible any adverse environmental impacts through environmental controls.

- <u>Rivers and Harbors Act, Section 10:</u>
  Dredging and disposal activities will comply with the substantive requirements and conditions normally associated with the issuance of a U.S. Army Corps of Engineers regulated dredging project. These activities will be carried out in coordination with the Corps and other Resource Agencies.

- <u>Endangered Species Act, Magnuson-Stevens Act, Massachusetts Natural Heritage and Endangered Species Program, and Fish and Wildlife Coordination Act:</u>
  Consultations will occur with the National Marine Fisheries Service, the U.S. Fish and Wildlife Services and the Massachusetts Division of Marine Fisheries. The NBHDC will review the previously submitted Essential Fish Habitat Assessment for Phase I work and update it with project specific information and evaluate essential fish habitat impacts associated with this project, along with any endangered species affected by the project. Avoidance where possible and mitigation measures will be proposed to address any EFH and endangered species impacts.

- Preservation of Historical and Archaeological Data Act of 1974 and Massachusetts Board of Underwater Archaeological Resources (MGL Ch. 6 Section 179 – 180):
  Coordination will occur with the appropriate tribal entities concerning the project in accordance with the Act (in the spirit of the Memorandum of Understanding (MOU) between the New Bedford Superfund Project and the local Native American tribes). Additionally, coordination will occur with the Massachusetts Board of Underwater Archaeology and cultural surveys will be completed where necessary.

- Massachusetts Coastal Zone Management Federal Consistency:
  Project documents will be provided to the Massachusetts Office of Coastal Zone Management (CZM) for review and comment relative to consistency with CZM enforceable program policies.

- Massachusetts Administration of Waterways Licenses Law, Chapter 91:
  Activities will comply with the substantive standards as well as any appropriate special waterways permit conditions identified in the Project Performance Standards in Attachment C.

- Wetland Protection – Federal Executive Order 11990, Part 6, Appendix A, Massachusetts Wetland Protection Act, Floodplain Management – Executive Order 11988, Part 6, Appendix A:
  The New Bedford Conservation Commission will be informed through meetings with the NBHDC of the intended project plans and Commission concerns and comments will be incorporated into contract documents as appropriate. Best available measures will be used to minimize adverse effects on identified resource areas and buffer zones. Efforts will be made to minimize destruction, loss and degradation of wetlands and associated buffer zones as much as possible. Efforts will be taken to minimize potential harm to the floodplain.

- Toxic Substances Control Act (TSCA):
  Because some of the dredged sediment contains PCB concentrations in excess of 50 ppm, a risk-based disposal method that will not pose an unreasonable risk of injury to human health or the environment will be utilized and a determination secured (by EPA) under 40 CFR 761.61(c).

2.2.2 Additional Performance Standards (as ARARs)

The following laws and regulations have been identified from the EPA's ROD (dated September 1998) as applicable, relevant and/or appropriate under the SER for the New Bedford Harbor Dredge – Phase II (Task 1) to be conducted by the NBHDC (see Appendix C for a complete listing and more detailed description of each):

Federal

- Clean Water Act (CWA) - Water Quality Criteria
- Fish and Wildlife Coordination Act
- Preservation of Historical and Archeological Data Act of 1974
- Coastal Zone Management Act
- Toxic Substances Control Act (TSCA)
- CWA, Section 404 - Dredge and Fill Activities
- Rivers and Harbors Act of 1899

Massachusetts

- Surface Water Quality Standards
- Hazardous Waste Management – Requirements for Generators of Hazardous Waste
- Hazardous Waste Management – Management Standards for all Hazardous Waste Facilities

- Rules for the Prevention and Control of Oil Pollution in the Waters of the Commonwealth
- Certification for Dredging, Dredging Material Disposal and Filling in Waters

2.2.3 Submittals for Agency Review

Key documents will be submitted for agency review at appropriate design milestones. The MADEP SER Project Manager will first route the Scope of Work (SOW) to USEPA for a consistency review in order to determine if the work is consistent with and does not conflict with the Superfund remedy. The SOW will then be returned to the MADEP SER Project Manager with comments (if applicable) or with a SOW Consistency Determination. If EPA has not issued a determination, EPA comments will be given to the NBHDC (and NBHDC agents) for consideration and/or incorporation into the document, then returned to the EPA for a SOW Consistency Determination. Once the Determination is issued, MADEP Project Manager will forward the Determination to the NBHDC, which will then submit a Draft Work Plan to the MADEP Project Manager. The MADEP Project Manager will coordinate with Resource Agencies review and comment, and identification of Performance Standards. All comments will then be returned by the MADEP Project Manager to the NBHDC for consideration and/or incorporation into the Draft Work Plan. All comments will be returned by the MADEP Project Manager to the NBHDC for consideration and/or incorporation in the Draft Work Plan. Upon completion, MADEP will send the Draft Work Plan to EPA for a Work Plan Consistency Determination to determine that the Work Plan and Performance Standards are consistent with and do not conflict with the Superfund remedy. The draft Work Plan will be returned to the MADEP Project Manager with EPA comments or with a Work Plan Consistency Determination. If EPA has not issued a determination, EPA comments will be given to the NBHDC (and NBHDC agents) for consideration and/or incorporation into the draft Work Plan, then returned to EPA for a Work Plan Consistency Determination. Upon receiving the Determination, the MADEP Project Manager will issue a letter to the NBHDC to proceed. Figure 2-1 presents the SER document review process as a flow chart diagram. It should be noted that the review process described herein is the formal SER review process. It is anticipated and encouraged that informal discussions, reviews and information sharing occur in order to expedite the review and approval process when appropriate and possible.

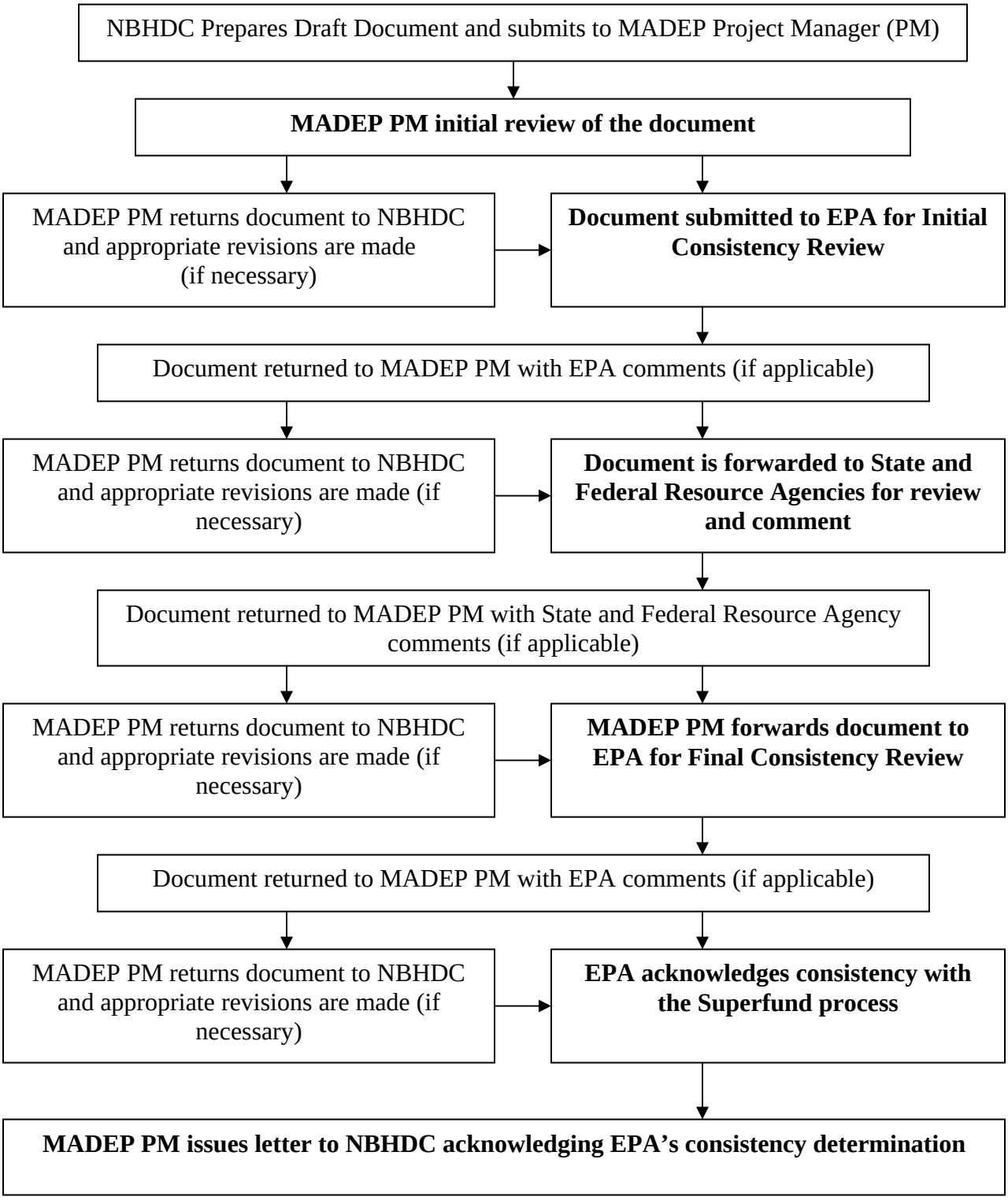
The following is a list of submittals currently identified for SER review:

- Statement of Work
- Sampling and Analysis Plan (SAP) – to include field and analytical QA/QC
- Design Documents (Basis of Design Summary Report, contract drawings & specifications, project data)
- Dredging Quality Assurance/Quality Control Plan (QA/QC Plan) - for construction
- Health and Safety Plan (HASP) – for construction
- Operation and Maintenance Plan (O&M Plan)

Figure 2-1 SER Document Review Process

FIGURE 2-1

SER DOCUMENT REVIEW PROCESS



3.0 SCOPE OF WORK

New Bedford Harbor Dredge – Phase II (Task 1) involves two parts: 1) design and construction of CAD cell(s) for disposal of contaminated dredged sediment from navigational dredging; and 2) dredging and disposal of sediment generated as a result of the required New Bedford Harbor Dredge. CAD cell(s) have been identified as the preferred disposal alternative in the Dredged Material Management Plan (DMMP) Final Environmental Impact Report (FEIR) for New Bedford and Fairhaven, Massachusetts (Maguire Group 2003). The NBHDC concurs with the conclusions of the DMMP that harbor CAD cell(s) are the most-effective and protective solution for sediment disposal. In order to facilitate disposal of contaminated maintenance dredge material on-site (i.e. within the limits of the Superfund site, such that the work can be done under the SER), the construction sequence will be established to initially create the required CAD cell(s), then perform the dredging within the New Bedford Harbor Dredge – Phase II (Task 1) areas, and dispose of the contaminated material within the newly created CAD cell(s), and cap the CAD cell(s).

3.1 General Approach

Pre-design activities, including sampling and analytical programs, bathymetric surveys, and remote sensing surveys were all completed prior to design. These tasks provided information to the design team, and allowed for consultation with Resource Agencies and a number of information documents, such as an Essential Fish Habitat and Endangered Species Assessment to the National Marine Fisheries Services and the Massachusetts Division of Marine Fisheries, an Underwater Archaeological and Hazards Analysis for the Massachusetts Board of Underwater Archaeology, and discussions with the New Bedford Conservation Commission on any local concerns.

Dredging will initially be required for excavation of the proposed transitional CAD cell(s) (here-in after referred to as CAD cells). CAD cell dredging will generate volumes of surficial contaminated organic silt, as well as underlying coarser grained clean material. The surficial contaminated material will require on-site disposal. To accommodate this requirement, a series of CAD cells is proposed; including use of an existing borrow area within the proposed New Bedford Harbor Dredge – Phase II CAD cell footprint. The existing borrow area will be utilized to contain the surficial contaminated sediment from the footprint of the first CAD cell to be constructed (which is designated CAD cell #1) and the dredge material from the Fish Island Dredge Area within North Terminal. After removal and disposal of the contaminated material from Fish Island and CAD cell #1, CAD cell #1 will be excavated to its full depth. The clean material generated during the construction of the initial CAD cell #1 will either be stockpiled for future capping requirements and/or reuse, or will be shipped off-site for disposal and/or reuse. Completion of CAD cell #1 will allow for dredging and disposal of contaminated surficial material from the footprint of CAD cell #2 in the future (if CAD cell #2 is determined to be necessary).

Dredging of the New Bedford Harbor Dredge – Phase II (Task 1) will commence after completion of the CAD cell excavation as described. It is anticipated that the majority of the sediment generated from the proposed maintenance dredging will consist of fine-grained organic silt material with varying levels of contamination. A smaller volume of underlying coarse-grained, clean sediment will also be generated. If appropriate (and after engineering review), these materials may be segregated, and the contaminated material disposed of in the CAD cells. Depending on final design volumes for the proposed CAD cells, it is conceivable that the entire volume of contaminated New Bedford Harbor Dredge – Phase II (Task 1) dredge material can be disposed of in cell #1, in which case the complete New Bedford Harbor Dredge – Phase II (Task 1) dredging could precede CAD cell #2 excavation.

Capping of the CAD cell(s) will be reviewed as part of the design process for the project. Current industry thinking concerning the capping of CAD cells suggests that CAD cells should not be capped for some period of time after being filled to allow for settling and consolidation, and to reduce mixing of the cap material with soft fill sediments. Design for the capping of the CAD cell(s) for this project will be undertaken at the appropriate time in the overall project sequence to allow for the various capping scenarios to be adequately reviewed by the project designers. If after review, capping is determined to be beneficial, CAD cell capping will be accomplished using clean coarse-grained material. It is the intent of the NBHDC to provide capacity in the CAD cell(s) to accommodate contaminated sediment generated as a result of initial dredging for development of planned Pope's Island North DMMP CAD cells. In which case, the CAD cell(s) would remain open after completion of the New Bedford Harbor Dredge – Phase II (Task 1) dredging. The City of New Bedford will implement an operation and maintenance (O&M) plan for the constructed and capped CAD cells.

