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Five-Year Review Report

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First Five-Year Review Report
for the

New Bedford Harbor Superfund Site

Bristol County, Massachusetts

September 2005

Prepared by the
United States Environmental Protection Agency
Region 1, New England
Boston, Massachusetts

EPA
New England

Approved by: Date:

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LIST OF ACRONYMS

ARAR	Applicable and Relevant and Appropriate Requirement
AWQC	Ambient Water Quality Criteria
CAD	Confined Aquatic Disposal
CDF	Confined Disposal Facility
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CSO	Combined Sewer Overflow
cy	cubic yard
DEP	Massachusetts Department of Environmental Protection
DPH	Massachusetts Department of Public Health
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Difference (documents changes to a ROD)
FS	Feasibility Study
IAG	Inter-Agency Agreement
ICs	Institutional Controls
MA	Massachusetts
NBH	New Bedford Harbor
NCP	National Contingency Plan
NLD	North Lobe Dredging
NPL	National Priority List (EPA's list of Superfund sites)
NRD	Natural Resource Damage(s)
NWS	North of Wood Street
OSWER	Office of Solid Waste and Emergency Response (EPA)
OU	Operable Unit
PCB	Poly-chlorinated Biphenyl
PETS	Public Exposure Tracking System
ppm	parts per million
PRP	Potentially Responsible Party
RA	Remedial Action
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SER	State Enhanced Remedy
TSCA	Toxic Substance Control Act
USACE	U.S. Army Corps of Engineers

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EXECUTIVE SUMMARY

The purpose of this five-year review is to determine whether the remedial actions at the New Bedford Harbor Superfund site, located in Bristol County, Massachusetts (the Site) are protective of public health and the environment and functioning as designed. This five-year review is for the entire Site (Operable Units One, Two and Three). The United States Environmental Protection Agency (EPA), Region I, conducted this review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121(c), 42 U.S.C. 9621, National Contingency Plan (NCP) Section 300.400(f)(4)(ii), and OSWER Directive 9355.7-03B-P (June 2001). It is a statutory review. This is the first five-year review for the Site covering the years 1999 through 2005.

EPA has segmented the 18,000 acre site into three operable units (OUs). OU1 covers the upper and lower harbor, with a Record of Decision (ROD) issued in 1998 (and modified by two Explanation of Significant Differences issued in 2001 and 2002). The OU1 remedy includes the removal of roughly 880,000 cy (~260 acres) of PCB-contaminated material, and disposal either offsite or in three shoreline confined disposal facilities (CDFs) in the upper harbor. OU2 addressed the hot spot sediments, a five acre area near the Aerovox mill defined by PCB levels above 4,000 ppm. The hot spot ROD was issued in 1990, an Amended ROD was issued in 1999, and the hot spot remedy was completed in 2000. OU3 encompasses the entire 17,000 acre outer harbor area; that ROD has not yet been issued.

To summarize this five year review, EPA continues to expect the upper and lower harbor OU1 remedy to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled to the maximum extent practicable. As described further below, the three exposure pathways of concern are consumption of local PCB-contaminated seafood, dermal contact with PCB-contaminated shoreline sediments, as well as ecological risks due to the highly contaminated sediments and water column at the site.

Given the 18,000 acre size of the site coupled with the area's cultural diversity and reliance on local fishing, complete control of PCB-contaminated seafood consumption will be problematic until remediation is complete. To address this challenge, and to compliment a state fishing ban issued in 1979, EPA has implemented an extensive education and outreach program, including the innovative Fish Smart campaign. Despite these efforts, however, consumption of local PCB-contaminated seafood continues. EPA will continue to explore additional solutions to keep local seafood consumption to an absolute minimum.

In addition to the seafood pathway, EPA has focused on minimizing dermal contact risks from PCB-contaminated shoreline areas. Accelerated cleanups have been performed to remediate the highest priority residential and public access areas at the site. Again, however, given the large scale of the site and the long remedial time frame, some dermal contact risk areas remain. To control these risks until full remediation occurs, EPA will continue to use shoreline fencing and signage as appropriate.

Ecological risks will also continue until the site remediation is completed. For example, current water column PCB levels are greater than ten times higher than the ambient water quality criteria of 0.03 ppb.

EPA New England is working in close collaboration with the City of New Bedford, the Natural Resource Damage (NRD) trustees, and other stakeholders to address the abandoned Aerovox mill on the shore of the upper harbor (see Figure 1). Using an alternative funding approach which includes the Aerovox bankruptcy proceedings, EPA and the City plan to remediate the highly PCB-contaminated Aerovox building and property in 2006-07 as part of a non-time critical removal action (NTCRA).

Other site issues are discussed in this review, including the trend towards public access and residential shoreline land use in the more contaminated upper harbor, and elevated airborne PCB levels in the vicinity of the Aerovox shoreline. This review includes recommendations to address all of these issues.

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Five-Year Review Summary Form

Site Name: New Bedford Harbor	**EPA ID:** MAD980731335	
Region: 1	**State:** MA	**City/County:** New Bedford/Bristol County
NPL Status: Final		
Remediation status: Under Construction		
Multiple Operable Units (OUs): N	**Number of OUs:** Three	
Construction completion dates: OU1 under construction, OU2 9/28/2000, OU3 pre-ROD		
Fund/PRP/Federal facility lead: Fund	**Lead agency:** U.S. EPA, Region 1	
Has site been put into reuse? Y		
Who conducted the review? EPA Region 1		
Author name: James Brown & David Dickerson	**Author title:** Co-Project Managers	
Author affiliation: U.S. EPA, Region 1		
Review period: 2/17/1999 - 9/30/2005	**Date(s) of site inspection:** ongoing	
Highlight: Statutory Policy	**Policy Type:** N/A	**Review Number:** First Review
Triggering action event: Construction start OU1 (signature date of the EPA/USACE RA IAG)		
Trigger action date: 2/17/1999	**Due date:** 2/17/2004	

Five Year Review Summary Form, cont'd

Issues:

1. Consumption of local PCB-contaminated seafood within the 18,000 acre site continues, despite extensive education and outreach efforts and a state fishing ban (the state ban provides no provisions for enforcement or penalties).

2. While the highest priority PCB-contaminated shoreline areas have been remediated, miles of lower priority contaminated shoreline areas remain.

3. Airborne PCB levels in the vicinity of the Aerovox shoreline come close, but do not exceed, a health-based exposure budget.

4. At the current funding rate, the OU1 cleanup will take many years to complete.

Recommendations and Follow-up Actions:

1. EPA should continue to implement the 1998 OU1 ROD, and simultaneously evaluate innovative and alternative cleanup strategies, similar to the recent pilot underwater cap near the Cornell-Dubilier mill, that have the potential to accelerate the cleanup time frame or reduce the cost of the remedy.

2. EPA should continue its strong educational and outreach programs, as well as search for new solutions, to minimize consumption of PCB-contaminated local seafood.

3. EPA should continue the use of institutional controls such as fencing and signage to ensure that dermal contact risks from unremediated shoreline areas are controlled.

4. EPA should continue to pursue the remediation of the abandoned Aerovox mill.

5. EPA should continue to develop long term institutional controls for remediated shoreline areas to protect against higher land use without further remediation.

Protectiveness Statement:

EPA continues to expect the upper and lower harbor OU1 remedy to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled to the maximum extent practicable. As described in this report, three exposure pathways of concern are consumption of local PCB-contaminated seafood, dermal contact with PCB-contaminated shoreline sediments, as well as ecological risks due to the highly contaminated sediments and water column at the site.

Other Comment:

For the upper harbor, an issue over the long term will be the well documented trend towards changes in shoreline land use from commercial/industrial to public access and residential. If such land use changes occur prior to remediation, or if they are expected to occur in the near future, EPA will use the OU1 ROD's more stringent shoreline cleanup standards to define the cleanup. However, in the case of such land use change occurring after EPA's cleanup, some party other than EPA would be responsible for the additional remediation.

1.0 Introduction

The purpose of a five-year review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review reports. In addition, five-year review reports identify deficiencies found during the review, if any, and identify recommendations to address them.

This review is required by statute. EPA must implement five-year reviews consistent with CERCLA and the NCP. CERCLA §121 (c), as amended, states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgement of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The NCP part 300.430(f)(4)(ii) of the Code of Federal Regulations (CFR) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

The New Bedford Harbor Site consists of three Operable Units (OUs): the upper and lower harbor OU (OU1); the hot spot OU (OU2) and the outer harbor OU (OU3). This five-year review addresses all three OUs.

This is the first five-year review for the New Bedford Harbor Site. This review is required by statute because the selected remedy for OU1 will require more than five years to complete resulting in hazardous substances, pollutants, or contaminants remaining on-Site above health-based levels that would allow for unlimited use and unrestricted exposure. The trigger for this statutory review is the signature date of the EPA/USACE Inter-agency agreement for remedial action (February 17, 1999) which obligated the funds for OU1 construction activities. The start of actual remediation in the field for OU1 did not start until December 1999 with the Early Action activities (see discussion below).

2.0 Site Chronology

Table 1.a lists the chronology of major site investigation and remedy selection events for the New Bedford Harbor Site. Table 1.b lists the chronology of major remedial action or cleanup events for the site.

Table 1.a: Chronology of Major *Remedy Selection* Events

1976-1982	Discovery of widespread contamination of PCBs and heavy metals in sediment and marine life throughout the Harbor.
1983	EPA adds the New Bedford Harbor site to the NPL.
1988-89	Pilot dredging and disposal study performed.
1989	EPA issues its Proposed Plan for the Hot Spot OU2.
April 1990	EPA issues its Record of Decision (ROD) for the Hot Spot OU2.
August 1990	EPA issues a Feasibility Study & Risk Assessment for the entire Harbor.
January 1992	EPA issues a Proposed Plan for the Upper and Lower Harbor OU1.
April 1992	The first of two ESDs to the 1990 Hot Spot ROD is issued to include permanent containment of incinerator ash at the on-site CDF.
May 1992	EPA issues an Addendum Proposed Plan for OU1 focusing on outer harbor issues.
1993	EPA suspends the incineration component of Hot Spot remedy in response to community opposition. New Bedford Harbor Community Forum established to help find an alternative to on-site incineration.
1995	EPA issues the second ESD to the 1990 Hot Spot ROD for interim storage of the dredged sediment while non-incineration options are evaluated.
1996	EPA issues a revised Proposed Plan for the Upper and Lower Harbor OU1 after extensive consensus-building with a community forum. The lower harbor area is separated into a new OU3.
1997	EPA issues its OU2 Hot Spot FS Addendum Report.
August 1998	EPA issues its Proposed Plan to amend the 1990 Hot Spot OU2 ROD.
September 1998	EPA issues the ROD for the Upper and Lower Harbor OU1, including disposal of 450,000 cy of dredged sediment in four shoreline CDFs.
April 1999	EPA issues the Amended ROD for the Hot Spot OU2.
2001	EPA issues the first ESD for the 1998 OU1 ROD. This ESD addressed, among other issues, the need for mechanical dewatering, a stone dike wall design for CDF D, and the need for rail to help build CDF D.
2002	EPA issues the second ESD for the 1998 OU1 ROD which replaces CDF D with offsite disposal.