3.2 Design Considerations

A design process will be undertaken to design the various pieces of the project. The design process will include the collection of necessary data concerning the characterization of the sediments and adjacent structures, designing the limits of the dredging and determining the dredge disposal scenario and necessary monitoring and controls.

3.2.1 CAD cells

- Sampling and Analysis

A program of vibracore sampling was conducted over the footprint of the proposed CAD cells during the period April 4 – 7, 2003. A total of 17 locations (M401 to M417) were sampled using hydraulic vibracore equipment. The maximum penetration of the vibracore was 7.5 ft, with recovery varying from 2.9 to 5.2 ft. Samples of the sediment recovered from the vibracores were delivered to EPA's (Foster Wheeler) on-site laboratory for PCB analysis. The on-site laboratory had been set up for the Superfund project, and was equipped to analyze sediment for PCB levels. A total of 37 samples were analyzed by the EPA on-site laboratory. Total reported PCB levels ranged from less than one up to 9.9 ppm. It should be noted that there were quality control issues with the on-site laboratory, which are discussed in more detail in a report produced by Foster Wheeler in August 2003. Although the reported results of the testing are likely to be biased low, the conclusion reached by the laboratory contractor after retesting select samples at an independent off-site laboratory is that the M400-series samples are anticipated to be uniformly below 50 ppm PCBs. Due to the generally lower levels of PCBs reported by the on-site laboratory for the M400 series samples, none of these were selected for duplicate testing off-site. The conclusion is based on comparison of duplicate samples from other areas.

Additional sampling and analysis will be required for final design of the CAD cells. A program of test borings will be implemented to provide subsurface soil and rock information over the full depth of the proposed CAD cells, and for determination of geotechnical engineering parameters required for design. Standard penetration testing will be conducted in the boreholes, and drive samples will be recovered for both geotechnical and chemical analyses. It is anticipated that analytical testing of the deeper coarse-grained material will follow guidelines provided by the USACE for the DMMP CAD cells (as noted in the Final Environmental Impact Report [Maguire Group 2003]), in order to determine suitability of the "clean" (the sediment below the contaminated surface layer) sediment for offshore disposal and/or reuse.

- Existing Borrow Area cell

Recent bathymetry of the proposed CAD cell area indicates that this area of the harbor has a mudline elevation generally between –30 and –34 ft. MSL. The former borrow area extends as deep as El. –38 to –42. Preliminary capacity estimates indicate a total volume of approximately 42,000 cy for the existing borrow area, assuming the post-filling elevation is established at El. –32. The actual disposal capacity of the borrow area cell will be determined after cap design and consolidation estimates are complete.

- CAD cell #'s 1 and 2

Design considerations for the CAD cells include depth, surface area, side slopes, and volumes. Conceptually, the available disposal volume in the borrow area will govern the surface area of the first CAD cell. It is the intention of the NBHDC to place the contaminated surficial material from CAD cell #1 into the borrow area. Preliminary design calculations indicate that a CAD cell #1 approximately 350 ft. on a side would meet the volume disposal needs of the project. Depth will be determined based on allowable excavation side slopes and depth to rock, if applicable. CAD cell(s) will be designed with an overall capacity to accommodate contaminated surficial material from the CAD cell(s), the full volume of contaminated sediment from the New Bedford Harbor Dredge – Phase II (Task 1), as well as some additional capacity held in reserve for initial DMMP cell dredging and immediate EPA needs. Final volumes will be determined during design, as local stratigraphy and allowable side slopes are determined, and volume estimates of contaminated material within proposed footprints are determined.

- Capping

If capping is determined to be appropriate, the general concept is that the CAD cells will be capped with a layer of clean granular material, which will isolate the contaminated sediments from the surface. It is anticipated that sufficient volume of suitable capping material will be generated from the excavation of future CAD cell(s) to cap these project cells (if appropriate). A maximum elevation of the top of the cap will be established based on maritime vessel requirements, and overall maintenance dredge depths for the area. Maximum cap elevations will be designed to take into account future maintenance dredge project overdredge scenarios. Cap thickness will be determined based on ability to maintain a consistent protective layer, accounting for consolidation of underlying sediment, as well as disturbance due to vessel-generated turbidity.

3.2.2 New Bedford Harbor Dredge – Phase II (Task 1)

- Sampling and Analysis

Several phases of subsurface explorations have been completed at the proposed dredge areas. Initially, a program of vibracore sampling was performed in October 2002 to provide analytical data for design. The sample locations (M201 to M224, shown on Figures 1-2 and 1-3) were selected in part based on existing analytical data from the superfund project. Several existing Superfund samples in or adjacent to the channel area indicated sediment contained PCBs at levels exceeding 50 ppm. The vibracore sampling program was intended to provide data over the footprint of all proposed dredge areas, and further delineate locations with elevated (> 50 ppm) PCB levels. The vibracore sampler was hydraulically advanced to depths corresponding to approximately one foot below the proposed dredge depth, accounting for allowable overdredge. In some areas, refusal was encountered above design depth.

Samples were retrieved from the cores and submitted to a combination of laboratories for chemical analysis. The EPA at the superfund on-site laboratory performed the majority of testing for PCBs.

Samples were also tested at a commercial laboratory for metals, EPH, PAH, reactive sulfide, moisture content and total organic carbon. Analytical data is summarized on Table 1-1.

A program of test borings was conducted to provide engineering parameters for dredge design. Seven test borings (M301 to M307) were advanced at locations where the vibracore sampler refused above design sample depth. Continuous standard penetration testing was performed in the borings, and drive core samples were logged to provide soil and rock stratigraphy over the design dredge depth. Logs of the borings are included as Attachment A.

- Dredge cuts

Design dredge cuts will be established based on discussions with the Harbormaster and the three pier or terminal operators. In general, the four areas require dredging to achieve and maintain a design mudline of El. –30 MLW. Dredge cuts and slopes immediately adjacent to bulkheads or other shoreline structures will be designed based on evaluation of the adjacent structures, as well as terminal operators' specific vessel requirements.

3.2.3 Disposal/Reuse Options

The proposed New Bedford Harbor Dredge – Phase II (Task 1) dredging and the dredging required for the CAD cell construction will generate volumes of several sediment types requiring disposal or reuse. The surficial sediment throughout the footprints of the CAD cells and proposed dredge areas is contaminated primarily with varying amounts of PCBs and copper, and to a lesser extent, other contaminants of concern. The surficial sediment will be disposed of in the CAD cells within the project area. The coarser-grained material below the surficial fine-grained material is generally considered "clean" for purposes of reuse or disposal.

New Bedford Harbor Dredge – Phase II (Task 1) dredging will generate approximately 50,000 cy of sediment, the majority of which is contaminated. Depending on final configurations of the proposed CAD cells, CAD cell construction could generate 25,000 to 30,000 cy of contaminated sediment, and upwards of 120,000 cy of clean material. If appropriate (and after engineering review to determine constructability), clean material may be segregated from contaminated material during dredging. A portion of the clean material could be used on site for construction of the CAD cell caps. If needed, capping volume will be determined during cap design. Options for reuse and/or disposal of the excess volume of clean material are currently being evaluated. Possibilities include upland reuse (the preferred option) as clean fill, or potentially through distribution to local quarries depending on gradation requirements. Off-shore disposal at the Buzzard's Bay, Cape Cod, or other off-shore disposal sites is also being evaluated.

3.3 Construction Considerations

The NBHDC will manage and oversee the construction activities. Construction operations will be performed in such a manner as to comply with the specific performance criteria established during the design phase of the project. Where possible, the intent will be to allow the contractor to determine appropriate means and methods of construction, subject to the controls and performance criteria contained in the project specifications. Proposed means and methods and adherence to design and performance criteria will be evaluated using the pre-construction submittal review process. A control plan to ensure conformance to performance criteria will be a Contractor submittal requirement.

3.3.1 Dredging

Dredging will be implemented in such a manner as to segregate the different types of dredge material anticipated as appropriate (debris, contaminated maintenance material, and clean improvement material). Establishment of performance standards, including water quality criteria, will mandate dredging operations. Dredge methods will be selected to achieve water quality standards. Dredging of contaminated material may require implementation of controls such as use of an environmental (sealed) bucket, silt curtains, oil absorbent booms, reduced cycle times, etc. Deeper clean material may require different dredge equipment depending primarily on density of material to be dredged. Water quality criteria will also apply to clean material dredging. Specifications and requirement details will be determined through the design process.

Water quality monitoring will be conducted during dredging operations, following a pre-determined schedule. Monitoring will likely include measurement of turbidity or total suspended solids, as well as sampling and analysis of the water column for contaminants of concern. It is anticipated that the specific monitoring requirements and schedule will be determined in conjunction with MADEP and other Resource Agencies as the project design advances. All dredging and disposal will be performed in such a manner as to minimize impacts to fish, critical habitats, and other wildlife. Contingency plans detailing engineering controls will be prepared by the Contractor in the event that water quality is impacted.

Where encountered, it will be necessary to screen debris from the dredge material using debris screens or other methods. Debris will be segregated and stockpiled for off-site disposal at a pre-determined location.

3.3.2 CAD cell filling

CAD cell filling operations will be subject to operational controls to be developed during project design. Project-specific water quality criteria developed by MADEP with the assistance of the Resource Agencies will apply to filling operations as well as dredging and other performance standards. Means and methods for discharge of fill into the CAD cells will be developed to ensure compliance with water quality criteria. It is anticipated that discussions between MADEP, and USACE and EPA (as part of the design process) regarding experience at the Boston Harbor CAD cells will be valuable relative to evaluating discharge requirements. Methods to be evaluated include use of split hull barges, as well as placement of sediment into the cell using clamshell equipment. Some combination of operational controls will likely be required during filling operations, such as use of silt curtains down-gradient or around the active CAD cell, use of oil-absorbent booms, discharge at depth vs. at surface, etc. Details are to be determined during the design process.

3.3.3 Cap Construction

Design of the capping for the project will take place late in the design process in order to gain as much insight into the nature of the materials to be capped as possible. Cap construction (if required) is anticipated to be one of the technically challenging aspects of the New Bedford Harbor Dredge – Phase II (Task 1) project, due to the generally very soft, low-strength sediment being placed into the CAD cell(s). It is unlikely that the relatively low strength cell fill material will be able initially to support the full cap thickness, even allowing for complete self-weight consolidation of the cell fill material. Therefore, a staged approach to capping may be required. The staged approach would involve placing the cap material in thin lifts to allow the underlying fill material to gain strength as a result of consolidation under the partial cap lift. Construction methods will be evaluated to allow for placement of relatively thin lifts of capping material. Construction sequencing will be evaluated that would allow for consolidation time in between lift placement. Frequent bathymetry may be required during cap construction to evaluate cap

thickness, assess cap coverage uniformity, and rate and magnitude of consolidation settlement. Cap placement will also be subject to water quality performance criteria. As part of the final capping plan, an assessment of the final cap thickness and effectiveness of capping will be evaluated.

3.4 CAD Cell Operation and Maintenance

As per the MOA between the NBHDC and MADEP, the City will retain responsibility for operation and maintenance (O&M) of the CAD cells (borrow area cell, and any in-harbor CAD cells) being constructed as part of this project. A detailed operation and maintenance (O&M) plan will be developed and submitted for review by the Resource Agencies. The O&M Plan will include a schedule for post-cap monitoring. Monitoring requirements will address long-term cap integrity and performance, based on cap design criteria and performance standards, all of which have not yet been determined. Specific monitoring requirements will be developed to assess physical aspects of cap performance. Periodic bathymetry may be specified to monitor surface elevation of the cap, and provide an indication of cap material displacement. If required, cap thickness (as well as contaminated sediment thickness) could be evaluated using probes such as the cone penetrometer.

4.0 PROJECT SCHEDULE

The following critical path project milestones have been identified:

- NBHDC submits Work Plan
- Finalization of Performance Standards
- Complete engineering design
- Issue dredging contract Invitiation for Bid (IFB)
- Award dredging contract
- Dredge contractor mobilize to site
- Commence dredging at Fish Island
- Begin CAD cell construction
- Complete CAD cell construction
- Begin remaining New Bedford Harbor Dredge – Phase II (Task 1) areas
- Complete dredging work under New Bedford Harbor Dredge – Phase II (Task 1) contract
- Cap CAD cell(s)

The Conceptual Project Schedule is presented below. Actual construction schedule will be based on the schedule developed during design and in coordination with the Resource Agencies, the City, and Dredging Contractor. The schedule presented is conceptual. As the New Bedford Harbor Dredge – Phase II project is dynamic, actual schedule dates will change and certain items may be added and/or deleted. The Project Schedule will be updated as needed to reflect actual work.

<u>Fall/Winter of 2004:</u>

- Dredging of Fish Island sediment and placement of those sediments in the borrow area.
- Dredging of the surficial contaminated sediments from the top of the CAD cell #1, and placement of these sediments into the borrow area (on top of the Fish Island sediments).

<u>Winter through Summer 2004 – 2005:</u>

- Construction of the CAD cell #1, removal and disposal of clean material from CAD cell #1 (contingent upon identification of suitable disposal site for the clean material).
- Dredging of the remaining New Bedford Harbor Dredge – Phase II areas (contingent upon construction of CAD cell #1).

<u>Spring 2005:</u>

- Design of the Fairhaven project dredge areas.

<u>Summer 2005:</u>

- Conduct Fairhaven project area dredging.

5.0 REFERENCES

Maguire Group, Inc. 2003. Dredged Material Management Plan (DMMP) Final Environmental Impact Report (FEIR) for New Bedford and Fairhaven, Massachusetts: Prepared for The Office of Coastal Zone Management; Foxborough MA.

Attachment A

Geotechnical Boring Logs
New Bedford Harbor Dredge – Phase II

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 1 OF 1

TO Apex Environmental, Inc.
PROJECT NAME New Bedford Harbor Dredge
REPORT SENT TO above / Borings

ADDRESS Boston, MA
LOCATION New Bedford, MA
OUR JOB NO. 03-125

HOLE NO. M-301
PROJ. NO.
SURF. ELEV.

GROUND WATER OBSERVATIONS

At _____ after ____ Hours
At _____ after ____ Hours

	CASING	SAMPLER	CORE BAR.
Type	HW-NW	S/S	NV-II
Size I.D.	4" 3"	1-3/8"	
Hammer Wt.	300#	140#	BIT
Hammer Fall	24"	30"	Dia.

DATE	
Start	10/25/02
Complete	10/25/02
Boring Foreman	G. Brouillette
Inspector/Engr.	

LOCATION OF BORING On Water (Air & Water 24.5')

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev./Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE No.	Pen"	Rec."
		0.0-2.0	D	8	6	4			Black Organic SILT, Sea Shells & Slag	1	24	10
						4						
		2.0-3.0	D	5	2	(100/0")	Min/Ft		(Button Bit from 3' to 3.5')	2	12	6
		3.5-7.5	C				15	3.5		C1	48	41
5							18		Gray GRANITE			
							18		(@ 6.5' - Void - 0.5')			
							15					
								7.5	Bottom of Boring 7.5'			

GROUND SURFACE TO _____ USED _____ CASING: THEN _____

Sample Type
D=Drive C=Cored W=Washed
UP=Fixed Piston UT=Shelby Tube
TP=Test Pit A=Auger
OE = Open End Rod
* 300# hammer

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb. Wt x 30" fall on 2" O.D. Sampler

Cohesionless	Density	Cohesive	Consistency
0-10	Loose	0-4	Soft
10-30	Med. Dense	4-8	M./Stiff
30-50	Dense	8-15	Stiff
50+	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY:
Earth Boring 3.5'
Rock Coring 4'
Samples 2

HOLE NO. M-301

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 1 OF 1

TO Apex Environmental, Inc.
PROJECT NAME New Bedford Harbor Dredge
REPORT SENT TO above / Borings

ADDRESS Boston, MA
LOCATION New Bedford, MA
OUR JOB NO. 03-125

HOLE NO. M-301A
PROJ. NO.
SURF. ELEV.

GROUND WATER OBSERVATIONS

At _____ after ____ Hours

At _____ after ____ Hours

	CASING	SAMPLER	CORE BAR.
Type	HW	S/S	
Size I.D.	4"	1-3/8"	
Hammer Wt.	300#	140#	BIT
Hammer Fall	24"	30"	

DATE	
Start	10/28/02
Complete	10/28/02
Boring Foreman	G. Brouillette
Inspector/Engr.	

LOCATION OF BORING On Water (Air & Water 28.0')

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE No.	Pen*	Rec.*
		0.0-0.5	D	100 (Obstruction)						1	6	6
									Black Organic SILT and Sea Shells			
		2.0-4.0	D	1	1	2				2	24	16
						3		3.0	Gray fine to medium SAND, trace shells			
		4.0-6.0	D	13	5	13				3	24	10
5						8						
		6.0-8.0	D	8	9	10				4	24	17
						10		7.0	Brown fine to medium SAND, some gravel			
		8.0-10.0	D	26	36	43				5	24	22
						44						
10								10.0	Bottom of Boring 10'			

GROUND SURFACE TO _____ USED _____ CASING: THEN _____

Sample Type
D=Drive C=Cored W=Washed
UP=Fixed Piston UT=Shelby Tube
TP=Test Pit A=Auger
OE = Open End Rod
* 300# hammer

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb. Wt x 30" fall on 2" O.D. Sampler

Cohesionless	Density	Cohesive	Consistency	
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med. Dense	4-8	M./Stiff	
30-50	Dense	8-15	Stiff	
50+	Very Dense	15-30	V-Stiff	

SUMMARY:
Earth Boring 10'
Rock Coring
Samples 5

HOLE NO. M-301A

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 1 OF 1

TO Apex Environmental, Inc.
PROJECT NAME New Bedford Harbor Dredge
REPORT SENT TO above / Borings

ADDRESS Boston, MA
LOCATION New Bedford, MA
OUR JOB NO. 03-125

HOLE NO. M-302
PROJ. NO.
SURF. ELEV.

GROUND WATER OBSERVATIONS
At _____ after ____ Hours
At _____ after ____ Hours

	CASING	SAMPLER	CORE BAR.
Type	HW	S/S	
Size I.D.	4"	1-3/8"	
Hammer Wt.	300#	140#	BIT
Hammer Fall	24"	30"	

DATE	
Start	10/25/02
Complete	10/25/02
Boring Foreman	G. Brouillette
Inspector/Engr.	

LOCATION OF BORING On Water (Air & Water 34.5')

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE No.	Pen"	Rec."
		0.0-2.0	D	Wt.	Rods	2			Black MUCK - Organic Silt	1	24	12
						13		0.5	Gray fine to medium SAND, trace gravel			
		2.0-4.0	D	12	14	18				2	24	12
						13						
		4.0-6.0	D	15	18	30				3	24	14
5						62						
								6.0	Bottom of Boring 6'			

GROUND SURFACE TO _____ USED _____ CASING: THEN _____

Sample Type
D=Drive C=Cored W=Washed
UP=Fixed Piston UT=Shelby Tube
TP=Test Pit A=Auger
OE = Open End Rod
* 300# hammer

Proportions Used

trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb. Wt x 30" fall on 2" O.D. Sampler

Cohesionless	Density	Cohesive	Consistency	
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med. Dense	4-8	M./Stiff	
30-50	Dense	8-15	Stiff	
50+	Very Dense	15-30	V-Stiff	

SUMMARY:
Earth Boring 6'
Rock Coring
Samples 3

HOLE NO. M-302

GUILD DRILLING CO., INC.

100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 1 OF 1

TO Apex Environmental, Inc.
PROJECT NAME New Bedford Harbor Dredge
REPORT SENT TO above / Borings

ADDRESS Boston, MA
LOCATION New Bedford, MA
OUR JOB NO. 03-125

HOLE NO. M-303
PROJ. NO.
SURF. ELEV.

GROUND WATER OBSERVATIONS

At _____ after ____ Hours

At _____ after ____ Hours

	CASING	SAMPLER	CORE BAR.
Type	HW	S/S	
Size I.D.	4"	1-3/8"	
Hammer Wt.	300#	140#	BIT
Hammer Fall	24"	30"	

DATE	
Start	10/25/02
Complete	10/25/02
Boring Foreman	G. Brouillette
Inspector/Engr.	

LOCATION OF BORING On Water (Air & Water 29.0')

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE No.	Pen"	Rec."
		0.0-2.0	D	Wt.	of	Rods			Black MUCK - Organic Silt	1	24	8
		2.0-4.0	D	1	1	3		2.0	Gray fine to medium SAND	2	24	10
						6						
		4.0-6.0	D	5	5	6				3	24	16
5						7						
								6.0	Bottom of Boring 6'			

GROUND SURFACE TO _____ USED _____ CASING: THEN _____

Sample Type
D=Drive C=Cored W=Washed
UP=Fixed Piston UT=Shelby Tube
TP=Test Pit A=Auger
OE = Open End Rod
* 300# hammer

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb. Wt x 30" fall on 2" O.D. Sampler

Cohesionless	Density	Cohesive	Consistency	
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med. Dense	4-8	M./Stiff	
30-50	Dense	8-15	Stiff	
50+	Very Dense	15-30	V-Stiff	

SUMMARY:
Earth Boring 6'
Rock Coring
Samples 3

HOLE NO. M-303

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 1 OF 1

O Apex Environmental, Inc.	ADDRESS Boston, MA	HOLE NO. M-305
ROJECT NAME New Bedford Harbor Dredge	LOCATION New Bedford, MA	PROJ. NO.
EPORT SENT TO above / Borings	OUR JOB NO. 03-125	SURF. ELEV.

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR.	DATE	
At ____ after ____ Hours	Type	HW	S/S		Start	10/28/02
	Size I.D.	4"	1-3/8"		Complete	10/28/02
At ____ after ____ Hours	Hammer Wt.	300#	140#	BIT	Boring Foreman	G. Brouillette
	Hammer Fall	24"	30"		Inspector/Engr.	

LOCATION OF BORING On Water (Air & Water 30.0')

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE No.	Pen"	Rec."
		0.0-2.0	D	Wt.	of	Rods			Black Organic SILT and Sea Shells, trace fine to medium sand	1	24	0
		2.0-4.0	D	Wt.	of	Rods				2	24	6
5		4.0-6.0	D	1	2	4				3	24	5
						6						
		6.0-8.0	D	8	10	14				4	24	22
						14		7.0	Brown fine to medium SAND			
									Bottom of Boring 8'			
								8.0				

ROUND SURFACE TO ____ USED ____ CASING: THEN ____

Sample Type	Proportions Used	140 lb. Wt x 30" fall on 2" O.D. Sampler				
D=Drive C=Cored W=Washed	trace 0 to 10%	Cohesionless	Density	Cohesive	Consistency	
JP=Fixed Piston UT=Shelby Tube	little 10 to 20%	0-10	Loose	0-4	Soft	30 + Hard
TP=Test Pit A=Auger	some 20 to 35%	10-30	Med. Dense	4-8	M./Stiff	
DE = Open End Rod	and 35 to 50%	30-50	Dense	8-15	Stiff	
300# hammer		50+	Verv Dense	15-30	V-Stiff	

SUMMARY:
Earth Boring 8'
Rock Coring
Samples 4

HOLE NO. M-305

GUILD DRILLING CO., INC.

100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 1 OF 1

TO Apex Environmental, Inc. | ADDRESS Boston, MA | HOLE NO. M-306

PROJECT NAME New Bedford Harbor Dredge | LOCATION New Bedford, MA | PROJ. NO.

REPORT SENT TO above / Borings | OUR JOB NO. 03-125 | SURF. ELEV.

GROUND WATER OBSERVATIONS

At _____ after ____ Hours

At _____ after ____ Hours

	CASING	SAMPLER	CORE BAR.
Type	HW	S/S	
Size I.D.	4"	1-3/8"	
Hammer Wt.	300#	140#	BIT
Hammer Fall	24"	30"	

DATE	
Start	10/28/02
Complete	10/28/02
Boring Foreman	G. Brouillette
Inspector/Engr.	

LOCATION OF BORING On Water (Air & Water 20.0')

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE No.	Pen"	Rec."
		0.0-2.0	D	Wt.	of	Rods			Black fine to coarse SAND	1	24	6
		2.0-4.0	D	WOR	1	1		2.0	Black fine SAND	2	24	5
						WOR						
		4.0-6.0	D	2	4	5				3	24	12
5						7		5.0	Gray fine to medium SAND			
		6.0-8.0	D	10	10	24				4	24	14
						36			" trace gravel			
		8.0-10.0	D	25	20	19		8.0		5	24	12
						17			Brown fine to medium SAND and Gravel			
10		10.0-12.0	D	18	9	10				6	24	12
						12						
		12.0-14.0	D	10	9	8				7	24	14
						8						
		14.0-16.0	D	8	10	10				8	24	8
15						13						
								16.0	Bottom of Boring 16'			

GROUND SURFACE TO _____ USED _____ CASING: THEN _____

Sample Type
D=Drive C=Cored W=Washed
UP=Fixed Piston UT=Shelby Tube
TP=Test Pit A=Auger
OE = Open End Rod
* 300# hammer

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb. Wt x 30" fall on 2" O.D. Sampler

Cohesionless	Density	Cohesive	Consistency
0-10	Loose	0-4	Soft
10-30	Med. Dense	4-8	M./Stiff
30-50	Dense	8-15	Stiff
50+	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY:
Earth Boring 16'
Rock Coring
Samples 8

HOLE NO. M-306

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 1 OF 1

TO Apex Environmental, Inc.
PROJECT NAME New Bedford Harbor Dredge
REPORT SENT TO above / Borings

ADDRESS Boston, MA
LOCATION New Bedford, MA
OUR JOB NO. 03-125

HOLE NO. M-307
PROJ. NO.
SURF. ELEV.

GROUND WATER OBSERVATIONS

At _____ after ____ Hours
At _____ after ____ Hours

	CASING	SAMPLER	CORE BAR.
Type	HW	S/S	
Size I.D.	4"	1-3/8"	
Hammer Wt.	300#	140#	BIT
Hammer Fall	24"	30"	

DATE	
Start	10/28/02
Complete	10/28/02
Boring Foreman	G. Brouillette
Inspector/Engr.	