Table 1.b: Chronology of Major *Remedial Action* Events

1994-1995	14,000 cy of Hot Spot sediments, with PCB levels reported as high as ten to 20 percent (100,000 - 200,000 ppm), are dredged from the harbor.
1999- 2000	Early Action cleanup is performed on highly contaminated (up to 20,000 ppm) residential properties in Acushnet and New Bedford, MA.
2001	The relocation of the combined sewer overflow (CSO) at CDF C is completed.
2001	Construction of a clean corridor for the relocation of the submerged power lines in the vicinity of the hot spot sediments is completed
2002	Removal of thirteen derelict commercial fishing vessels and barges is completed at the former Herman Melville shipyard, to allow for remedial dredging and the relocation of a commercial barge pier.
June 2003	The six acre North of Wood Street cleanup is completed, removing PCB levels as high as 46,000 ppm from residential and recreational shoreline areas.
2003	The remedial dredging at the former Herman Melville shipyard is completed.
2003	The marine bulkhead for the Area D dewatering facility is completed
2004	Relocation of two CSOs at Area D is completed
2004	Construction of the dewatering facility at Area D is finished.
August 2004	Full scale dredging is initiated in the vicinity of the Aerovox mill.
January 2005	Construction of a relocated commercial barge pier and associated navigational channel is completed.
July 2005	The pilot underwater capping project in the vicinity of the Cornell-Dubilier mill is completed.
September 2005	The second annual season of full scale dredging is initiated near Aerovox..

3.0 BACKGROUND

3.1 Physical Characteristics and Land and Resource Use

The New Bedford Harbor Superfund Site (the Site), located in Bristol County, Massachusetts, extends from the shallow northern reaches of the Acushnet River estuary south through the commercial harbor of New Bedford and into 17,000 adjacent areas of Buzzards Bay (Figure 1,1.a). The Site has been divided into three areas - the upper, lower and outer harbors - consistent with geographical features of the area and gradients of contamination (Figure 1, 1.a). The upper harbor comprises approximately 200 acres. The boundary between the upper and lower harbor is the Coggeshall Street bridge where the width of the harbor narrows to approximately 100 feet. The lower harbor comprises approximately 750 acres. The boundary between the lower and outer harbor is the 150 foot wide opening of the New Bedford hurricane barrier (constructed in the mid-1960s). The Site is also defined by three state-sanctioned fishing closure areas extending approximately 6.8 miles north to south and encompassing approximately 18,000 acres in total (Figure 2).

The City of New Bedford, located along the western shore of the Site, is approximately 55 miles south of Boston. During most of the 1800s, New Bedford was a world renown center of the whaling industry and attracted a large community of immigrants from Portugal and the Cape Verde islands. As of 1990, approximately 27% of New Bedford's 99,922 residents spoke Portuguese in their homes (US Census Bureau, 1997). Including the neighboring towns of Acushnet, Fairhaven and Dartmouth, the combined 1990 population was approximately 153,000. New Bedford is currently home port to a large offshore fishing fleet and is a densely populated manufacturing and commercial center. By comparison, the eastern shore of New Bedford Harbor is predominantly saltmarsh, open space and residential (with some commercial marine use in the lower harbor). A large, approximately 70 acre saltmarsh system has formed along almost the entire eastern shore of the upper harbor.

The Acushnet River discharges to New Bedford Harbor in the northern reaches of the Site, contributing relatively minor volumes of fresh water to the tidally influenced harbor. Numerous storm drains, CSOs and industrial discharges, as well as smaller brooks and creeks, also discharge directly to the Site. The upper and lower harbors are believed to be areas of net groundwater discharge and are generally described as a shallow, well-mixed estuary.

3.2 History Of Contamination

Industrial and urban development surrounding the harbor has resulted in sediments becoming contaminated with high concentrations of many pollutants, notably polychlorinated biphenyls (PCBs) and heavy metals, with contaminant gradients decreasing from north to south. From the 1940s into the 1970s two capacitor manufacturing facilities, one located near the northern boundary of the site (Aerovox) and one located just south of the New Bedford Harbor hurricane barrier, (Cornell Dubilier Electronics, Inc.) discharged PCB-wastes either directly into the harbor or indirectly via discharges to the City's sewerage system.

Identification of PCB-contaminated sediments and seafood in and around New Bedford Harbor was first made in the mid 1970s as a result of EPA region-wide sampling programs. In 1979, the Massachusetts Department of Public Health promulgated regulations prohibiting fishing and lobstering throughout the Site due to elevated PCB levels in area seafood (Figure 2). Elevated levels of heavy metals in sediments (notably cadmium, chromium, copper and lead) were also identified during this time frame.

PCB levels in the upper harbor sediments currently range from below detection to greater than 10,000 ppm. PCB levels in the lower harbor sediments range from below detection to approximately 1,000 ppm. Sediment PCB levels in the outer harbor are generally low, with only localized areas of PCBs in the 10-150 ppm range near the recent underwater capped area near the Cornell-Dubilier facility, CSOs and the City's sewage treatment plant's outfall pipes. EPA will further characterize the outer harbor OU area as part of an upcoming RI/FS.

3.3 Initial Response

The Site was proposed for the Superfund NPL in 1982, and finalized on the NPL in September 1983. Pursuant to 40 CFR 300.425(c)(2), the Commonwealth of Massachusetts (the Commonwealth) nominated the Site as its priority site for listing on the NPL.

In 1982, the U.S. Coast Guard erected signs around the Site warning against fishing and wading. These signs have been maintained or replaced by EPA and the City of New Bedford as needed, most recently in 2005.

EPA's site-specific investigations began in 1983 and 1984 with a Remedial Action Master Plan and the Acushnet River Estuary Feasibility Study. Site investigations continued throughout the rest of the 1980s and early 1990s, including among others a pilot dredging and disposal study in 1988 and 1989, and extensive hydrodynamic and bioaccumulation computer modeling, additional feasibility studies and risk assessments all published in 1990. These studies are summarized in more detail in the 1998 ROD for the upper and lower harbor (EPA, 1998).

Collectively, these investigations identified the Aerovox facility as the primary source of PCBs to the Site. PCB wastes were discharged from Aerovox's operations directly to the upper harbor through open trenches and discharge pipes, or indirectly throughout the Site via CSOs and the City's sewage treatment plant outfall. Secondary inputs of PCBs were also made from the Cornell Dubilier Electronics, Inc. (CDE) facility just south of the New Bedford hurricane barrier.

Based on the investigations' results, enforcement actions were initiated against both the Aerovox and CDE facilities as well as the City of New Bedford pursuant to CERCLA as well as other state and federal environmental statutes. These actions are summarized below.

In May 1982, Aerovox Incorporated signed an administrative consent order pursuant to section 106 of CERCLA regarding contamination on its property adjacent to the upper harbor. This

order called for a cut-off wall and cap system to isolate contaminated soil, and for groundwater monitoring and maintenance. This containment system was completed in June 1984. As constructed, the groundwater cut-off wall consists of steel sheet piling keyed into a relatively impermeable peat layer (the sheet piling extends from 9 to 13 feet below grade) . The cap consists of a 2.5 inch thick hydraulic asphalt concrete cap over approximately 33,000 square feet of previously unpaved surfaces near the Acushnet River and near the main manufacturing building.

Also in May 1982, CDE and EPA signed an administrative consent agreement and final order under the Toxic Substance Control Act (TSCA). This agreement addressed PCB handling procedures, discharges, releases to the municipal sewer system and surrounding areas, and groundwater monitoring requirements. Subsequently, in September 1983, EPA issued an administrative order to CDE under section 106 of CERCLA requiring CDE to remove PCB-contaminated sediments from portions of the municipal sewer system downstream of the CDE plant. The removal and disposal of these sediments took place in the fall of 1984. EPA also issued an administrative order to the City of New Bedford under section 106 of CERCLA in September 1983 requiring the City to assist CDE in the sewer line clean-up and to monitor PCB levels from the City's municipal wastewater treatment plant.

On December 9, 1983, the United States filed a complaint on behalf of the National Oceanic and Atmospheric Administration (NOAA) under section 107 of CERCLA seeking damages for injury to natural resources at and near the Site caused by releases of PCBs. The next day, the Commonwealth of Massachusetts (the Commonwealth) filed its own section 107 action. The cases were subsequently consolidated. In February 1984, the complaint was amended to include claims on behalf of EPA for recovery of response costs incurred, or to be incurred, under section 107, and for injunctive relief under section 106 of CERCLA and other environmental statutes. The United States brought this action against six companies which, at various times, owned and/or operated either of the two capacitor manufacturing facilities at the Site.

On December 31, 1985, the Commonwealth issued a notification of responsibility to the City of New Bedford pursuant to the state's hazardous waste regulations regarding the build-up of PCB-contaminated grit in one of the main interceptors of the City's sewerage system. Severe amounts of PCB-contaminated grit had accumulated within the interceptor especially in the area between Coffin Avenue and Campbell Street; PCB levels in this grit averaged 265 ppm on a dry weight basis. The City subsequently encased and abandoned approximately one and one-half mile of this sewer interceptor.

In 1991 and 1992, the Unites States, the Commonwealth and five defendants in the litigation - Aerovox Incorporated, Belleville Industries, Inc., AVX Corporation, Cornell-Dubilier Electronics, Inc., and Federal Pacific Electric Company (FPE) - reached settlement regarding the governments' claims. The governments claims against the sixth defendant, RTE Corporation, were dismissed on jurisdictional grounds. The federal and state governments recovered a total of $99.6 million plus interest from the five settling defendants.

The terms of the settlements are set forth in three separate consent decrees. Under the first consent decree, Aerovox Incorporated and Belleville Industries, Inc. were required to pay a total of $12.6 million, plus interest, to the United States and the Commonwealth for damages to natural resources and for past and future Site response costs. The court approved and entered this consent decree in July 1991. Under the second consent decree, AVX Corporation was required to pay $66 million, plus interest, to the governments for natural resource damages and for past and future Site response costs. This decree was approved and entered by the court in February 1992. Under the third consent decree, CDE and FPE paid $21 million, plus interest, to the governments for natural resource damages and for past and future Site response costs. This decree was approved and entered by the Court in November 1992.