LOCATION OF BORING On Water (Air & Water 24.0')

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev./Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE No.	Pen*	Rec.*
		0.0-2.0	D	Wt.	of	Rods			Black Organic SILT and Sand	1	24	0
		2.0-4.0	D	Wt.	of	Rods				2	24	11
						1						
		4.0-6.0	D	8	8	7		4.0	Brown fine SAND	3	24	24
5						11						
		6.0-8.0	D	5	7	10				4	24	22
						10		7.0	Gray fine SAND			
		8.0-10.0	D	6	6	9				5	24	20
						7						
10		10.0-12.0	D	8	10	11				6	24	24
						14						
								12.0	Bottom of Boring 12'			

GROUND SURFACE TO _____ USED _____ CASING: THEN _____

Sample Type
D=Drive C=Cored W=Washed
UP=Fixed Piston UT=Shelby Tube
TP=Test Pit A=Auger
OE = Open End Rod
* 300# hammer

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb. Wt x 30" fall on 2" O.D. Sampler

Cohesionless	Density	Cohesive	Consistency
0-10	Loose	0-4	Soft
10-30	Med. Dense	4-8	M./Stiff
30-50	Dense	8-15	Stiff
50+	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY:
Earth Boring 12'
Rock Coring
Samples 6

HOLE NO. M-307

Apex Environmental, Inc.
374 Congress Street, Suite 508
Boston, MA 02210
Phone: 617.728.0070

PROJECT
New Bedford Harbor Dredge - Phase II
New Bedford, Massachusetts

BORING NO. CAD-1
SHEET 1 of 3
FILE NO. 6542.003
CHKD. BY K. Hartel

Boring Co.	New Hampshire Boring	Boring Location	Northing 2696013.2	Easting 815159.3	
Driller	Barry Wordell	Mudline El.	-30.6	Datum	MLLW
Logged By	Joe Kraycik	Date Start	9/20/2004	Date End	9/20/2004

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: Barge Mounted Diedrich D50 ATV
Drilling Method: 4-inch (PW) 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								ORGANIC SILT	
2									
3									
4									
5		S1	24/24	4-6	3-9-7-5	16	Sandy organic silt and clay (OL/OH); Black, very stiff, organic odor; Grades to well-graded sand (SW) with trace organics that is dark gray and medium dense; Fine sand: 25%, medium sand: 40%, coarse sand: 25%, organics: <10%.		
6								GLACIO-FLUVIAL	
7									
8									
9		S2	24/17	8-10	2-2-3-3	5	Poorly-graded sand with trace silt and gravel (SP); Olive gray, loose; Silt: 5%, fine sand: 40%, medium sand: 35%, coarse sand: 15% gravel: 5%.		
10									
11									
12									
13									
14									
15		S3	24/8	14-16	2-2-2-3	4	Poorly-graded sand (SP) similar to S2.		
16									
17									
18									
19									
20		S4	24/7	19-21	2-3-8-14	11	Poorly-graded sand and silt (SM); Silt: 30%, fine sand: 50%, medium sand: 10%, coarse sand: 10%.		

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:

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PROJECT
New Bedford Harbor Dredge - Phase II
New Bedford, Massachusetts

BORING NO. CAD-1
SHEET 2 of 3
FILE NO. 6542.003
CHKD. BY K. Hartel

Boring Co.	New Hampshire Boring	Boring Location	Northing 2696013.2	Easting 815159.3	
Driller	Barry Wordell	Mudline El.	-30.6	Datum	MLLW
Logged By	Joe Kraycik	Date Start	9/20/2004	Date End	9/20/2004

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: Barge Mounted Diedrich D50 ATV
Drilling Method: 4-inch (PW) 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
21							(cont.) Poorly-graded sand and silt (SM); Silt: 30%, fine sand: 50%, medium sand: 10%, coarse sand: 10%.	GLACIO-FLUVIAL	
22									
23									
24									
25		S5	24/12	24-26	9-9-6-10	15	Poorly-graded sand with gravel (SP); Possible wash sample; Olive gray, medium density; Fine sand: 10%, medium sand: 15%, coarse sand: 50%, gravel: 25%.		
26									
27									
28									
29									
30		S6	23/7	29-31	10-8-24-100/5"	32	Well-graded sand and gravel (SW); Brown, dense; Fine sand: 15%, medium sand: 20%, coarse sand: 40%, gravel: 25%; Gravel is fine to medium , sub-rounded to sub-angular and composed of quartz, K-feldspar, and granite. Advance casing to 34 feet.		
31									
32									
33									
34									
35		S7	24/7	34-36	16-9-12-38	21	Well-graded sand and gravel (SW) similar to S6 with increasing gravel content and trace silt.		
36									
37									
38									
39									
40		S8	24/10	39-41	6-3-7-19	10	Well-graded gravel and sand (GW); Brownish gray, medium density; Silt: 5%, fine sand: 10%, medium sand: 10%, coarse sand: 20%, gravel: 55%.		

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:

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PROJECT
New Bedford Harbor Dredge - Phase II
New Bedford, Massachusetts

BORING NO. CAD-1
SHEET 3 of 3
FILE NO. 6542.003
CHKD. BY K. Hartel

Boring Co.	New Hampshire Boring	Boring Location	Northing 2696013.2	Easting 815159.3	
Driller	Barry Wordell	Mudline El.	-30.6	Datum	MLLW
Logged By	Joe Kraycik	Date Start	9/20/2004	Date End	9/20/2004

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: Barge Mounted Diedrich D50 ATV
Drilling Method: 4-inch (PW) 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
41							(cont.) Well-graded gravel and sand (GW); Brownish gray, medium density; Silt: 5%, fine sand: 10%, medium sand: 10%, coarse sand: 20%, gravel: 55%.	GLACIO-FLUVIAL	
42									
43									
44									
45		S9	24/8	44-46	4-3-3-7	6	Well-graded gravel and sand (GW) similar to S8.		
46									
47									
48									
49									
50									
51									
52									
53									
54									
55		S10	5/5	54-54.4	100/5"		Well-graded gravel and sand (GW) similar to S8. Iron staining observed.		
56							Bottom of Exploration at 54.4 ft.		
57									
58									
59									
60									

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:

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PROJECT
New Bedford Harbor Drege - Phase II
New Bedford, Massachusetts

BORING NO.	CAD-2
SHEET	1 of 3
FILE NO.	6542.003
CHKD. BY	K. Hartel

Boring Co.	New Hampshire Boring	Boring Location	Northing 2695565.3	Easting 814905.3	
Driller	Barry Wordell	Mudline El.	-30.6	Datum	MLLW
Logged By	Joe Kraycik	Date Start	9/23/2004	Date End	9/24/2004

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: Barge Mounted Diedrich D50 ATV
Drilling Method: 4-inch (PW) 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 (ft)	Casing Blows	Type & No.	PEN/REC (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	SPT N-Value	SAMPLE DESCRIPTION (ASTM D2488)	STRATUM DESCRIPTION	REMKS
1								ORGANIC SILT	
2		S1	24/12	1-3	WOR		Organic silt and clay (OL/OH); black, organic odor.		
3									
4		S2	24/10	3-5	6-3-3-1	6	Poorly-graded sand and silt with trace organics (SM); Brownish-black, loose, slight organic odor; Fine sand: 50%, medium sand: 10%, silt: 35%, organics:25%.	GLACIO-FLUVIAL	
5									
6		S3	1/1	5-5.1	100/1"		Refusal; Brownish-black, fine to medium sand with some silt. Pulled casing, set spuds, readvance casing to 6'. Windy conditions moving barge.		
7		S4	24/11	6-8	13-9-13-14	22	Well-graded gravel and sand (GW); Brown , medium dense; Fine sand: 10%, medium sand: 10%, coarse sand: 25%, gravel: 15%; Gravel is composed of quartz, K and Na feldspar, granite, olivine, and is subrounded to subangular.		
8									
9		S5	24/8	8-10	13-11-9-23	20	Well-graded gravel and sand (GW); Reddish-brown, medium dense, similar to S4.		
10									
11									
12		S6	24/9	11-13	100-21-14-14	35	Poorly-graded sand and gravel with trace silt (SP); Brownish-gray, dense: Fine sand: 10%, medium sand: 15%, coarse sand: 30%, gravel: 30%, silt: 15%.		
13									
14		S7	24/7	13-15	17-8-3-2	11	Well-graded sand and gravel with trace silt (SW); Brownish-gray, medium dense; Fine sand: 15%, medium sand: 15%, coarse sand: 30%, gravel: 35%, silt: 5%.		
15									
16									
17		S8	19/12	16-18	1-1-1-100/1		Poorly-graded sand with some gravel (SP); Olive gray, very loose; Fine sand: 40%, medium sand: 20%, coarse sand: 15%, gravel: 25%.		
18									
19							Advance (drive) casing to 18.5. Roller bit refusal at 18.5. Core rock from 18.5 to 21.5 - boulder. (see rock core log, page 3).		
20									

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:

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PROJECT
New Bedford Harbor Drege - Phase II
New Bedford, Massachusetts

BORING NO. CAD-2
SHEET 2 of 3
FILE NO. 6542.003
CHKD. BY K. Hartel

Boring Co.	New Hampshire Boring	Boring Location	Northing 2695565.3	Easting 814905.3	
Driller	Barry Wordell	Mudline El.	-30.6	Datum	MLLW
Logged By	Joe Kraycik	Date Start	9/23/2004	Date End	9/24/2004

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: Barge Mounted Diedrich D50 ATV
Drilling Method: 4-inch (PW) 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
21							end of boulder encountered at 21.5 ft.		
22							Telescope 3" casing inside 4" casing; advance casing to 22 ft.		
23		S8	24/7	22-24	5-7-10-11	17	Poorly-graded sand and gravel (SP); Light brown., medium dense: Fine sand: 5%, medium sand: 15%, coarse sand: 40%, gravel: 40%; Gravel is composed of quartz, K feldspar, granite, gneiss, fine to coarse grained, and subrounded to subangular,		
24									
25		S9	24/9	24-26	10-8-30-33	38	Well-graded gravel and sand (GW); Light brown, dense; Fine sand: 5%, medium sand: 10%, coarse sand: 35%, gravel 50%; Composition of gravel is similar to S8.		
26									
27		S10	17/10	26-27.4	16-21-100/5"	-	Well-graded gravel and sand with trace silt (GW); Brownish-gray. Split spoon refusal at 27.4 ft. See page 3 for log of rock core.		
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									

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:

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PROJECT
New Bedford Harbor Drege - Phase II
New Bedford, Massachusetts

BORING NO. CAD-2
SHEET 3 of 3
FILE NO. 6542.003
CHKD. BY K. Hartel

Boring Co.	New Hampshire Boring	Boring Location	Northing 2695565.3	Easting 814905.3	
Driller	Barry Wordell	Mudline El.	-30.6	Datum	MLLW
Logged By	Joe Kraycik	Date Start	9/23/2004	Date End	9/24/2004

Sample 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 Barge Mounted Diedrich D50 ATV
Drilling Method 4-inch (PW) 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
18						
		C1	18.5-19.5	5	Begin C1 at 18.5 ft.	
19						
			19.5-20.5	2.5	White to pink, fine to medium grained granitic gneiss recovered.	
20					Out of rock (boulder) at 21.5 ft.	
			20.5-21.5	3		
21					End C1 at 21.5 ft.	
					REC=88% RQD=45%	
22						
23					(See page 2 for drilling and sampling data from 21.5 ft to 27.4 ft.)	
24						
25						
26						
27					Begin C2 at 27.4 ft.	
		C2	27.4-28.4	4.5	White to pink, fine to medium grained granitic gneiss; No breaks.	
28						
			28.4-29.4	4	No breaks	
29						
			29.4-30.4	3	Highly fractured with horizontal and vertical breaks; Iron staining; Sand present.	
30						
			30.4-31.4	2	Horizontal break present; Iron staining and sand at breaks.	
31						
			31.4-32.4	4.5	End C2 at 32.4 ft.	
32					REC=82% RQD=75%	
			32.4-33.4	3	Begin C3 at 32.4 ft.	
33					White to pink, fine to medium grained granitic gneiss.	
			33.4-34.4	2	One low-angle break.	
34						
			34.4-35.4	3	Three low-ang;e breaks; Iron staining and sand in breaks.	
35						
			35.4-36.4	4	Highly fractured with horizontal and vertical breaks.	
36					One horizontal break.	
			36.4-37.4	4	End C3 at 37.4 ft. REC=88% RQD=45%	
37					Bottom of Exploration at 37.4 ft.	

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)
2)
3)
4)

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PROJECT
New Bedford Harbor Dredge - Phase II
New Bedford, Massachusetts

BORING NO. CAD-3
SHEET 1 of 2
FILE NO. 6542.003
CHKD. BY K. Hartel

Boring Co.	New Hampshire Boring	Boring Location	Northing 2695904.6	Easting 814775	
Driller	Barry Wordell	Mudline El.	-32.5	Datum	MLLW
Logged By	Tom Stolworthy	Date Start	9/2/2004	Date End	9/3/2004

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: Barge Mounted Diedrich D50 ATV
Drilling Method: 4-inch (PW) 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							No Samples Taken to depth of 11.5 ft		
2									
3							See log of boring 3A		
4									
5									
6									
7									
8									
9									
10									
11									
12		S1	24/19	11.5-13.5	6-12-29-15	41	SM; Olive gray, fine sand and silt, little medium sand, organic odor.	GLACIO-FLUVIAL	
13									
14		S2	24/19	13.5-15.5	5-4-10-13	14	SM; Olive gray, fine sand and silt, organic odor.		
15									
16		S3	24/16	15.5-17.5	8-9-8-8	17	SM; Light gray, fine sand sand and silt with trace amounts of corase sand; slight organic odor.		
17									
18		S4	24/22	17.5-19.5	1-4-33-20	37	SM; Light gray, fine sand and slit, slight organic odor.		
19									
20		S5	24/24	19.5-21.5	3-6-8-6	14	SP; Gray, corse and medium sand with some fine sand, poorly sorted to 21 feet,		

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:

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PROJECT
New Bedford Harbor Dredge - Phase II
New Bedford, Massachusetts

BORING NO. CAD-3
SHEET 2 of 2
FILE NO. 6542.003
CHKD. BY K. Hartel

Boring Co.	New Hampshire Boring	Boring Location	Northing 2695904.6	Easting 814775	
Driller	Barry Wordell	Mudline El.	-32.5	Datum	MLLW
Logged By	Tom Stolworthy	Date Start	9/2/2004	Date End	9/3/2004

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: Barge Mounted Diedrich D50 ATV
Drilling Method: 4-inch (PW) 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
21							(cont.) SP; Gray, corse and medium sand with some fine sand, poorly sorted to 21 feet, slight clay stringer to 21.5 feet.	GLACIO-FLUVIAL	
22		S6	24/10	21.5-23.5	14-20-8-8	28	SP; Gray/brown, coarse sand with little fine sand and trace amounts of fine gravel, poorly sorted.		
23									
24		S7	24/19	23.5-25.5	20-16-14-22	30	SP; Gray/brown, coarse sand with little fine sand and gravel, poorly sorted.		
25									
26		S8	24/12	25.5-27.5	8-13-21-3	34	SP; Brown, coarse sand with little fine gravel and trace fine to medium sand, poorly sorted.		
27									
28		S9	24/10	27.5-29.5	14-11-6-17	17	SP; Borwn, coarse sand with some fine gravel and little fine to medium sand with trace cobbles, poorly sorted.		
29									
30		S10	18/13.5	29.5-31	12-49-130	179	SP; Brown, coarse sand with some fine gravel and little fine to medium sand, poorly sorted to 31 feet.		
31							Gray, fine sand with clasts of granitic gneiss.		
32							Unable to core rock due to mechanical problems with drill rig. Bottom of exploration at 31 ft.		
33									
34									
35									
36									
37									
38									
39									
40									

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:

Apex environmental, inc.
374 Congress Street, Suite 508
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PROJECT
New Bedford Harbor Dredge - Phase II
New Bedford, Massachusetts

BORING NO.	CAD-3A
SHEET	1 of 3
FILE NO.	6542.003
CHKD. BY	K. Hartel

Boring Co.	New Hampshire Boring	Boring Location	Northing 2695897.9	Easting 814773.3	
Driller	Barry Wordell	Mudline El.	-32.5	Datum	MLLW
Logged By	Joe Kraycik	Date Start	9/13/2004	Date End	9/14/2004

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: **Barge Mounted Diedrich D50 ATV**
Drilling Method: **4-inch (PW) 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
1			24/0	0-2	WOR	WOR	No Recovery	ORGANIC SILT	
2									
3		S1	24/24	2-4	WOR	WOR	Organic silt and clay (OL/OH); Black, soft, strong odor; Coarsens downwards, bottom 2 inches composed of gray, fine to medium sand and silt (SM) ; Silt: 30%, fine sand: 45%, medium sand: 25%.		
4									
5		S2	24/18	4-6	16-12-15-17	27	Fine to medium sand and silt with trace clay and organics (SM); Gray, medium dense, organic odor; Clay: <5%, silt: 35%, fine sand: 45%, medium sand: 10-15%, organics: <5%.	GLACIO-FLUVIAL	
6									
7		S3	24/15	6-8	6-5-4-3	9	Poorly-graded sand with some silt (SP-SM); Olive gray, loose; Silt: 5-10%, fine sand: 50%, medium sand: 30-40%, coarse sand: 5-10%.		
8									
9		S4	24/17	8-10	2-2-2-3	4	Same as above (SP-SM). Casing sank under own weight. Advanced boring to 24 ft. (See log of boring CAD-3 for stratigraphy).		
10									
11									
12									
13									
14									
15									
16									
17									
18							Note: from approximately 18 to 24 ft depth, spinning casing became difficult and it was necessary to drive the casing.		
19									
20									

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:

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PROJECT
New Bedford Harbor Dredge - Phase II
New Bedford, Massachusetts

BORING NO.	CAD-3A
SHEET	2 of 3
FILE NO.	6542.003
CHKD. BY	K. Hartel

Boring Co.	New Hampshire Boring	Boring Location	Northing 2695897.9	Easting 814773.3	
Driller	Barry Wordell	Mudline El.	-32.5	Datum	MLLW
Logged By	Joe Kraycik	Date Start	9/13/2004	Date End	9/14/2004

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: Barge Mounted Diedrich D50 ATV
Drilling Method: 4-inch (PW) 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
21									
22									
23									
24									
25		S5	24/13	24-26	9-3-5-4	8	Well-graded sand with trace silt and gravel (SW); Olive grey, loose; Silt: <5%, fine sand: 45%, medium sand: 30%, coarse sand: 10%, gravel: <5%.	GLACIO-FLUVIAL	
26									
27		S6	24/17	26-28	7-3-3-4	6	Well-graded sand and gravel with trace silt (SW); Olive gray, loose, coarsens at 27.5 feet; Silt: <5%, fine sand: 35%, medium sand: 20%, coarse sand: 25%, gravel: 10-15%.		
28									
29		S7	24/	28-30	3-4-4-9	8	Well-graded sand and gravel with trace silt (SW); Light brown, loose; Silt: <5%, fine gravel is fine to medium grained.		
30								GLACIAL TILL	
31		S8	9/	30-30.75	9-100/3"	-	Well-graded sand and gravel (SW); Gray, very dense, some coarse gravel present; Silt: <5%, fine sand: 30%, medium sand: 15%, coarse sand: 20%, gravel: 30%.		
32							Spoon hit refusal at 30.75 feet. Begin rock core at 30.75 ft. Boring log continued on next page.		
33									
34									
35									
36									
37									
38									
39									
40									

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.

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PROJECT
New Bedford Harbor Dredge - Phase II
New Bedford, Massachusetts

BORING NO.	CAD-3A
SHEET	3 of 3
FILE NO.	6542.003
CHKD. BY	K. Hartel

Boring Co.	New Hampshire Boring	Boring Location	Northing 2695897.9	Easting 814773.3	
Driller	Barry Wordell	Mudline El.	-32.5	Datum	MLLW
Logged By	Joe Kraycik	Date Start	9/13/2004	Date End	9/14/2004

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 Barge Mounted Diedrich D50 ATV
Drilling Method 4-inch (PW) 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
		C1			Begin C1 at 30.75 ft.	
31			30.75-31.75	7	Fine to medium grained, highly weathered, gray/pink granitic gneiss; Horizontal fractures.	
32			31.75-32.75	5	Approximate 4" drop at 32.7 ft.	
33			32.75-33.75	3	Quartz pegmatite intrusions, higlhy weathered with gravel and cobbles; Horizontal fractures.	
34			33.75-34.75	2	Approximate 1 ft drop at 34.1 ft.	
35			34.75-35.75	3	End C1 at 35.75 ft. REC=62% RQD=44%	
					Begin C2 at 35.75 ft.	
36		C2	35.75-36.75	6	Fine to medium grained, light gray/pink granitic gneiss; Horizontally fractured with sand in fractures.	
37			36.75-37.75	3	Low angle fracture (10-20°) with sand in fracture, weathered.	
38			37.75-38.75	5	Medium to high angle fracture with silt in fracture, weathered.	
39			38.75-39.75	6	Slightly darker with more foliation and banding.	
40			39.75-40.75	7	End C2 at 40.75 ft.	
					REC=78% RQD=91%	
41						
					Bottom of exploration at 40.75 ft.	
42						
43						
44						
45						
46						
47						
48						
49						
50						

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)
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PROJECT
New Bedford Harbor Dredge - Phase II
New Bedford, Massachusetts

BORING NO. CAD-4
SHEET 1 of 3
FILE NO. 6542.003
CHKD. BY K. Hartel

Boring Co.	New Hampshire Boring	Boring Location	Northing 2695138.5	Easting 814853.4	
Driller	Barry Wordell	Mudline El.	-29.5	Datum	MLLW
Logged By	Joe Kraycik	Date Start	9/16/2004	Date End	9/16/2004

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: Barge Mounted Diedrich D50 ATV
Drilling Method: 4-inch (PW) 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								ORGANIC SILT	
2		S1	24/24	1.5-3.5	6-12-16-18	28	Sandy organic soil (OL/OH); Black, very stiff; Organic silt/clay: 65%, fine sand: 25%, medium sand: 10%.		
3							At 3 ft: Poorly graded sand and silt (SP-SM); gray, medium dense; fine sand 65%, medium sand 20%, silt 10 - 15%.		
4								GLACIO-FLUVIAL	
5									
6									
7		S2	24/15	6.5-8.5	5-8-6-4	14	Poorly-graded sand (SP); Olive gray, medium dense; Fine sand: 50%, medium sand: 40%, coarse sand: 10%, trace shell fragments.		
8									
9									
10									
11									
12		S3	24/17	11.5-13.5	9-5-8-9	13	Poorly graded sand with silt (SP-SM); Olive gray, medium dense; Fine sand: >60%, medium sand: 20%, silt: 10-15%, clay: <5%.		
13									
14									
15									
16									
17		S4	24/12	16.5-18.5	3-3-3-5	6	Well-graded sand with some gravel (SW); Olive gray, loose; Fine sand: 25%, medium sand: 45%, coarse sand: 20%, gravel: 5-10%.		
18									
19									
20									

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:

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PROJECT
New Bedford Harbor Dredge - Phase II
New Bedford, Massachusetts

BORING NO. CAD-4
SHEET 2 of 3
FILE NO. 6542.003
CHKD. BY K. Hartel

Boring Co.	New Hampshire Boring	Boring Location	Northing 2695138.5	Easting 814853.4	
Driller	Barry Wordell	Mudline El.	-31.9	Datum	MLLW
Logged By	Joe Kraycik	Date Start	9/16/2004	Date End	9/16/2004

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: **Barge Mounted Diedrich D50 ATV**
Drilling Method: **4-inch (PW) 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
21									
22		S5	24/12	21.5-23.5	9-10-19-16	29	Well-graded sand and gravel (SW); Brownish-gray, medium dense; Fine sand: 10%, medium sand: 15%, coarse sand: 40%, gravel: 35%; Fine to coarse, subrounded to subangular; Quartz, K-feldspar, olivine, granite, gneiss.		
23									
24									
25									
26									
27		S6	24/9	26.5-28.5	16-18-19-30	37	Well-graded gravel with sand (GW); Brown, dense; Fine sand: <5%, medium sand: 10%, coarse sand: 25%, gravel: 60%; Fine to coarse, coarse gravel on top; Mineral content similar to above.		
28									
29									
30									
31									
32									
33		S7		32-34	28-13-34-83	47	Gravel with silt and sand (GW); Gray, dense; Silt: 30%, fine sand: 10%, medium sand: 10%, coarse sand: 10%, gravel: 45%.		
34									
35									
36									
37									
38									
39									
40		S8	24/9	39-41	43-13-19-9	32	Well-graded gravel with silt and sand (GW); Gray, dense; Silt: 20%, fine sand: 10%, medium sand: 15%, coarse sand: 15%, gravel: 40%.		

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:

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PROJECT
New Bedford Harbor Dredge - Phase II
New Bedford, Massachusetts

BORING NO. CAD-4
SHEET 3 of 3
FILE NO. 6542.003
CHKD. BY K. Hartel

Boring Co.	New Hampshire Boring	Boring Location	Northing 2695138.5	Easting 814853.4	
Driller	Barry Wordell	Mudline El.	-31.9	Datum	MLLW
Logged By	Joe Kraycik	Date Start	9/16/2004	Date End	9/16/2004

Sampler: 2-inch O.D. split-barrel sampler driven 24 inches with a 140 lb. center ho hammer free falling from a height of 30 inche
Drill Rig Barge Mounted Diedrich D50 ATV
Drilling Method 4-inch (PW) flush joint drill casing
Casing driven with a 300 lb. Center hole hammer free falling from a height of 24 inch

Groundwater Readings Not Applicable for Offshore Boring:

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
41							(cont.) Well-graded gravel with silt and sand (GW); Gray, dense; Silt: 20%, fine sand: 10%, medium sand: 15%, coarse sand: 15%, gravel: 40%.		
42									
43									
44									
45		S9	17/	44-45.4	43-82-100/5"	-	Well-graded gravel with sand (GW) some silt and clay; Gray, very dense; Silt: 20%, fine sand: 10%, medium sand: 15%, coarse sand: 10%, gravel: 40%, clay: <5%. Split spoon refusal at 45.4 ft.		
46									
47							Bottom of exploration at 45.4 ft.		
48									
49									
50									
51									
52									
53									
54									
55									
56									
57									
58									
59									
60									

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:

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PROJECT
New Bedford Harbor Dredge - Phase II
New Bedford, Massachusetts

BORING NO. CAD-5
SHEET 1 of 2
FILE NO. 6542.003
CHKD. BY K. Hartel

Boring Co.	New Hampshire Boring	Boring Location	Northing 2695179.3	Easting 814434.5	
Driller	Barry Wordell	Mudline El.	-31.3	Datum	MLLW
Logged By	Joe Kraycik	Date Start	9/15/2004	Date End	9/15/2004

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: Barge Mounted Diedrich D50 ATV
Drilling Method: 4-inch (PW) 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		S1	24/0	0-2			No recovery	ORGANIC SILT	
2									
3		S2	24/24	2-4	9-12-15-10	27	2 to 3.25 feet: Organic silt and clay (OL/OH); Black, organic odor; 3.25 to 4 feet: Fine sand and silt (SM); Gray; Coarsens with depth to a well-graded sand and gravel (SW); Light brown, medium dense; Some organic odor; Silt: 5-10%, fine sand: 30%, medium sand: 25%, coarse sand: 30%, gravel: 15%.		
4								GLACIO FLUVIAL	
5		S3	24/14	4-6	11-7-9-14	16	Well-graded sand and gravel with trace silt (SW); Brown, medium dense; Possible wash; Silt: 5%, fine sand: 20%, medium sand: 35%, coarse sand: 25%, gravel: 15%.		
6									
7									
8									
9									
10									
11		S4	24/9	10-12	22-28-25-8	53	Well-graded sand and gravel with silt (SW-SM); Light brown, very dense; Silt: 15%, fine sand: 15%, medium sand: 20%, coarse sand: 30%, gravel: 20%; Gravel is fine to coarse grained, rounded to sub-angular, and composed of quartz, K and Na feldspar, and granite.		
12									
13									
14									
15									
16		S5	24/14	15-17	21-24-9-12	33	Similar to S4 (SW-SM); Silt: 10%.		
17									
18									
19							Well-graded gravel with sand (GW); Medium sand: 35%, coarse sand: 35%, gravel: 40%; Gravel is fine to coarse grained, rounded to subangular, and composed of quartz, K and Na feldspar, and granite. Prepare to core rock at 20.4 ft.		
20		S6	5/3	20-20.4	100/5"	-			