3.4 Basis For Taking Action

Hazardous substances that have been detected at the Site in each media are identified below. A more complete discussion can be found in Section V of the OU1 ROD for the Upper and Lower Harbor Operable Unit (EPA, 1998).

Sediment	Surface Water	Biota	Air
PCBs	PCBs	PCBs	PCBs
PAHs	Copper		
Cadmium			
Chromium			
Copper			
Lead			

A baseline public health risk assessment was performed to estimate the probability and magnitude of potential adverse health effects, both carcinogenic and non-carcinogenic, from exposure to Site contaminants. In addition to PCBs, this evaluation also identified cadmium, copper and lead as contaminants that could potentially contribute to significant adverse health effects. The exposure pathways found to be of most concern were:

- ingestion of contaminated seafood
- direct contact with contaminated shoreline sediments, and
- (for children ages 1-5) incidental ingestion of contaminated shoreline sediment.

Ecological risk studies have concluded that aquatic organisms are at significant risk due to exposure to PCBs in New Bedford Harbor. A more complete discussion of the human health and ecological risks posed by the Site can be found in Section VI of the OU1 ROD (EPA, 1998).

4.0 REMEDIAL ACTIONS

Again, the New Bedford Harbor Site has been divided into three operable units (OUs), or phases of site cleanup: The Upper and Lower Harbor (OU1); the Hot Spot (OU2); and the Buzzards

Bay or Outer Harbor (OU3). The ROD for OU3 is currently unscheduled pending additional investigations in the outer harbor. As explained below, however, pilot testing of underwater capping is currently underway as part of the OU3 RI/FS.

4.1 Operable Unit 1 Remedy Selection

The ROD for OU1 was signed on September 25, 1998. The remedial action objectives developed for the OU1 remedy are:

1. To reduce risks to human health by reducing PCB concentrations in seafood, by lowering PCB concentrations in sediment and in the water column;

2. To ensure that contact with shoreline sediments does not present excessive risks to human health as a result of dermal contact with or accidental ingestion of PCB-contaminated sediment in shoreline residential or public access areas; and

3. To improve the quality of the seriously degraded marine ecosystem by:

   a.) reducing marine organisms' exposure to PCB contaminated sediment while minimizing consequent harm to the environment, and;

   b.) reducing surface water PCB concentrations to comply with chronic ambient water qualitiy criteria (AWQC) by reducing PCB sediment concentrations.

The cleanup plan selected in the 1998 OU1 ROD consists of the following components:

1. construction of four shoreline CDFs and water treatment facilities;

2. dredging of sediments and shoreline soils with PCB concentrations above the selected cleanup goals, as listed below:

   - upper harbor subtidal and unvegetated intertidal zone: 10 ppm PCBs
   - lower harbor subtidal and unvegetated intertidal zone: 50 ppm PCBs
   - intertidal areas with abutting residential land use: 1 ppm PCBs
   - intertidal areas with public access or abutting recreational land use: 25 ppm PCBs
   - saltmarsh areas with little to no public access: 50 ppm PCBs

3. operation of the CDFs and water treatment facilities;

4. saltmarsh excavation, restoration and monitoring;

5. preliminary capping and sediment consolidation within the filled CDFs;

6. final capping, long-term monitoring and maintenance, and beneficial reuse of the CDFs;

7. long-term site wide monitoring, and;

8. seafood advisories and other institutional controls.

The 1998 OU1 ROD also included, at the request of the Commonwealth of Massachusetts, a State Enhanced Remedy (SER) pursuant to 40 CFR 300.515(f) for the removal of navigational sediments not otherwise covered by the ROD. This portion of the remedy is funded and managed by the Commonwealth in conjunction with the City of New Bedford, with oversight by EPA. It serves to increase the remedy's protectiveness since PCB-contaminated sediments not covered by the OU1 ROD will be removed and disposed as part of the port's navigational dredging program. As discussed below in section 4.2.4, the SER also provided clean underwater cap material for contaminated sediments near the Cornell-Dubilier mill.

In September 2001, EPA issued a change to the 1998 harbor cleanup plan using a process known as an Explanation of Significant Difference (ESD). This ESD addresses the following five remedial issues: 1) additional intertidal areas in the upper harbor requiring cleanup to address dermal contact risks, 2) mechanical dewatering of dredged sediments, 3) use of the pilot study CDF at Sawyer Street, 4) change in the CDF D wall design (CDF D was the largest of the four CDFs included in the 1998 OU1 ROD) and 5) use of rail at CDF D.

In August 2002 EPA issued a second ESD for the 1998 OU1 ROD. This ESD eliminates CDF D, and instead selects offsite landfilling for the dredged and dewatered sediments slated for it. ESDs as well as other site information is available for review at the New Bedford Free Public Library (reference section) and at EPA's Boston records center. Both ESDs are also available online at the New Bedford Harbor web site (www.epa.gov/ne/nbh) under "Technical Documents."

4.2 Operable Unit 1 Remedy Implementation

4.2.1 Early Cleanup Activities

The first remedial action taken after issuance of the 1998 OU1 ROD was to erect fencing in 1999 along the New Bedford shoreline in residential and public access areas where new sediment sampling showed very high levels of shoreline PCBs. Additional "no fishing" signs were also added throughout the site. This was followed in 1999 and 2000 by the "Early Action" cleanup which excavated approximately 2,500 cy of highly contaminated residential shoreline areas in Acushnet followed by restoration of the impacted shoreline.

These early action cleanups were followed by the accelerated cleanup of the entire six acre intertidal and subtidal area north of Wood Street. This North of Wood Street cleanup was completed in March 2003, with additional saltmarsh and upland plantings completed in June 2003 (TTFW, 2005a). EPA prioritized this effort due to the very high PCB levels along the shoreline in this area (up to 46,000 ppm), along with the fact that two parks and many residences abut the shoreline in this river stretch. Two temporary dams were built to dewater this stretch of the river, to allow 15,600 cy of contaminated sediments to be excavated in near-dry conditions.

4.2.2 Preparation For Full Scale Dredging

In addition to accelerated cleanups in the northern-most part of the site, numerous advance projects and business relocations had to be completed to prepare for full scale dredging (see Table 1.b). Construction of a clean corridor to relocate thirteen submerged high voltage power cables was completed in 2001. Construction of a sediment dewatering and transfer facility (the dewatering facility) at Hervey Tichon Avenue in New Bedford for processing the dredged sediments was completed in 2004. Construction of this facility required a marine bulkhead around the shoreline, construction of the 55,000 sq. ft. building, and construction of a rail spur to the redeveloped city rail yard located across the street (see Figures 3 and 4). The marine bulkhead was completed in fall 2003 and the dewatering facility and rail spur were completed in summer 2004.

In addition, construction of the dewatering facility required the relocation of a commercial barge pier that formerly operated at this area, as well as relocation of two CSOs that discharged to the dewatering facility area. Furthermore, the only suitable location in the harbor for the relocated barge pier contained thirteen abandoned commercial fishing vessels as well as PCB-contaminated sediments, all of which required removal prior to constructing the new pier. The environmental dredging was completed in fall 2003 (TTFW, 2005b) and construction of the new pier was completed in winter 2005.

4.2.3 Full Scale Dredging

The dredging contractor mobilized to the site in Spring 2004. Preparation activities for full scale dredging included: construction of a desanding facility at Sawyer Street in New Bedford, and construction of various marine pipelines and a pumping network for the dredged material. Full scale dredging of the upper harbor started in August 2004 and ended for the season in November 2004 (Jacobs, 2005 - draft). Approximately 14,000 cubic yards of contaminated sediments were dredged, dewatered and transported off-site to a TSCA-permitted hazardous waste landfill as part of the 2004 full scale effort. Full scale dredging resumed in September 2005. The current funding rate allows approximately 2.5 to 3 months of dredging (approximately 25,000 cy) each year. These amounts could vary from year to year depending on funding rates and areas being dredged. Figure 4 shows the location of the major components of the full scale dredging process, as well as the sediment areas above cleanup levels requiring remediation.

Based on the extensive sediment sampling program performed during remedial design, as well as inclusion of potential over-dredging amounts, the current estimated total volume requiring remediation pursuant to the 1998 OU1 ROD is 880,000 cy.

4.2.4 Pilot Underwater Capping

The 1998 ROD for the upper and lower harbor included cleanup of an area just south of the hurricane barrier near the Cornell-Dubilier mill since, although in the *outer* harbor, it was the only known area therein that contained PCB levels above the lower harbor's 50 ppm cleanup standard. Due to the general north to south (worst first) dredging strategy, this area was slated for dredging

towards the end of the OU 1 cleanup. In 2004 and 2005, however, an opportunity for an alternative accelerated cleanup approach for this area presented itself at no cost to EPA: clean sand generated by the port of New Bedford's navigational dredging (implemented pursuant to the state enhanced remedy - see section 4.1 above) could be used to create an underwater cap instead of disposing it at sea at an approved disposal site.

From April through July 2005, EPA worked in close collaboration with the port and a multi-agency steering committee to design and implement an effective underwater cap that met the port's available budget. To view a color-coded map of the cap thickness at completion of the pilot, go to the project web site (www.epa/gov/ne/nbh) and select "Pilot Underwater Cap." EPA will continue to monitor the physical, chemical and biological quality of the cap to ensure that it is functioning as intended, and to assess the potential for use of underwater capping at other areas of the site. The conclusion to date, however, is that the pilot capping operation was successful, and that additional capping efforts in this area would be justified.

To simplify the geographic divisions (operable units) at the site, and to reflect the experience of the pilot capping study, EPA is planning an upcoming decision document that will clarify that the southern limit of OU1 will be the hurricane barrier. The Cornell-Dubilier sediment area would thus move from OU1 to OU3. (Again, the Cornell-Dubilier area was included in the OU1 ROD as an exception, since PCBs in this outer harbor area were above the lower harbor's cleanup level of 50 ppm).

4.2.5 Long Term Site Wide Monitoring

The two largest long term monitoring programs for the site are the annual seafood monitoring program (run by the MA DEP) and EPA's long term benthic quality monitoring program. In summary, these two programs continue to demonstrate the need for the harbor PCB cleanup, in terms of unacceptable risks to both human health and the marine ecosystem.

A variety of other sediment monitoring is done as needed to support the implementation of the 1998 OU1 ROD. See section 6.4.3 for a more detailed discussion of these long term monitoring programs.