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:

Apex Environmental, Inc.
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Boston, MA 02210
Phone: 617.728.0070

PROJECT
New Bedford Harbor Dredge - Phase II
New Bedford, Massachusetts

BORING NO.	CAD-5
SHEET	2 of 2
FILE NO.	6542.003
CHKD. BY	K. Hartel

Boring Co.	New Hampshire Boring	Boring Location	Northing 2695179.3	Easting 814434.5	
Driller	Barry Wordell	Mudline El.	-31.3	Datum	MLLW
Logged By	Joe Kraycik	Date Start	9/15/2204	Date End	9/15/2004

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 Barge Mounted Diedrich D50 ATV
Drilling Method 4-inch (PW) 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
		C1	20.4-21.4	5	Reddish, highly weathered and fractured pegmatite, 70% quartz veins, 30% granite, sand and silt	
21					present in fractures.	
			21.4-22.4	3.5	Pink/white/black medium coarse granite, weathered, horizontal and vertical fractures.	
22						
			22.2-23.4	3	Similar to 21.4-22.4, horizontal breaks, vertical fracture over entire interval; grading into	
23					granitic gneiss.	
			23.4-24.4	3	Pink/white granitic gneiss, horizontal banding, no fractures.	
24						
			24.4-25.4	3	Similar to 23.4-24.4, weathered horizontal break at 24.7', high angle healed fracture last 3".	
25					End of C1 at 25.4 ft. REC=93% RQD=65%	
		C2	25.4-26.4	3	Granitic gneiss similar to 23.4-24.4, horizontal fracture (mechanical) at 26.8', fracture	
26					(weathered) at 26 ft.	
			26.4-27.4	4	Horizontal and vertical fractures.	
27						
			27.4-28.4	3	Horizontal fractures, iron staining, sand in fractures, slightly weathered.	
28						
			28.4-29.4	3	Highly fractured, sand in fractures, iron staining.	
29						
			29.4-30.4	4	Horizontal and vertical fractures.	
30						
31					End of C2 at 30.4 ft.	
					REC= 95% RQD=80%	
32					Bottom of exploration at 30.4 ft.	
33						
34						
35						
36						
37						
38						
39						
40						

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:
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PROJECT
New Bedford Harbor Dredge - Phase II
New Bedford, Massachusetts

BORING NO.	CAD-6
SHEET	1 of 2
FILE NO.	6542.003
CHKD. BY	K. Hartel

Boring Co.	New Hampshire Boring	Boring Location	Northing 2695343.5	Easting 814674.3	
Driller	Barry Wordell	Mudline El.	-31.3	Datum	MLLW
Logged By	Joe Kraycik	Date Start	9/8/2004	Date End	9/10/2004

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: **Barge Mounted Diedrich D50 ATV**
Drilling Method: **4-inch (PW) 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								ORGANIC SILT	
2		S1	24/24	1-3	WOR-7-8	7	Black organic silt/clay (OL/OH); Organic odor; Coarsening downwards at bottom; Advance casing and roller bit to a depth of 2 feet.		
3		S2	24/21	2-4	6-7-10-14	17	Light brown, poorly-graded sand with some silt and trace coarse sand (SP-SM); medium dense; Trace OL/OH in top 6"; Silt: 15%, fine sand: 40%, medium sand: 35%, coarse sand: 5%, OL/OH: 5%; Some minor iron staining.	GLACIO-FLUVIAL	
4									
5		S3	24/18	4-6	9-7-5-5	12	Light brown, medium dense, well-graded sand with trace gravel and silt (SW); shell fragments, top 6" is primarily sand and silt, Silt: 5-10%, fine sand: 30%, med. sand: 30%, coarse sand: 25-30%, gravel: 5%.		
6									
7		S4	24/6	6-8	13-23-16-20	39	Reddish brown, dense, poorly-graded sand and gravel with trace silt (SP); Silt: 5%, medium sand:20%, coarse sand: 40%, gravel:35%; The gravel is rounded to sun-angular and composed of quartz, K and Na feldspar, granite, and gneiss; Note poor recovery.		
8									
9		S5	24/12	8-10	22-13-11-12	24	Reddish brown, medium dense well-graded gravel with sand (GW); Fine sand: 10%, medium sand: 15%, fine gravel: 25%, medium gravel: 35%, coarse gravel: 15%; Rock and mineral content same as 6-8 feet; Note poor recovery.		
10									
11		S6	24/10	10-12	16-16-11-10	27	Same as S5 (GW).		
12									
13		S7	24/10	12-14	16-13-12-16	25	Same as S5 with trace amounts of silt (<5%) (GW). Possible wash.		
14									
15		S8	24/11	14-16	12-27-19-9	46	Well-graded gravel (GW), possible wash; The bottom 4" is medium dense fine to medium sand with trace amounts of gravel; Fine sand: 50%, medium sand: 40%, gravel: 5%.		
16									
17		S9	3/3	16-16.25	100/3"	-	Well-graded sand and gravel with trace silt (SW); Fine sand: 15%, medium sand: 25%, coarse sand: 40%, gravel: 15%, silt: <5%. Refusal at 16.25 ft. Set up to core rock.		
18									
19									
20									

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:

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PROJECT
New Bedford Harbor Dredge - Phase II
New Bedford, Massachusetts

BORING NO. CAD-6
SHEET 2 of 2
FILE NO. 6542.003
CHKD. BY K. Hartel

Boring Co.
Driller
Logged By

Boring Location Northing 2695343.5 Easting 814674.3
Mudline El. -31.3 Datum MLLW
Date Start 9/8/2004 Date End 9/10/2004

Sample 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 Barge Mounted Diedrich D50 ATV
Drilling Method 4-inch (PW) 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	REMARKS
17		C1	16.3-17.3	9	Begin C1 at 16.3 ft.	
18			17.3-18.3	7	Granite. Possible boulder.	
19			18.3-19.3	9	Core dropped at 19.3 ft, approximate 4" void. Out of rock at approximately 20 ft.	
20					Pulled 3" casing from boring.	
21					Advanced roller bit through core run, to approximately 21 ft. Hit rock at 21 ft.	
22					Advanced roller bit through rock (possible boulder) to 24 ft.	
23					possible boulder from 21 to 24 ft.	
24						
25					driller advanced roller bit without sampling to 26 ft. Attempted split spoon sample at 26 ft. Drove spoon 100 blows for 2 inches.	
26					very coarse sand and gravel in tip. Set up to core rock. Begin C2 at 26 ft.	
27		C2	26-27	8	Fine to medium grained, slightly weatherd, light gray/pink granitic gneiss; Fractures at 42" and 44", likely mechanical; High angle fracture joints at 24-27".	
28			27-28	4		
29			28-29	5		
30			29-30	4		
31			30-31	7	end of C2 at 31 ft. REC=78% RQD=89%	
32		C3	31-32	3	begin C3 at 31 ft. Fine to medium grained, slightly weatherd, light gray/pink granitic gneiss	
33			32-33	1.5	31.42': Horizontal break, staining, weathered, 4' fracture zone; Pegmatite vein. 32.7': Pegmatite vein.	
34			33-34	2	33.75': Medium angle mechanical break, possibly along a fracture; 34'.	
35			34-35	1.5	34': Horizontal break, weathered, clay along pegmatite intrusion. 34.4-35': Horizontal and medium angle breaks, weathered, staining; Break at 34.4; at pegmatite	
36			35-36	2	intrusion.	
37					End of C3 at 36 ft. REC=97% RQD=80% Bottom of exploration at 36 ft.	
38						
39						
40						

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.

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PROJECT
New Bedford Harbor Dredge - Phase II
New Bedford, Massachusetts

BORING NO. CAD-8
SHEET 1 of 2
FILE NO. 6542.003
CHKD. BY K. Hartel

Boring Co.	New Hampshire Boring	Boring Location	Northing 2695624.7	Easting 814477.1	
Driller	Barry Wordell	Mudline El.	-33.2	Datum	MLLW
Logged By	Joe Kraycik	Date Start	9/21/2004	Date End	9/21/2004

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: Barge Mounted Diedrich D50 ATV
Drilling Method: 4-inch (PW) 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								ORGANIC SILT	
2									
3									
4									
5		S1	24/24	4-6	7-9-8-5	17	4 to 5 feet: Organic silt and clay with some sand (OL/OH); Black, very stiff, organic odor; Coarsens with depth; 5 to 6 feet: Well-graded sand with some organics (SW); Grayish-black, medium density, slight organic odor; Fine sand: 35%, medium sand: 25%, coarse sand: 20%, organics: 20%.		
6								GLACIO-FLUVIAL	
7									
8									
9									
10		S2	24/13	9-11	15-16-15-29	31	Well-graded sand with little gravel (SW); Brown, dense; Silt: 5-10%, fine sand: 15-20%, medium sand: 30%, coarse sand: 30%, gravel 15%.		
11									
12									
13									
14									
15		S3	24/	14-16	31-20-15-27	35	Well-graded sand and gravel (SW); Brown, dense; Fine sand: 25%, medium sand: 30%, coarse sand: 15%, gravel: 40%; The gravel is subrounded to subangular and composed of quartz and granite.		
16									
17									
18							Advanced roller bit and casing to refusal at 18 ft.		
19							Set up to core rock at 18 ft. See next page for rock core log.		
20									

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:

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PROJECT
New Bedford Harbor Dredge - Phase II
New Bedford, Massachusetts

BORING NO.	CAD-8
SHEET	2 of 2
FILE NO.	6542.003
CHKD. BY	K. Hartel

Boring Co.	New Hampshire Boring	Boring Location	Northing 2695624.7	Easting 814477.1	
Driller	Barry Wordell	Mudline El.	-33.2	Datum	MLLW
Logged By	Joe Kraycik	Date Start	9/21/2004	Date End	9/21/2004

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 Barge Mounted Diedrich D50 ATV
Drilling Method 4-inch (PW) 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
18					Begin C1 at 18 ft.	
19		C1	18-19	3	White to pink, fine to coarse grained granitic gneiss; Iron staining at top; One horizontal break; Slightly weathered.	
20			19-20	6	No breaks, uniform texture.	
21			20-21	6	One horizontal, low-angle break; Slightly weathered.	
22			21-220	4	No breaks, uniform texture.	
23			22-23	5	One horizontal break, appears mechanical.	
24					End of C1 at 23 ft.	
25					REC= 90% RQD=100%	
26					Bottom of exploration at 23 ft.	
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						

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:
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Attachment B

1998 Record of Decision – State Enhanced Remedy Excerpt

EPA Superfund Record of Decision:
NEW BEDFORD OU 01, NEW BEDFORD, MA
09/25/1998

XI. The State-Enhanced Remedy

In addition to the selected remedy described above, the Commonwealth of Massachusetts has petitioned EPA to allow the inclusion of navigational dredging in New Bedford Harbor as an enhancement of the remedy. Such enhancements are envisioned in the implementing regulations of CERCLA at 40 CFR 300.515(f). The enhancement requested by the Commonwealth would link as appropriate the dredging and disposal of sediments dredged from the harbor's navigational channels (located in the lower and outer harbors) with CERCLA and the Superfund program. Although these navigational sediments fall below the 50 ppm lower harbor TCL (and thus do not overlap with sediments stated for remedial dredging), they are nevertheless contaminated with heavy metals, and lower levels of PCBs. Thus these navigational sediments, approximately 1.7 million cy in volume, are most likely unsuitable for open water disposal (Maguire Group, 1997), and alternative disposal approaches are required if shipping channels are to be maintained to their federally-approved depths. As discussed further below, and provided consistency with 40 CFR 300.515(f)(1)(ii) as well as other dredging-related regulations is maintained, EPA accepts the Commonwealth's request to include navigational dredging as an enhancement of the selected remedy.

EPA believes that the primary benefits of linking the two dredging programs, while not sacrificing the normal regulatory review process for federal navigational projects, will be a streamlined permitting process for on-site navigational disposal facilities (if any), coordinated rather than separate environmental monitoring programs, where feasible, and increased overall coordination between the two dredging projects. In fact, the overall environmental benefit of the remedial CDFs is increased by using the CDFs to contain a portion of the navigational sediments (as part of the interim caps) as well as the more highly contaminated remedial sediments. Such a scenario should also reduce cleanup costs since at least some of the costs for the clean fill that would otherwise be required for the preliminary caps would no longer be necessary.

Incorporating the enhanced remedy shall not jeopardize or delay the overall implementation or funding of the selected remedy. Rather, implementation of the navigational dredging project, including solicitation of public comment on it, will be the responsibility of those parties normally involved in such projects, namely the MA Coastal Zone Management office, the US Army Corps of Engineers, the National Fisheries Management Service and other relevant state and federal regulatory programs. Consistent with 40 CFR 300.515(f)(1)(ii)(A), the EPA Superfund program will not be responsible for funding any part of the enhanced remedy.