4.2.6 Fish Smart Outreach Campaign, Seafood Advisories and Other Institutional Controls

EPA New England's Fish Smart campaign is an innovative educational campaign designed to raise the public's awareness of the health risks from eating PCB-contaminated seafood from New Bedford Harbor. The audience it targets includes:

1. Women of child-bearing age;
2. Children; and the
3. General fishing community (local and sport fishermen, not the commercial fishing fleet which travels far offshore to catch fish).

EPA, MA DEP, and MA DPH have partnered in this campaign and have been actively engaging local partners, specifically:

1. Local medical providers;
2. Social service providers;
3. Marinas & bait shops; and
4. Schools and environmental nonprofit groups.

This campaign continues to build as EPA further expands the number and type of local partners with which it is working. Outreach material was developed with the help of an informal focus group consisting of local medical and social service providers. Materials are in English, Spanish, and Portuguese.

Reaching Women of Child-Bearing Age and Young Children

The Greater New Bedford Community Health Center and WIC offices are active partners who have Fish Smart Campaign posters in all waiting and examining rooms, and who try to engage their patients in dialogue about nutritional habits and distribute language-appropriate Fish Smart Campaign flyers. Combined, both offices see approximately 2,000 women of child-bearing age and children monthly.

EPA and MA DPH have held bi-annual medical Grand Rounds since 2003 and plan to continue. Presented at either the Greater New Bedford Community Health Center or St. Luke's Hospital, these medical and scientific presentations, which offered attendees continuing medical credits, raise the awareness of the medical community regarding the PCB health risks from consuming contaminated seafood and engage them as active partners in disseminating information to the target audiences.

The New Bedford Health Dept. also makes posters and flyers available to its clients. The health department's phone number is listed on all Fish Smart Campaign materials. The New Bedford Immigrants Assistance Center also distributes posters and flyers and has had EPA and MA DPH participate in the Center's health fair. EPA and MA DPH also made a presentation the Peri-natal group, which is a coordinating group representing over ten different organizations in the Greater New Bedford area that address pre-natal care, teen pregnancy and welfare services.

Reaching School-Age Children

EPA, MA DPH, MA DEP, the Lloyd Environmental Center, and the New Bedford Sea Lab hosted a two-day teachers' workshop in July 2005. By providing the information and tools needed, the workshop's objective is for teachers to incorporate Fish Smart messages into their elementary school curriculum. In order to receive their continuing education credits, teachers must attend a two hour Call-Back session in October 2005 where they will share lesson plans developed with Fish Smart information. This workshop likely will be provided on an annual basis thereby greatly increasing the number of students educated about the health risks of eating PCB-contaminated seafood from the harbor.

To further this objective, in 2004 EPA, MA DPH, MA DEP, and the Lloyd Environmental Center, provided two fifth grade classes with classroom and field hands-on experiences pertaining

to the New Bedford Harbor ecosystem, PCB cleanup activities, and seafood consumption health risks from harbor PCB-contaminated seafood. The participating school is in close proximity to the harbor and is in a Cape Verdean neighborhood.

Reaching Fishing Community

A multi-language brochure with a map of the harbor and its fishing ban information are mailed annually to nearly 4,000 households in the municipalities surrounding New Bedford Harbor. Local partners, EPA and MA DEP conduct a spring-time outreach effort to marinas and bait shops with the desired outcome of the businesses hanging Fish Smart Campaign posters and making the Fish Smart multi-language brochure available to their customers. Fish Smart promotional material also appears annually in the Standard Times Seaside Edition which reaches approximately 40,000 subscribers.

In addition, easy to understand multi-language signs are posted along the shore in popular fishing locations warning about the dangers of consuming PCB-contaminated seafood.

Discussions are also underway with the South East Transit Authority to outfit all of the buses and the New Bedford bus station with Fish Smart Campaign posters. EPA will also seek permission to hang Fish Smart Campaign posters in all of the community centers, homeless centers, and public housing complexes.

4.2.7 Summary of Sediment Areas Remediated to Date

Table 2 - Summary of Sediment Areas Remediated to Date

Project	Date	Sediment volume remediated (cy)
1. First pilot study	1988/89	2900
2. Hot spot dredging	1994/95	14000
3. Early action	2000	2500
4. Pre-design field test (PDFT)	2000	2300
5. North of Wood Street	2002/03	15600
6. North Lobe Dredging	2003	4100
7. Full scale dredging - season 1	2004	14000
8. Full scale dredging - season 2	2005	25,000 (forecasted)
9. Pilot underwater cap	2005	25,000 cy (dredging amount avoided)
10. Total remediated volume	1988-2005	105400

In addition, it should be noted that an additional approximately 13,000 cy of sediments were dredged in 2004/05 as part of the commercial barge business relocation discussed above in section 4.2.2. This relocation was required due to construction of the dewatering facility, and the related dredging was for navigation not PCB removal. In fact, the North Lobe Dredging project (item #6 in the table above) was performed to remove those sediments above the lower harbor cleanup level of 50 ppm prior to construction of the new commercial barge pier and channel.

4.2.8 State Enhanced Remedy

As discussed above in section 4.1, the Commonwealth of Massachusetts in conjunction with the City of New Bedford are performing navigational dredging pursuant to the state enhanced remedy (SER) portion of the OU1 ROD. As of September 2005, three separate dredging projects have been undertaken pursuant to the SER. These projects are summarized in Table 3 below.

Table 3 - Summary of State Enhanced Remedy Navigational Dredging Performed to Date

State Enhanced Remedy Project	Date	Sediment volume (cy)
1. Fish Island & top of transitional CAD to borrow pit CAD	winter 2005	31700
2. Clean transitional CAD sand to pilot underwater cap	summer 2005	84,200*
3. Priority areas in New Bedford and Fairhaven, disposed in the transitional CAD ("phase 2, part 2")	fall 2005	42200
4. Total volume of sediments (both clean and contaminated)	2005	158100

*Note that it was the 84,200 cy of clean sandy material excavated to create the transitional CAD cell that was used to cap PCB-contaminated sediments near the Cornell-Dubilier facility as part of the pilot underwater cap discussed above in section 4.2.4.

4.3 Operable Unit 2 Hot Spot Remedy Selection

The ROD for OU2 was signed on April 6, 1990. The remedial action objectives developed for the OU2 remedy are:

1. Significantly reduce PCB migration from the Hot Spot area sediment, which acts as a PCB source to the water column and to the remainder of the sediments in the harbor.

2. Significantly reduce the amount of remaining PCB contamination that would need to be remediated in order to achieve overall harbor cleanup.

3. Protect public health by preventing direct contact with Hot Spot sediments.

4. Protect marine life by preventing direct contact with Hot Spot sediments.

The cleanup plan selected in the 1990 OU2 ROD consists of the following components:

1. Dredging about 10,000 cubic yards of hot spot sediments (PCB concentrations ranging from a minimum of 4,000 to over 100,000 ppm);

2. treatment of the large volume of water co-dredged along with the sediments;

3. dewatering the dredged sediments;

4. on-site incineration of the dewatered sediments;

5. stabilization of the incinerator ash (if determined to be necessary); and

6. on-site disposal of the incinerator ash.

In April 1992, EPA issued an ESD to change the storage of ash generated from the incineration of Hot Spot sediments from temporary storage in an on-site CDF to permanent storage in an on-site CDF.

In 1993, due to a vehement reversal in public support for the incineration component of the cleanup plan at about the time the incinerator was being mobilized, EPA agreed to terminate the incineration contract and begin studies of other possible options for treating the Hot Spot sediments. The New Bedford Harbor Superfund Site Community Forum was created in late 1993 to develop a consensus based cleanup plan to replace the on-site incineration component of the original cleanup plan.

During the 1994-95 construction seasons the dredging component of the 1990 Hot Spot remedy decision was implemented. Dredging of about 14,000 cubic-yards in volume and 5 acres in area began in April 1994 and was completed in September 1995.

In October 1995, EPA issued an ESD to document the need for interim storage of the dredged Hot Spot sediments in the Sawyer Street CDF while studies of treatment options other than on-site incineration were conducted.

In December 1997, EPA issued a Hot Spot Feasibility Study Addendum Report which presented the evaluation of the non-incineration treatment options investigated. In August 1998, EPA issued a Proposed Plan to amend the incineration component of the 1990 Hot Spot cleanup plan. The 1998 Proposed Plan called for dewatering the Hot Spot sediments and transporting them to a permitted off-site hazardous waste landfill.

In April 1999, EPA signed an amendment to the 1990 ROD which calls for off-site landfilling instead of on-site incineration. The amended cleanup plan consists of the following activities:

1. Upgrade the existing site facilities as needed;

2. sediment dewatering and water treatment;

3. transportation of dewatered sediment to an off-site TSCA permitted landfill;

4. air monitoring program.

The dredging component of the remedy remained unchanged.

4.4 Operable Unit 2 Remedy Implementation

The implementation of the OU2 remedy is briefly summarized below. A more detailed description can be found in the Report on the Effects of the Hot Spot Dredging Operations (EPA, 1997) and the Remedial Action Report for OU2 (EPA, 2000).

About 14,000 cubic-yards of hot spot sediments were dredged from the upper harbor during the 1994-95 construction seasons. The hot spot sediments were temporarily stored in an on-site CDF while alternatives to on-site incineration were evaluated. As discussed above, in April 1999, EPA signed an amendment to the 1990 OU2 ROD which called for off-site landfilling instead of on-site incineration. A contract to implement the amended hot spot remedy was awarded in October 1999. Transportation of the passively dewatered hot spot sediments to an off-site TSCA permitted hazardous waste disposal facility started in December 1999 and was completed in May 2000.

4.5 Operable Unit 3 (Outer Harbor) Remedy Selection

The EPA has not yet selected a remedy for the 17,000 acre OU3. As discussed above in section 4.2.4, however, EPA recently completed a pilot underwater capping study for the most highly contaminated area in the outer harbor (based on existing data). In addition, EPA is pursuing alternative funding sources to complete the OU3 RI/FS.

5.0 PROGRESS SINCE THE LAST REVIEW

This is the first five-year review for the Site.

6.0 FIVE-YEAR REVIEW PROCESS

6.1 Administrative Components

The New Bedford Harbor site's five-year review team was led by Mr. James Brown and Mr. David Dickerson, EPA Region 1 co-project managers for the site. The review components included:

- on-going site inspection;
- review of project documents and After Action Reports;
- review of data reports;
- review of cleanup levels and risk calculations
- development and review of the Five-Year Review Report.