RESPONSIVENESS SUMMARY (Enhancement of Remedy Comments in Red)

2.3 Comments From Local Government

2.3.1 Mayor Rosemary S. Tierney
Mayor Tierney commented that she supports the proposed cleanup plan, with the recognition that it "is not a perfect solution to the problem" but one that "permits further consideration of a better remedy." She encouraged EPA to continue studies of treatment alternatives prior to final capping of the CDFs, as well as to work with the City to determine the best future uses and engineering design for the proposed CDFs. She also expressed full support for the enhancement of the remedy to include navigational dredging, provided neither project delays the other. Should that occur, the Mayor noted that both projects should proceed separately.

EPA Response

EPA appreciates Mayor Tierney's comments and has agreed to pursue literature reviews of potential advances in and implementation experiences with sediment treatment technologies, especially prior to final capping of the CDFs. EPA's engineering design for the CDFs will be done with full openness and coordination with not only the City but the Community Forum and natural resource trustees as well. EPA will also work with the City and other CDF abutters to determine the best future uses of the CDFs once

they are completed. EPA will cooperate with the Commonwealth in its efforts to implement an effective and timely navigational dredging program.

2.4 Comments From State Government

2.4.2 Representative William Straus
Representative Straus commented orally at the November 20,1996 Public Hearing that the phase two cleanup proposal enjoys a greater degree of public support because the community was involved in the discussions and overall decision making process. He made reference to the Community Forum's agreement with the EPA for this remedy, and noted that the remedy is not a perfect one but one that does contribute greatly to the public health and offers other enhancements for the harbor.

Representative Straus also commented that the proposed enhanced remedy linking navigational dredging would, in addition to an economic benefit, provide benefits to public health and natural resources due to the removal of lower levels of PCBs. With regard to the remedy enhancement, the Representative noted that although the proposed plan conditions navigational dredging on available state funding, the U.S. Army Corps of Engineers may be able to contribute some funding for this dredging (as opposed to disposal) project as well, and that that possibility should be explored.

Finally, Representative Straus commented that the proposed remedy does offer the possibility for eventual treatment of the contaminated sediments should technologies develop further. However, if treatment remains cost-prohibitive, the Representative noted that the remedy could nevertheless provide an enhancement to the community through inclusion of the CDFs in the harbor development process.

EPA Response
EPA appreciates Representative Straus' support of the remedy and participation in the consensus building Community Forum process, and notes the clarification regarding funding for navigational dredging. Since the main channels in the harbor are federally authorized, it is possible that dredging (as opposed to disposal) of navigational sediments could be at least partially financed by the Corps of Engineers. Since the Commonwealth requested the enhancement, it has taken the lead in pursuing additional funding. The Corps' dredging, however, cannot be implemented absent a viable disposal alternative. EPA recognizes the interplay between the two projects and will continue to work with the Commonwealth in their efforts to implement an effective navigational dredging program.

2.4.3 Massachusetts Executive Office of Environmental Affairs (EOEA)

Secretary Coxe representing EOEA commented both orally at the November 20, 1996 Public Hearing and in writing on a number of issues, noting the site "presents one of the most complex remediation challenges in Massachusetts" and crediting the Community Forum participants with the hard work required to "craft an effective and workable solution." In summary, the Secretary commented that both EOEA and Governor Weld support the proposed plan because it "will remove the vast majority of PCBs from the site" and since it "greatly reduces the risks to human health and the marine ecosystem." The Secretary gave this support with the understanding that it "is not the perfect solution, because it does not destroy the PCBs, (but) it is the best solution technology will currently allow."
Secretary Coxe encouraged EPA to continue the review of potential treatment technologies,and in the event that a method to destroy the PCBs is not found, to consider the maximum beneficial uses of the CDFs. Noting "that marine economic development of New Bedford Harbor has been impeded by the presence of PCBs and metals" she identified as perhaps the biggest opportunity for water related economic reuse to be the proposed CDF D. Secretary Coxe also underscored the importance of the Commonwealth's commitment to long term monitoring of the CDFs, and the consequent importance of building high quality CDFs that will effectively contain the PCBs.

Secretary Coxe also commented that the dredging and disposal operations be completed with as little environmental damage as possible, and addressed three specific areas of concern regarding the dredging operations: a) escape of contaminants and particulate matter must be minimized, b) impacts to fisheries must be limited and c) the continued function of the saltmarshes must be ensured. She added that the ROD should specify that the area north of Wood Street and in the ditches, creeks and mosquito control channels of the saltmarshes be investigated further and included in the remedy if above TCLs.

Secretary Coxe also gave support for the proposed enhanced remedy for inclusion of navigational dredging, saying that benefits of such a linkage could include permit streamlining, cost-effectiveness and ultimately "improved environmental and economic

conditions" of the harbor. She made clear that this proposed enhancement would be contingent on state funding, and that if a non-Superfund approach to navigational dredging could be implemented faster then that approach would be pursued.

Finally, Secretary Coxe requested that EPA include additional dredging of areas near the Cornell Dubilier plant outfall above 10 ppm PCBs as part of this remedy (areas above 10 ppm near the plant and the old sewage treatment plant outfall were included in the May 1992 proposed plan addendum). Citing a preference for removing these sediments "sooner rather than later" after proposed additional investigation of the outer harbor area, she added that funding for this additional remediation could be secured from a portion of the funds specifically set aside for the harbor cleanup and/or restoration as part of the legal settlement for the site.

EPA Response
EPA appreciates the Commonwealth's support, and agrees with Secretary Coxe's comments (except as noted herein). EPA will continue its review of potential treatment technologies and will work with the Commonwealth as well as the Community Forum to ensure that the CDFs are designed and constructed to effectively contain PCB migration.

All sediments above the relevant TCL in the upper or lower harbor will be remediated including those above the Wood Street bridge and in the ditches, creeks and mosquito control channels in the upper harbor saltmarshes. EPA will implement this remediation in a manner that minimizes short term environmental damage (note EPA response to MA DMF below).

EPA plans to coordinate with all stakeholders throughout the remedial design and construction of the project, particularly in defining the maximal beneficial reuse of the CDFs and in coordinating with the navigational dredging project. EPA does believe that some parts of CDFs A, B and C (e.g, the shoreline and intertidal areas) should be targeted as natural resource enhancements.

The Commonwealth's concern about contamination near the Cornell Dubilier plant beyond those addressed in the remedy are noted. After reviewing comments on the May 1992 Addendum Proposed Plan EPA concluded that we had insufficient information about the nature and extent of contamination in the upper Bay to determine an effective remedy. EPA also believes that the possible effects of the ROD 1 and 2 cleanups should be evaluated before a final remedy decision is made for the entire outer harbor area. EPA will continue to study this area in consultation with the Commonwealth and will issue another decision document when those studies are complete.

2.5 Comments From Federal Government

2.5.1 National Oceanic and Atmospheric Administration (NOAA)
NOAA commented that it generally agrees with the proposed remedy, but disagrees with several specific technical issues discussed below. NOAA supports the hybrid TCL approach "due to the implementability problem of moving below 10 ppm" and the fact that, as explained in the Proposed Cleanup Plan, the lower harbor is a state designated port area and is predominantly lined with industrial and commercial facilities.

NOAA disagreed with the criteria evaluation for the sitewide 50 ppm TCL on pages 10 and 11 of the Proposed Cleanup Plan, noting that "in no way does a uniform 50 ppm cleanup level protect the environment." NOAA also voiced concern regarding the saltmarsh cleanup strategy: It recognizes the objective of using a 50 ppm TCL to minimize the amount of saltmarsh destruction, but is unconvinced that a 50 ppm TCL would necessarily protect biota that use the saltmarsh. NOAA requested that EPA monitor effects on living resources in and near the saltmarshes, and to entertain additional remediation should unacceptable bioaccumulation levels befound.

NOAA also expressed an interest "in including a comprehensive cleanup in the outer harbor in this remedy rather than putting it off" until phase three (for the outer harbor). Assuming that a 10 ppm PCB TCL would be selected for phase three, NOAA speculated that given the time required to close the proposed phase two CDFs, sediments above 10 ppm PCBs in the outer harbor could be identified, removed and placed in the phase two CDFs.

Finally, NOAA's National Marine Fisheries Service (NMFS) expressed concern about "the significant lack of detailed information regarding the request by the state to include navigational dredging as an enhancement of the remedy." It urged that "a thorough alternatives analysis that identifies the least environmentally damaging practicable alternative" be performed for the navigational dredging and disposal needs. Given the

large size of the envisioned navigational dredging project, without such an evaluation and additional information, NOAA/NFMS commented that it would not be able to concur with the proposed remedy enhancement.

EPA Response
EPA appreciates NOAA's support for the remedy and understanding of the difficulties presented by site cleanup. EPA understands that a sitewide 50 ppm TCL is not completely protective of ecological resources; the reduction of the TCL from 50 to 10 ppm in the upper harbor reflects this understanding that a greater degree of ecological protectiveness was appropriate. EPA further believes that, coupled with institutional controls to combat contaminated seafood consumption, the remedy is protective of human health. Regarding the 50 ppm saltmarsh TCL, EPA realizes that coordination with NOAA and other resource agencies is critical to development of a saltmarsh monitoring program that will effectively measure the ecological integrity of these areas. EPA expects that bioaccumulation will be one of many monitoring parameters used to measure the success of the saltmarsh restoration as well as the overall site cleanup.

In terms of NOAA's interest in a comprehensive outer harbor cleanup approach at this point, EPA reiterates the need for additional sediment sampling and data gathering before this additional cleanup can take place. EPA will consider NOAA's hypothetical remedial sequence for the outer harbor operable unit, but notes that phase two CDF capacity may be more critical than the phase two schedule for CDF closing.

EPA also appreciates NOAA's concern about the preliminary nature of the discussion regarding the Commonwealth's request for a navigational dredging enhancement of the remedy EPA's understanding of the Commonwealth's approach in this regard is that any such enhancement would NOT obviate the normal substantive regulatory review process for such a navigational dredging project.

Attachment C

Proposed Project Performance Standards

NBH Dredge – Phase II/North Terminal Area Dredge Project
Proposed Performance Standards

I MADEP 401 Water Quality Program Standards:

1. Anti-degradation provisions of the Massachusetts Surface Water Quality Standards protect all waters, including wetlands. The Contractor shall take all steps necessary to assure that the proposed activities will be conducted in a manner, which will avoid violations of said standards.

2. Prior to the start of in-water work, the SER Project Manager (SER PM) shall be notified of any proposed change(s) in plans that may affect waters or wetlands.

3. As proposed, silt-curtains and absorbent booms shall be deployed to enclose the area being dredged. The contractor's plan for deployment of the silt curtains/absorbent booms shall be submitted to the SER PM for review prior to the start of in-water work. Should the deployment of silt-curtains prove not feasible or be unsuccessful, the SER PM will be notified prior to any dredging without silt curtains.

4. Water Quality Monitoring:

    a. **When the dredging operation is contained within a silt-curtained area,** the following water-quality monitoring program shall be carried out daily for the first three days of dredging and once a week thereafter:
        i. A reference location shall be established outside of and approximately 200-feet from the silt-curtained area and a monitoring location shall be established outside of and within 15-feet of the silt-curtain.
        ii. Turbidity shall be measured, using an optical backscatter sensor, at both the reference and monitoring locations, at established depths: near the water's surface, at the mid-point of the water column and near the bottom. The three values obtained shall be averaged, such that a single, representative turbidity value is calculated for the monitoring site and a single, representative value is calculated for the reference site.
        iii. Turbidity shall be measured at both the monitoring and reference site prior to the start of dredging, and once every two hours during dredging.
        iv. An exceedance of the project turbidity standard shall be attributed to project activities when the average turbidity at the monitoring site exceeds the average reference site turbidity plus the permissible turbidity increase, as outlined in the following table:

Reference Site Turbidity (NTUs)	Permissible Turbidity Increase
<10	Reference plus 20 NTUs
11-20	Reference plus 15 NTUs
>21	Reference plus 30% of reference

v. If, in two consecutive monitoring events, the average turbidity at the monitoring site exceeds the average turbidity at the reference site by more than the permissible turbidity increase, then water samples, composited over the entire water column, from both the monitoring and reference sites shall be collected and submitted for analysis of Total Suspended Solids, dissolved PCBs, arsenic, cadmium, copper, chromium, lead, mercury, nickel, and zinc. When samples are submitted to the laboratory, a 36-hour turn-round time shall be requested. Additionally, the Proponent, or their contractor, shall take operational action(s) designed to limit such exceedences, such as increasing the dredge cycle time, inspection and any necessary repair, of the silt curtains, deployment of an additional row of silt curtains or other mitigation measures. Turbidity monitoring shall continue on the schedule outlined in Section 6.a.iii, until compliance is reestablished.

vi. If compliance can not be reestablished within 48 hours, dredging shall cease and Department and any other interested local, state, or federal agency staff, in consultation with the Proponent, their contractors and/or consultants shall review the operational actions undertaken, the results of the analyses of the water samples and evaluate the biological significance of the available data and determine the requirements for additional mitigation, if any.

b. **Should the deployment of silt-curtains prove not possible or be unsuccessful,** the following water-quality monitoring program shall be carried out daily for the first three days of dredging and twice a week thereafter:

i. A reference location shall be established approximately 200-feet up-current from the dredge and a monitoring location shall be established 200-feet down-current from the dredge at the edge of the mixing zone.

ii. Turbidity shall be measured, using an optical backscatter sensor, at both the reference location and the monitoring location, at established depths: near the water's surface, at the mid-point of the water column and near the bottom. The three depth values obtained shall be averaged, such that a single, representative turbidity value is calculated for the reference location and a single, representative turbidity value is calculated for the monitoring location.

iii. Turbidity shall be measured at both the reference location and at the edge of the mixing zone prior to the start of dredging, and once every two hours of dredging.

iv. An exceedance of the project turbidity standard shall be attributed to project activities when the average turbidity at the edge of the mixing zone exceeds the reference site turbidity plus the permissible turbidity increase, as outlined in the following table:

Reference Site Turbidity (NTUs)	Permissible Turbidity Increase
<10	Reference plus 20 NTUs
11-20	Reference plus 15 NTUs
21-30	Reference plus 10 NTUs
>31	Reference plus 30% of reference

v. If, in two consecutive monitoring events, the average turbidity at the edge of the mixing zone exceeds the average turbidity at the reference site plus the permissible turbidity increase, then water samples, composited over the entire water column, from both the reference location and the edge of the mixing zone shall be collected and submitted for analysis of Total Suspended Solids, dissolved PCBs, arsenic, cadmium, copper, chromium, lead, mercury, nickel, and zinc. When samples are submitted to the laboratory, a 36-hour turn-round time shall be requested. Additionally, the Proponent, or their contractor, shall take operational action(s) designed to limit such exceedences, such as increasing the dredge cycle time, inspection and any necessary repair, of the silt curtains, deployment of an additional row of silt curtains or other mitigation measures. Turbidity monitoring shall continue on the schedule outlined in Section 6.b.iii, until compliance is reestablished.

vi. If compliance cannot be reestablished within 48 hours, dredging shall cease and the Department and any other interested local, state or federal agency staff, in consultation with the Proponent, their contracts and/or consultants shall review the operational actions undertaken, the results of the analyses of the water samples and evaluate the biological significance of the available data and determine the requirements for additional mitigation, if any.