Soon after the review and approval of this Five-year Review Report, a notice will be placed in a local paper(s) announcing that it is complete and available to the public at the two Site repositories listed below (in addition to the project web site):

New Bedford Free Public Library
613 Pleasant Street
New Bedford, MA 02740

EPA – Region 1 (New England) Records Center
One Congress Street
Boston, Massachusetts 02114-2023

6.2 Community Notification and Involvement

EPA New England maintains a very active outreach and public involvement program to keep the public aware and informed of the site's progress. This includes, among others, informal monthly update meetings, public meetings, neighborhood group meetings, press releases, fact sheets, site tours, and local cable TV interviews. The mailing list for the NBH site contains nearly 4,000 contacts. A more focused Fish Smart campaign is also being implemented (see section 4.2.6 above).

EPA notified the harbor communities that this five-year review was being undertaken by placing a public notice and discussing it at the monthly update meetings. On March 29, 2005, a public notice was published in the New Bedford Standard Times that the five-year review was being conducted. A public notice will be sent to the same newspaper to announce that the Five-Year Review is complete, and that the results of the review and the report are available to the public at the New Bedford Free Public Library, the EPA Region 1 Office and at www.epa.gov/ne/nbh.

6.3 Document Review

This five-year review consisted of a review of relevant documents for Operable Units one, two and three. See Section 12.0, References Cited, for a list of documents that were reviewed. Additional documents reviewed include the latest Five-Year Review Guidance and the 2005 pilot underwater cap bathymetry and monitoring data received to date.

6.4 Data Review

6.4.1 Water Quality Monitoring

Based on the long history of cleanup operations and environmental monitoring at the site beginning with the 1988/89 pilot study (e.g., USEPA, 1997), EPA and the U.S. Army Corps of Engineers (USACE) have developed a site-specific turbidity-based monitoring program that is easily monitored and which protects the marine ecosystem. Figures 5 and 6 show the systematic basis of this monitoring program in flow chart format. In summary, detections of turbidity levels at 50 ntu (nepthelometric turbidity units) above background or greater 300 feet down current trigger the collection of water samples for chemical and toxicity analyses. If this 50 ntu criterion is detected 600 feet down current, dredging operations must be stopped, and reevaluated and modified as necessary to comply with the 50 ntu criteria.

The extensive water quality monitoring data base collected to date clearly shows that all in-water construction and dredging operations performed to date have complied (and generally not even approached) this criterion (ENSR, 2003; ENSR, 2004; ENSR, 2005 - draft). The protectiveness of the 50 ntu turbidity criterion is also continually evaluated, by performing acute and chronic toxicity sampling on samples with elevated turbidity levels (e.g., 70 ntu) collected immediately next to the construction or dredging operations.

While clearly demonstrating compliance and protectiveness, the site water quality monitoring has identified areas of the dredging operation where turbidity impacts could be reduced. These include minimizing impacts from sediment scour due to boat propellors and workboat or pipeline groundings, and the unintended consequence of silt curtains *causing* turbidity when in contact with sediment during low tide in shallow water. The site team will continue to address these issues during its ongoing operations.

6.4.2 Air Monitoring

A very comprehensive data base of airborne PCB levels has been developed for the NBH site, beginning most notably with the hot spot dredging operations in 1994-95 (EPA, 1997). In 1999-2000, in support of the 1998 ROD, EPA commissioned a year long baseline monitoring program with sampling locations at each of the four planned CDFs (FWEC, 2001). Airborne PCB samples are also collected as part of every remedial activity involving removal of PCB-contaminated sediments (e.g., NWS, NLD AAR's). To ensure that the airborne PCB levels reported are truly the total of all PCBs detectable, the analytical method used at the site since 1999 quantifies all ten of the PCB homolog groups.

More recently, to account for the long term nature of the harbor cleanup, as well as the chronic nature of PCB toxicity, the site team established a "public exposure tracking system" (PETS) to ensure that the public's long term exposure to airborne PCBs remains below health-based levels. To assist public understanding of the program, the PETS process graphs a linear acceptable exposure level over time, and plots the actual monitored exposure levels at various receptors over time: as long as the field monitored values remain below the "budgeted" cumulative exposure line then health risks from

airborne PCBs remain insignificant. See Figure 7. Air monitoring data is also posted on the project web site as soon as possible: see www.epa.gov/ne/nbh, and click on "Air Monitoring."

To date, there have been no exceedances of the established PETS airborne PCB budgets for any of the target receptors. It should be noted, however, that field monitored values at the Aerovox shoreline have come close to exceeding the allowable PCB budget for that location (Figure 7). This situation should be alleviated by the prioritized OU1 dredging in this area as well as the remediation of the entire Aerovox property currently scheduled for fall/winter 2006-07.

6.4.3 Long Term Monitoring

The two largest long term monitoring programs for the site are the annual seafood monitoring program and the episodic benthic quality long term monitoring program. In summary, these two programs continue to demonstrate the need for the harbor PCB cleanup, in terms of unacceptable risks to both human health and the marine ecosystem. These monitoring programs also demonstrate that the remedy is being implemented in a safe manner that doesn't exacerbate PCB bioaccumulation within the local marine food chain.

The seafood monitoring program, initiated in 2002, is coordinated by the Commonwealth of Massachusetts, with oversight by EPA New England (USEPA, 2004). Edible tissues of a variety of locally caught species from all three seafood closure areas are monitored yearly for PCB levels - both Aroclors and congeners. This state seafood monitoring is augmented by a long term monitoring program of blue mussels (*Mytilus edulis*) performed twice annually by EPA's Narragansett, RI research laboratory. This program clearly demonstrates that PCB levels in blue mussels in the upper and lower harbor are well above the US FDA standard of 2 ppm for PCBs in seafood (Figure 8).

The main goal of the benthic quality long term monitoring program is to assess the overall effectiveness of the remedy over the long term (Nelson *et al.*, 1996). The program includes physical (grain size, TOC), chemical (PCBs, metals, AVS) and biological (sediment toxicity, species enumeration) end points, and covers the upper, lower and outer harbor areas with statistical rigor. Since benthic quality is not expected to change significantly in any one year, the program is conducted periodically - once every three to five years - to coincide with significant remedial events (e.g., prior to hot spot dredging, prior to full scale dredging). To date four separate rounds of the benthic long term monitoring program have been conducted in 1993, 1995, 1999 and 2004 (Nelson *et al.*, 1996, USEPA 1998, ENSR 2001).

In addition to these two long term monitoring programs, the site team undertakes a variety of sediment PCB monitoring as needed to assist in the design and implementation of the ongoing remedial actions. These include additional characterization sampling, "progress" sampling during cleanup operations and post-cleanup sampling to track potential recontamination of remediated areas from abutting unremediated areas. For the north of Wood Street cleanup, some initial recontamination of subtidal areas was noted in 2004, but sampling in 2005 showed that PCB levels in these areas had dropped back to acceptable levels (presumably from high spring runoff flow in the Acushnet River). EPA will continue to monitor the area to ensure the protectiveness of the north of Wood Street (NWS) cleanup.

It should be noted that this NWS post-cleanup monitoring also identified a small shoreline area above mean high water (MHW) in Acushnet, MA with high PCB levels. Based on existing sample data at the time of the NWS cleanup, the limit of excavation for this particular area (which at the time was heavily overgrown with vegetation) was set at MHW. The area was subsequently cleared of vegetation (by others), and the post-cleanup monitoring discovered the high PCB levels. As a result, this small shoreline area will be remediated and restored as part of the 2005 remedial actions. This experience emphasizes the need for comprehensive pre-cleanup PCB sampling: in this case extensive pre-cleanup samples were indeed collected, but tended to concentrate on the residential and public park shoreline areas of the river. The experience also demonstrates, however, that EPA's oversight and sampling efforts are sufficiently robust to identify ongoing problem areas.

6.5 Site Inspection

Since the cleanup is still in progress site inspections are routinely performed throughout the year, especially during construction activities.

6.6 Interviews

EPA coordinates on a daily basis with the USACE design/build team, and regularly with other harbor stakeholders, so there was no need to conduct interviews specifically for this five-year review period.

7.0 TECHNICAL ASSESSMENT

7.1 Question A: Is the remedy functioning as intended by the decision documents?

Due to the very large size of the site cleanup, construction of the remedy has not been completed. At the current annual funding rate, completion of the cleanup is not expected for many years. However, EPA's oversight of construction activities and its review of monitoring data, ARARs, risk assumptions, and other documents demonstrates that the remedy is being implemented in full accordance with the 1998 ROD and the 2001 and 2002 ESDs. EPA continues to expect that the remedy will be protective when it is completed.

7.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of remedy selection still valid?

Based on a review of the most current state and federal regulations, as well as other PCB contaminated sediment sites nationally, the target sediment cleanup levels remain valid. The overall long term goals of the remedy also remain appropriate (e.g., eventual lifting of the state fishing bans and compliance with the PCB AWQC).

7.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

While not calling into question the protectiveness of the remedy, there is an issue regarding changes in shoreline land use over time. The site team works closely with the City and private shoreline landowners to assess changes in shoreline land use that would trigger the ROD's more stringent cleanup levels for public access and residential shoreline areas (e.g., Brownfield or industrial use changing to public access or residential). Specific examples of these land use changes have already occurred, and the site team has made the appropriate adjustment in cleanup level (e.g., Founders' Park, Pierce Mill Park). Given the overall trends towards a more publically accessible shoreline in the upper harbor, as well as towards conversion of shoreline mills to residential use (e.g., Rope Works building, Whalers Cove assisted living, etc.) the site team expects to see additional shoreline properties developed before remediation occurs which will trigger more stringent shoreline cleanup levels over time. Continued coordination and surveillance by the site team will be required to track these land use changes and incorporate them into the remedy.

In other words, the remedy is still protective and sufficiently addresses the expected range of shoreline land uses, but these land uses will change over time - especially given the long time frame of the cleanup. The biggest issue this raises is in the scenario wherein EPA remediates an industrial/commercial shoreline parcel, but then some years later the land use changes to public access or residential. Long-term institutional controls will be needed to advise future users of remediated areas that a higher use of the area beyond that envisioned when the cleanup occurred is prohibited until the landowner conducts further cleanup action. Some controls currently being considered are local ordinances and posting of maps in the affected Towns' Registry of Deeds indicating the cleanup levels achieved during remediation.

7.4 Technical Assessment Summary

According to the data reviewed for this five-year period and the on-going site inspections, the remedy is functioning as intended by the RODs for the Site. There have been no changes in regulatory statutes that affect target sediment cleanup levels, and no new pathways for exposure identified, that would call into question the goals of the remedy as set forth in the RODs.

As discussed earlier, two issues that impact the short term protectiveness of the remedy to human health are a) the ongoing consumption of local PCB-contaminated seafood and b) the potential for access to unremediated PCB-contaminated shorelines. EPA is controlling these risks to the maximum extent possible through the extensive use of educational and outreach efforts and with institutional controls such as fencing and signage. However, given the large scale of the site and its long remedial time frame, complete temporary control of these potential risk pathways remains problematic. In addition, ecological risks from the PCB contamination continue in the interim until the remedy is completed.

8.0 ISSUES

Table 4 below on page 22 summarizes the four main issues with regard to protection of human health at the site identified to date. As discussed herein, ecological risks from the site will remain until the remedy is complete.

Table 4: Issues

Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness* (Y/N)
1. Consumption of local PCB-contaminated seafood	Y	N
2. Access to unremediated PCB-contaminated shorelines	Y	N
3. Elevated airborne PCB levels near Aerovox	N	N
4. Long term changes in shoreline land use	N	potentially

* once remedy is complete

9.0 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Table 5: Recommendations and Follow-up Actions

Issue	**Recommendation and Follow-up Actions**	**Party Respon-sible**	**Over-sight Agency**	**Mile-stone Date**	**Affects Protectiveness**	
					Current	**Future**
1. Consumption of local PCB-contaminated seafood	Continue Fish Smart and other education and outreach efforts	EPA/ USACE/ MA DPH	EPA	ongoing	Y	N
2. Dermal contact with unremediated shoreline areas	Continue shoreline fencing and signage to minimize contact	EPA/ USACE	EPA	ongoing	Y	N
3. Elevated airborne PCBs in the vicinity of the Aerovox shoreline	Continue to prioritize dredging in this area and plans to remediate the Aerovox site	EPA/ USACE/ MA DEP/ City of N. Bedford	EPA	winter 2006/07	N	N
4. Long time frame of current remedial approach	Evaluate alternative cleanup methods	EPA/ USACE	EPA	ongoing	N	N
5. Long term changes in shoreline land use	Continue to coordinate with landowners, and develop long term ICs.	EPA/ USACE	EPA	ongoing	N	maybe

10.0 PROTECTIVENESS STATEMENT

EPA continues to expect the upper and lower harbor OU1 remedy to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled to the maximum extent practicable. As described in this report, the three exposure pathways of concern are consumption of local PCB-contaminated seafood, dermal contact with PCB-contaminated shoreline sediments, as well as ecological risks due to the highly contaminated sediments and water column at the site.

Given the vast geographic scale of the site coupled with the area's cultural diversity and reliance on local fishing, complete control of PCB-contaminated seafood consumption will be problematic until full remediation is complete. As discussed above, to combat this challenge the site team has implemented its Fish Smart campaign - one of the most comprehensive educational outreach strategies of its kind in the country. However, consumption of local PCB-contaminated seafood continues despite these extensive outreach efforts. EPA will continue to explore new solutions to keep local seafood consumption to an absolute minimum.

In addition to the seafood pathway, EPA has focused on minimizing dermal contact risks from PCB-contaminated shoreline areas. As discussed above, the Early Action and NWS accelerated cleanups were performed to remediate the highest priority residential and public access areas at the site. Again, however, given the vast physical scale of the site and the long remedial time frame, some dermal contact risk areas remain. To control these risks until full remediation occurs, EPA has used shoreline fencing (e.g., Pierce Mill Park) and signage (e.g., Veranda Street cove) as appropriate. Many other shoreline areas remain unremediated, but these are generally in industrial/commercial or remote areas where frequent dermal contact with PCB-contaminated sediment is not expected.

For shoreline areas subject to land use changes, EPA will continue to work closely with the City and with landowners during the remedial action and will develop a long-term control to notify landowners of allowable uses once remediation is complete.

Finally, it should be noted that site-specific computer modeling estimates that (to summarize a complicated issue) at least a ten year "lag" time would be required after the completion of dredging before seafood consumption risks would drop to acceptable levels (EPA, 1998). Realistically, EPA expects a gradual lifting of the state fishing bans depending both on species and closure area, with certain species and closure areas (e.g., Area III) reaching acceptable risk levels sooner than this ten year time frame.

The sediment dredged from the upper harbor as part of the OU2 hot spot remedy has been safely transported to an off-site TSCA landfill. Since no exposure to the hot spot sediment exists the OU2 remedy is protective of human health and the environment. A remedy has not been selected for OU3, thus a protectiveness statement for it can not be made at this time.

11.0 NEXT REVIEW

The next five year review is currently scheduled to be issued in September 2010.

12.0 REFERENCES CITED

ENSR, 2001. New Bedford Harbor Long Term Monitoring Report Survey III: Summary Report. ENSR Corporation. March 2001.

ENSR, 2003. Water Quality Monitoring Summary Report (Construction of the Commonwealth Electric Cable Crossing). New Bedford Harbor Superfund Site, New Bedford Massachusetts. ENSR Corporation. August 2003.

ENSR, 2004. Water Quality Monitoring Summary Reports 2002-2003 (Herman Melville Boatyard Demolition - 2002, Area D Construction - 2002/03, North Lobe Dredging - 2003). New Bedford Harbor Superfund Site, New Bedford Massachusetts. ENSR Corporation. March 2004.

ENSR, 2005 (draft). Water Quality Monitoring Summary Reports 2004 (Construction of the Packer Marine Facility, Dredging of DMU 2). New Bedford Harbor Superfund Site, New Bedford Massachusetts. ENSR Corporation. May 2005 Draft.

FWEC, 2001. Final Annual Report, Baseline Ambient Air Sampling & Analysis, 1 June 1999 - 30 May 2000, Operable Unit # 1, New Bedford harbor Superfund Site. Foster Wheeler Environmental Corporation (FWEC) for USACE New England District. March 2001.

Jacobs, 2005. USACE New England District, After-Action Report, 2004 New Bedford Harbor Remedial Action, New Bedford Harbor Superfund Site. Jacobs Engineering Group. January 2005.

Nelson, W.G., B.J. Bergen, S.J. Benyi, G. Morrison, R.A. Voyer, C.J. Strobe, S.Rego, G. Thursby, and C.E. Pesch, 1996. New Bedford Harbor Long-Term Monitoring Assessment Rport: Baseline Sampling. U.S. Environmental protection Agency, National Health and Environmental Effects Research Laboratory, Atlantic Ecology Division, Narragansett, R.I. EPA/600/R-96/097. October 1996

TTFW, 2005a. After Action Report for North of Wood Street Remediation, New Bedford Harbor Superfund Site, Operable Unit # 1. Prepared by Tetra Tech FW (TTFW), Inc., for the U.S. Army Corps of Engineers, New England District. April 2005.

TTFW, 2005b. After Action Report for North Lobe Dredging, New Bedford Harbor Superfund Site, OU1. Prepared by Tetra Tech FW, Inc., for USACE, New England District. August 2005.

USEPA, 1997. Report on the Effects of the Hot Spot Dredging Operations, New Bedford Harbor Superfund Site, New Bedford Massachusetts. U.S. EPA - New England Region. October 1997.

USEPA, 1998. Record of Decision for the Upper and Lower Harbor Operable Unit, New Bedford Harbor Superfund Site, New Bedford, Massachusetts. U.S. EPA - New England Region. Sept. 1998.

USEPA, 2000. Final Remedial Action Report, Hot Spot Operable Unit, New Bedford Harbor Superfund Site, New Bedford, Massachusetts. U.S. EPA - New England Region. September 2000.