5. As proposed, dredging of contaminated, silty sediment shall be done using a closed, environmental, clamshell bucket. Where pilings or other debris are found to interfere with environmental bucket closure or equipment operation, a conventional clamshell bucket may be used to extract the pilings/debris. Sediment removal during such activity shall be minimized to the greatest extent practicable. Should dredging with the environmental bucket become unfeasible or unsuccessful, the SER PM must be notified prior to any contaminated sediment dredging not using the environmental bucket, and the contractor must also continue to meet the project water quality standard performance standards.

6. Water discharged from the barge shall be appreciably free of suspended sediment and meet the water quality criteria established in Section 4 (above). Any free liquid

flowing from the barge in the harbor shall be passed through a sand media filter or equivalent filtration system (which must be approved by the project Resident Engineer) prior to discharge.

7. Diesel-powered equipment shall be fitted with after-engine emissions controls such as oxidation catalysts or particulate filters.

8. Within 30 days of the completion of the initial dredging, a bathymetric, survey of the dredge footprint, depicting post-dredge conditions, shall be sent to the MADEP SER Project Manager.

9. Disposal of any volume of dredged material at any location in tidal waters is subject to approval by the Department and the Massachusetts Coastal Zone Management office.

II <u>MADEP Chapter 91 Waterways Standards:</u>

1. Acceptance of these Waterways Conditions shall constitute an agreement by the Proponent to conform to all terms and conditions herein.

2. All subsequent maintenance dredging and transportation and disposal of this dredge material, during the term of this Project shall conform to all standards and conditions applied to the original dredging operation performed under this Project.

3. After completion of the work authorized, the Proponent shall furnish to the Department a suitable plan showing the depths at mean low water over the area dredged. Dredging under this Project shall be conducted so as to cause no unnecessary obstruction of the free passage of vessels, and care shall be taken to cause no shoaling. If, however, any shoaling is caused, the Proponent shall at his/her expense, remove the shoal areas. The Proponent shall pay all costs of supervision, and if at any time the Department deems necessary a survey or surveys of the area dredged, the Proponent shall pay all costs associated with such work.

4. The Proponent shall assume and pay all claims and demands arising in any manner from the work authorized herein, and shall save harmless and indemnify the Commonwealth of Massachusetts, its officers, employees, and agents from all claims, audits, damages, costs, and expenses incurred by reason thereof.

5. The Proponent shall, at least three days prior to the commencement of any dredging in tide water, give written notice to the Department of the time, location, and amount of the proposed work.

<u>Special Waterways Conditions</u>

1. Dredge material shall be transported to suitable disposal facilities; unregulated dumping of dredge materials is not permitted.

2. The Proponent shall develop and implement a Navigation Plan to address and mitigate temporary impacts to navigation during dredging activities.

3. The Proponent shall provide and maintain in good working order appropriate United States Coast Guard (USCG) approved navigation aids to assist mariners in avoiding work areas as required by the USCG.

4. The Proponent shall maintain vehicular access to water-dependent users throughout construction activities.

5. The Proponent shall remove and properly dispose of all temporary structures and debris no later than three (3) months after completion of the dredging and disposal. the dewatering and amendment of the sediments.

6. Modification to this Project: the SER PM, may review on an individual basis, modifications to construction activities and/or temporary structures which represent an insignificant deviation from original specifications, in terms of configuration, materials or other relevant design or fabrication parameters as determined by DEP within all areas of construction. Such review shall be in accordance with the following procedure:
    a. The Proponent shall submit a written request describing the proposed modifications to the work accompanied by plans, for prior review of the DEP. The DEP will consider comments submitted within ten (10) days of the DEP's receipt of the request. The DEP will send any significant modifications to the Resource Agencies for review and comment and to identify any future Performance Standards, if necessary. EPA will also have the opportunity to make a consistency determination if the change is significant, as necessary. The DEP will notify the Resource Agencies of any minor modifications.

7. After completion of the work authorized the Proponent shall furnish the Department a suitable plan showing the depths at mean low water over the areas dredged within 90 days of completion of each phase of the dredging.

FEDERAL PERFORMANCE STANDARDS
New Bedford Harbor Dredge - Phase II

REQUIREMENT	CITATION	STATUS	REQUIREMENT SYNOPSIS	ACTIONS TO BE TAKEN TO ATTAIN ARARS
Federal				
Clean Water Act (CWA), Water Quality Criteria	33 USC 1313, 1314	Relevant and Appropriate	Federal surface water quality standards are incorporated into Massachusetts Surface Water Quality Standards.	Please refer to the Massachusetts Surface Water Quality Standards.
Fish and Wildlife Coordination Act	16 USC Part 661 et seq.; 40 CFR 6.302(g)	Applicable	Requires consultation with appropriate agencies to protect fish and wildlife when federal actions may alter waterways. Must develop measures to prevent and mitigate potential loss to the maximum extent possible.	Appropriate agencies will be consulted prior to implementation to find ways to minimize adverse effects to fish and wildlife from harbor dredging and construction of disposal cells.
Preservation of Historical and Archeological Data Act of 1974	16 USC 469 et. seq.	Applicable	Requires recovering and preserving significant historical or archeological data when such data is threatened by a federal action or federally lecensed action which alters any terrain where such data is located.	An assessment of the Harbor for potential locations of historical or archaeological cultural resources will be conducted. Located objects will be recovered in accordance with requirements.
Coastal Zone Management Act	16 USC Parts 1451 et seq.	Applicable	Requires that any actions must be conducted in a manner consistent with state approved management programs.	The entire site is located in a coastal zone management area. Dredging activities will comply with state approved management programs.
Toxic Substances Control Act (TSCA), PCB Disposal Requirements	15 USC 2601 - 2692; 40 CFR 761.50(a)(3); (b)(3)(i)(A)	Applicable	General PCB Disposal requirements for all actions and provides jurisdiction for State Enhanced Remedy cleanup.	Dredging and disposal of TSCA material will be jointly managed by the EPA and implemented in accordance with TSCA requirements.
CWA, Section 404, Dredge and Fill Activities	40 CFR 230	Applicable	Control of discharges of dredged or fill material in order to restore and maintain the chemical, physical and biological integrity of waters in the United States.	Dredging of sediments and filling of CAD cells will be implemented so as to minimize to the maximum extent possible any adverse environmental impacts through engineering controls such as type of dredge used, or rate of dredging.
Rivers and Harbors Act	33 USC 401-426m	Applicable	Requires coordination and approval of U.S. Army Corps of Engineers (USACE) for dredging and for construction of future use of CAD cells in navigable waters of the United States.	All dredging and disposal activities will comply with substantive requirements of this chapter. Dredging will be coordinated with the USACE.
Magnuson-Stevens Fishery Conservation and Management Act	Public Law 94-265	Applicable	Provides for conservation and management of fishery resources within the U.S. and allows for the preparation of Fishery Management Plans (FMPs) for the those needing management.	Appropriate agencies will be consulted prior to implementation to find ways to minimize adverse effects to fish and wildlife from harbor dredging and construction of disposal cells.
Floodplain Management - Executive Order 11988	40 CFR Part 6, Appendix A	To be considered	Federal agencies are required to reduce the risk of flood loss, minimize the impact of floods, and to restore and preserve the natural and beneficial values of floodplains.	No floodplains are proposed to be impacted during this project. If any construction does occur within a floodplain, potential harm will be minimized.
Wetland Protection - Executive Order 11990	40 CFR Part 6, Appendix A	Applicable	Federal agencies are required to avoid adversely impacting wetlands whenever possible, minimize wetland destruction and preserve the value of wetlands.	The destruction, loss and degradation of wetlands will be minimized as much as possible given the extent and location of contaminated sediment.
Endangered Species Act	16 USC Part 1531 et. Seq; 40 CFR 6.302(h)	Applicable	Requires consultation with appropriate agencies if a threatened or listed species or their habitat may be affected.	The appropriate agencies will be consulted to consider any mitigation measure necessary for remedial activities affecting the feeding grounds of the roseate tern.

MASSACHUSETTS PERFORMANCE STANDARDS
New Bedford Harbor Dredge - Phase II

REQUIREMENT	CITATION	STATUS	REQUIREMENT SYNOPSIS	ACTIONS TO BE TAKEN TO ATTAIN ARARS
Massachusetts				
Surface Water Quality Standards	21 MGL 27; 314 CMR 4, 03(1)(3)(c)04 (1),(2),(4),(6); 4.05(4)(a-b),(5)	Relevant and Appropriate	MADEP surface water quality standards incorporate the federal Ambient Water Quality Criteria (AWQC) as standards for surface waters of the state. Standards establish acute and chronic effects on aquatic life for contaminants including PCBs, cadmium, chromium, copper, and lead.	Site specific water quality criteria will be established for the project. Dredging controls will be implemented such that water quality criteria are not exceeded. Water quality monitoring will be implemented during dredging.
Hazardous Waste Management - Identification and Listing	12C MGL 4 and 6; 310 CMR 30.100	Applicable	Establishes standards for identifying and listing hazardous waste.	Testing as appropriate will assess whether hazardous wastes are present in dredge sediment.
Hazardous Waste Management - Requirements for Generators of Hazardous Waste	21C MGL 4 and 6; 310 CMR 30.300	Applicable	Establishes standards for various classes of generators.	Any hazardous process wastes will be managed in accordance with the substantive requirements of these regulations.
Hazardous Waste Management - Management Standards for all Hazardous Waste Facilities	21C MGL 4 and 6; 310 CMR 30 et seq.	Applicable	Establishes standards for treatment, storage, and disposal of hazardous waste. Sec. 30.501(3)(a) exempts facilities which treat, dispose or store hazardous waste containing 50 ppm or more of PCBs if theyare adequately regulated under TSCA, 40 CFR 761.	Any hazardous process wastes will be managed in accordance with the substantive requirements of this section. Any off-site transportation/disposal will comply with the appropriate regulations.
Rules for the Prevention and Control of Oil Pollution in the Waters of the Commonwealth	21 MGL 26-53; 314 CMR 15.03 (1),(3-5); 15.06(1-5)	Applicable	Regulates the discharge of oil or sewage, industrial waste or other material containing oil into waters of the Commonwealth. PCBs contain oil, some of which floats on surface water.	The remedy will comply with the substantive requirements of the provisions.
Certification for Dredging, Dredging Material Disposal and Filling in Waters	21 MGL 26-53; 314 CMR 9.06(1-2)	Applicable	Establishes procedures and criteria for the administration of Section 401 of the federal Clean Water Act for the discharge of dredged or fill material in waters of the United States within the Commonwealth.	All dredging and discharge of dredged material will comply with the substantive requirements of the provisions.
Wetlands Protection Act	MGL 131 Sect. 40; 310 CMR 10 et seq.	Applicable	Standards regulate dredging, filling, altering, or polluting of coastal and inland wetland resource areas. Protected resource areas within and adjacent to the site include: Land Subject to Coastal Storm Flowage 10.02(1)(d); Coastal Wetlands 10.24(7)(b); Land Under Ocean 10.25(5)(6); Designated Port Area 10.26(3)(4); Land Containing Shellfish 10.34(5)(7); Banks...Land Under...Fish Runs 10.35(3-4); and Riverfront Area 10.58(4)(a),(c)(1and3),(d)(2),(d)(5),(a-b and f-g).	Best available measures will be used to minimize adverse effects on identified resource areas during construction. DMF will be consulted for activities affecting fish and shellfish habitat.
Administration of Waterways Licenses Law	91 MGL 1.00 et seq.; 301 CMR 9.00	Applicable	Criteria for work within flowed and filled tidelands. Focus on long term viability of marine uses and protecting public rights in tidelands. Applicable provisions are Restrictions on Fill and Structures 9.32(1)(a)(2,3)(b)(3,4); Preserving Water-Related Public Rights 9.35(1),(2)(a)(1 and 3 (a and b)); Protecting Water Dependent Uses 9.36 (2)(3)(4)(5)(a)(1,2)(5)(b); Engineering and Construction Standards 9.37(1)(c),(3)(a),(b)(4); and Dredging and Dredged Material Disposal 9.40(2),(3)(e).	Temporary unavoidable impacts to water dependent users will occur. Impacts will be minimized, and alternate access will be available.
Coastal Zone Management	301 CMR 21.00	Applicable	Requires that any actions must be conducted in a manner consistent with state approved management programs.	The entire site is located in a coastal zone management area. Actions taken will be consistent with substative portions of identified policies of CZM.