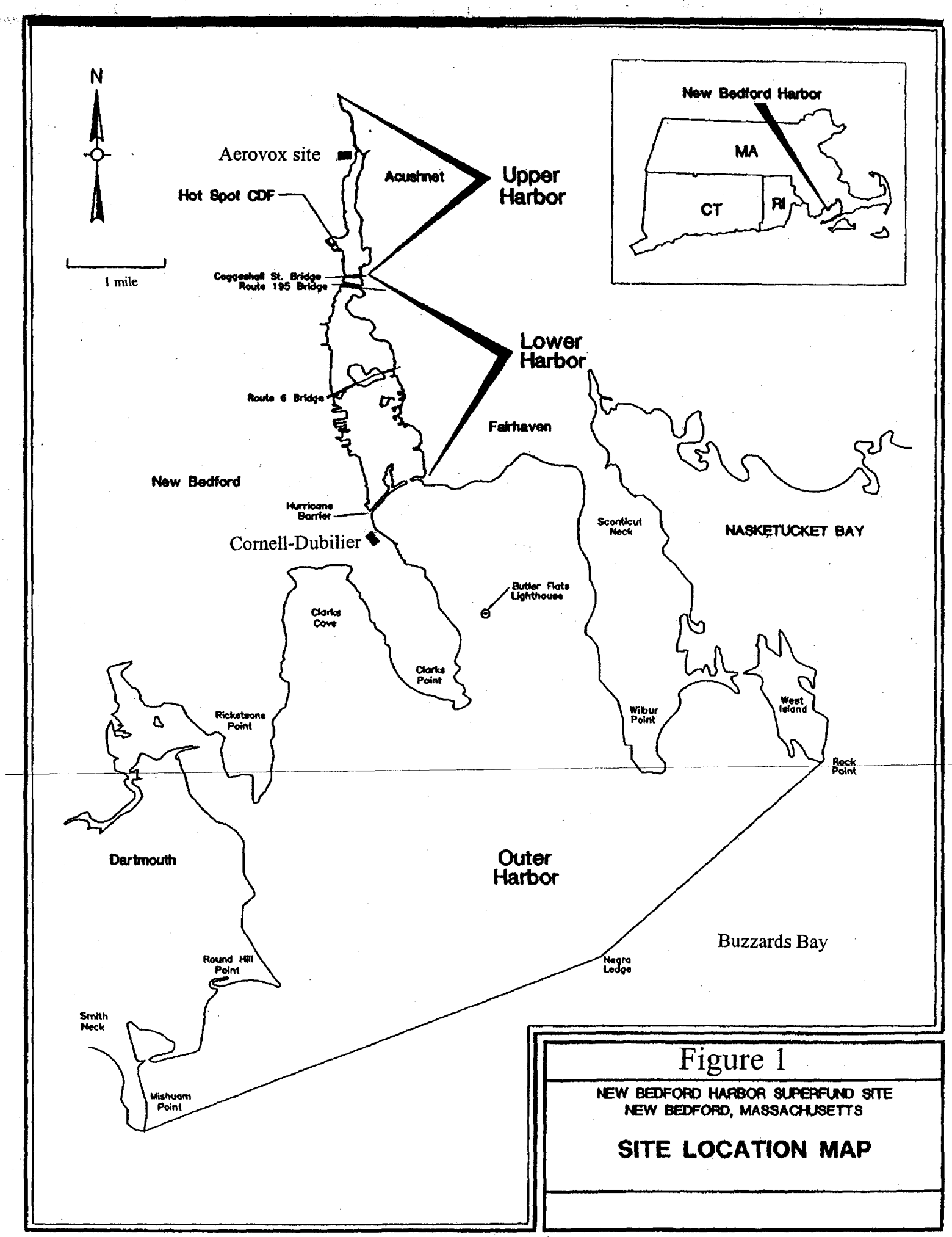


Figure 1

NEW BEDFORD HARBOR SUPERFUND SITE
NEW BEDFORD, MASSACHUSETTS

SITE LOCATION MAP

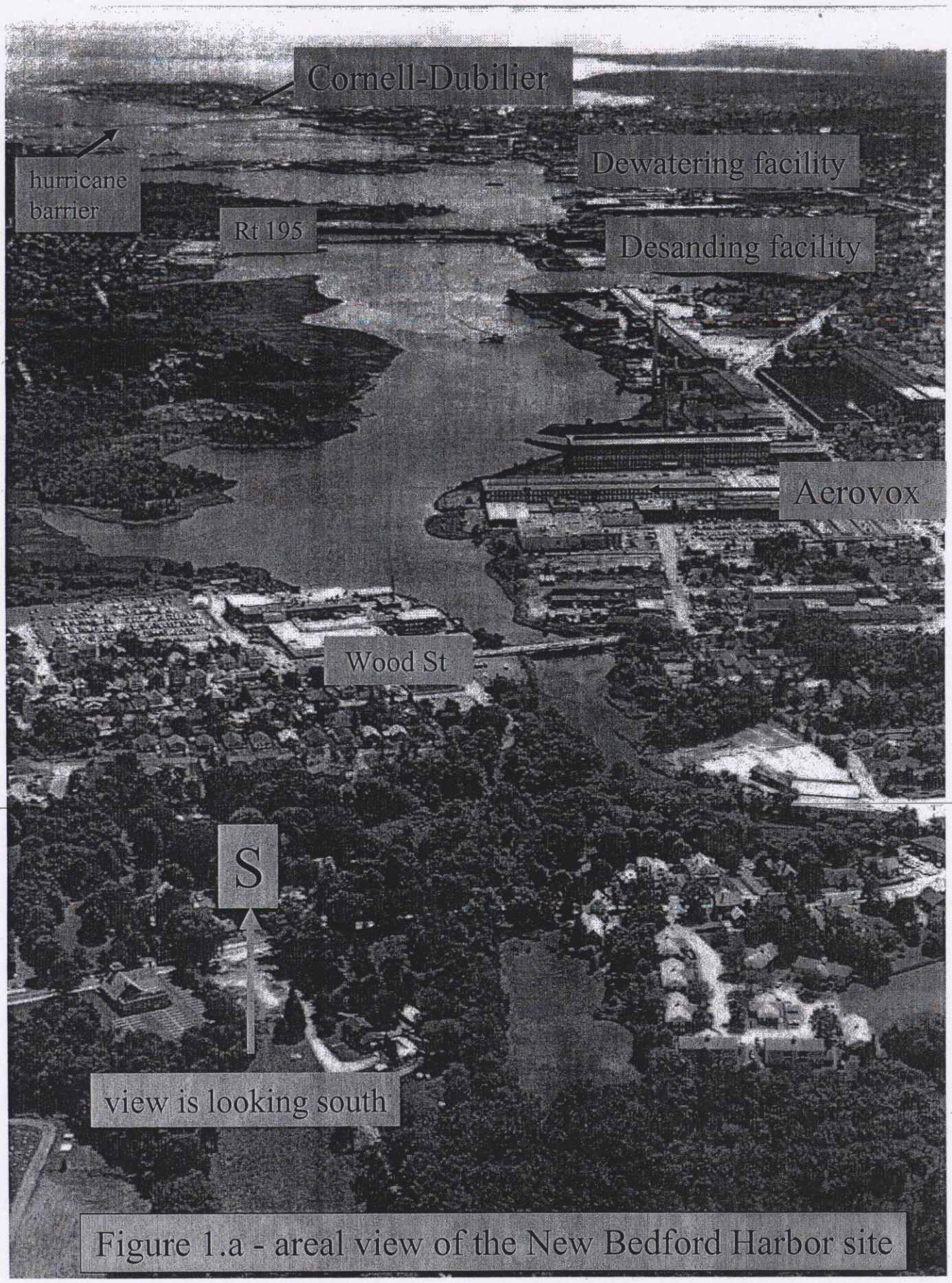


Figure 1.a - areal view of the New Bedford Harbor site

Figure 2 - The 1979 State Fishing Ban

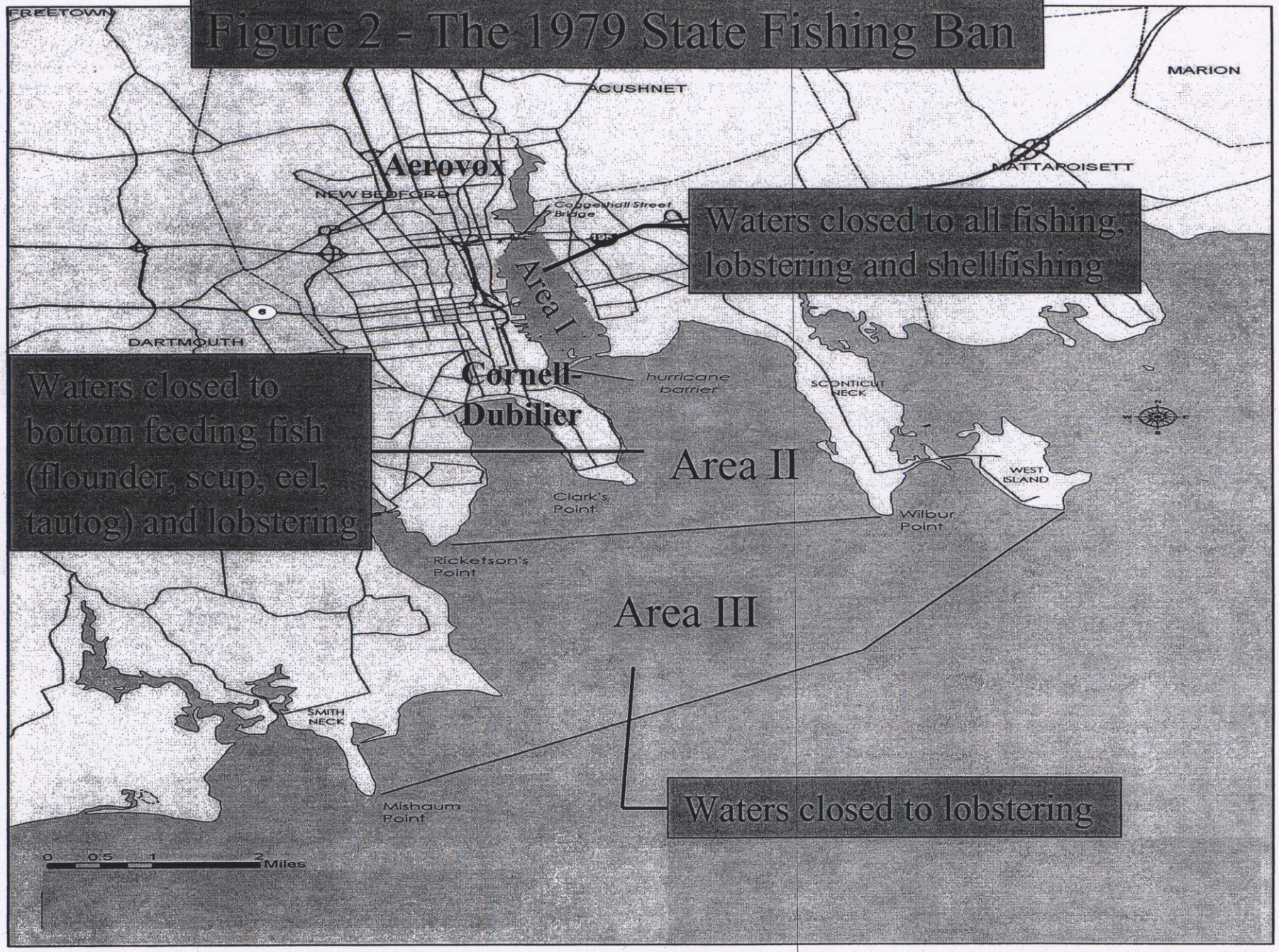


Figure 3 - Dewatering building, bulkhead and rail spur, New Bedford Harbor Superfund Site

View looking west from New Bedford Harbor

View looking east from Herman Melville Blvd.

Photo: Chris Turek

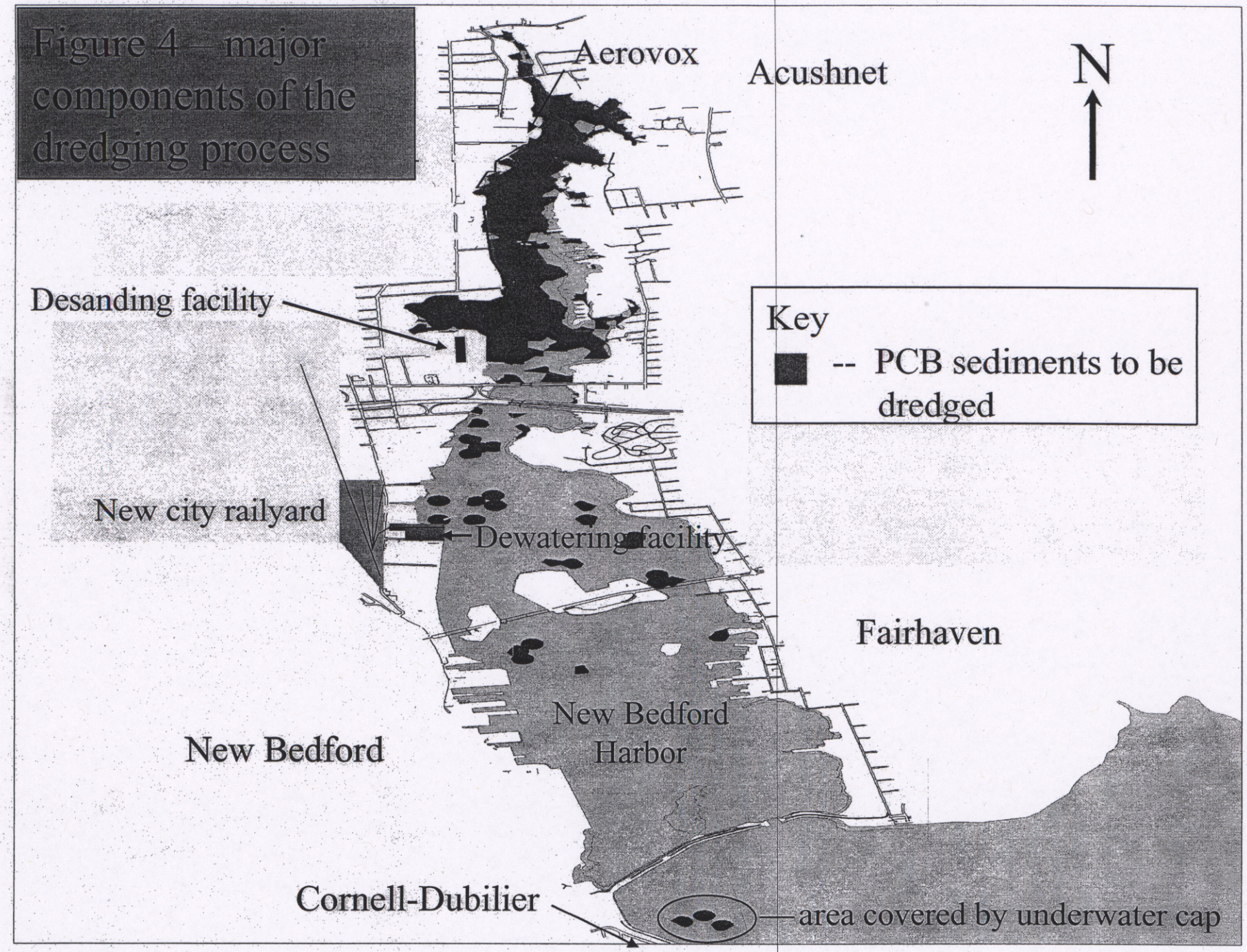
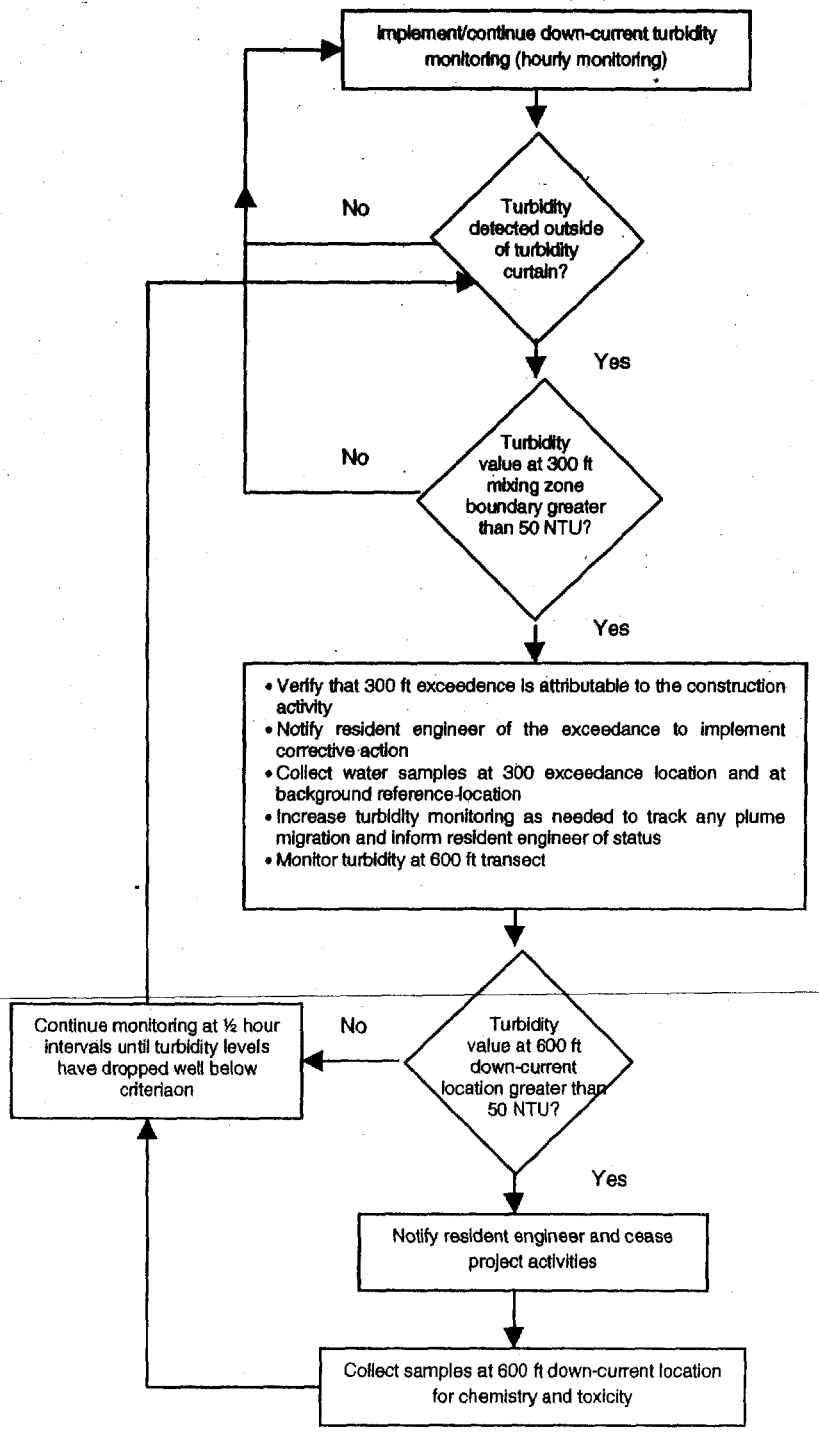


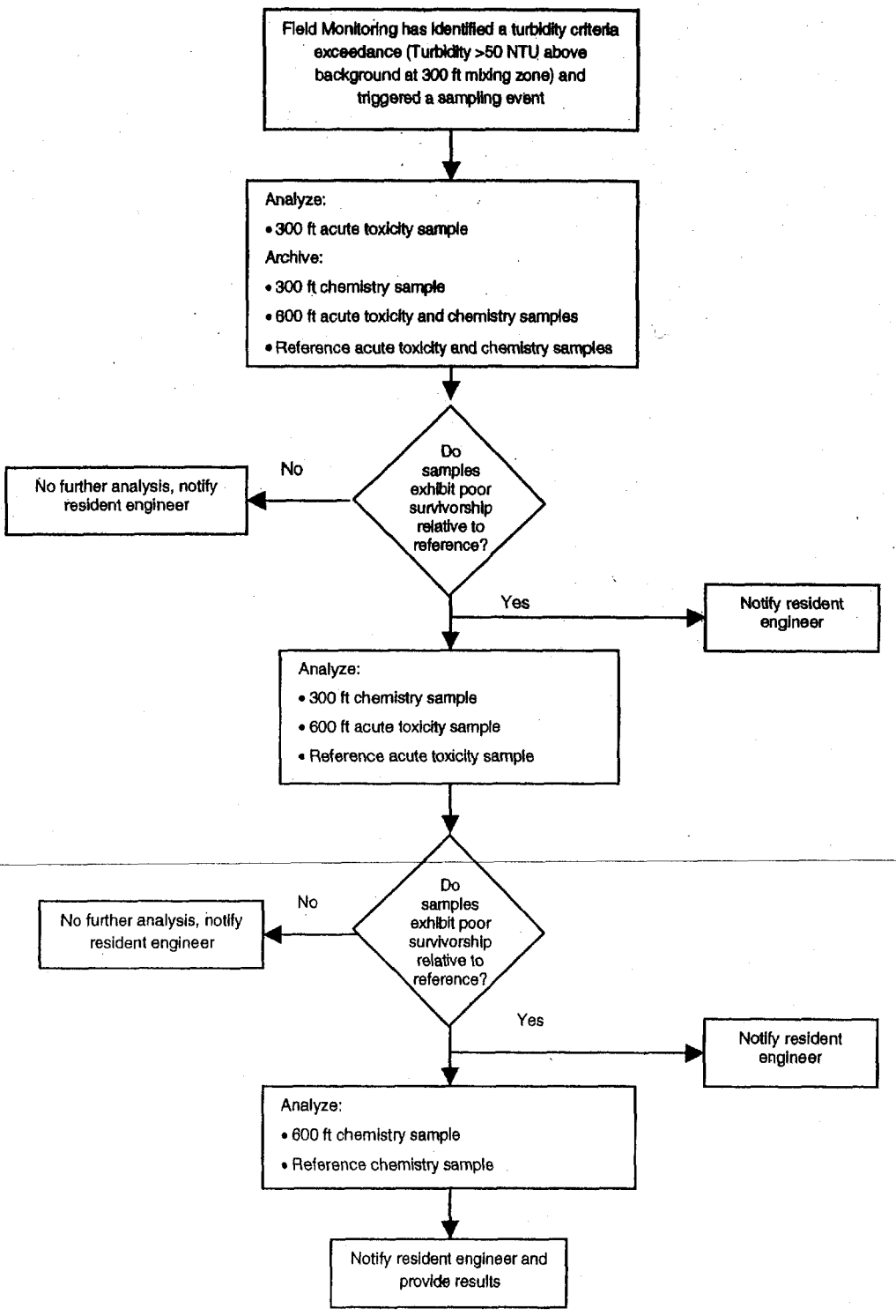
Figure 4 – major components of the dredging process

Figure 5 - Water Quality Monitoring Decision Sequence



Notes
1: 50 NTU value is defined as 50 NTU above the background turbidity level
2: The presence and extent of any visible oil sheen emanating from project area, even though project turbidity limits have not been exceeded should be brought to the attention of resident engineer, and a surface grab sample shall be collected for potential analysis.

Figure 6 - Water Quality Monitoring Analytical Protocol



Air Sampling Status Report

Sample Station :	24 Aerovox
Collection Date:	6/1/2005
Measured PCB Concentration (ng/m^3):	75
Exposure Budget Expended During This Period:	15.3%
Cumulative Exposure Budget Expended to Date:	70.2%
Response Level:	No Triggers Identified
Response:	No Response Necessary

Triggers:

Low

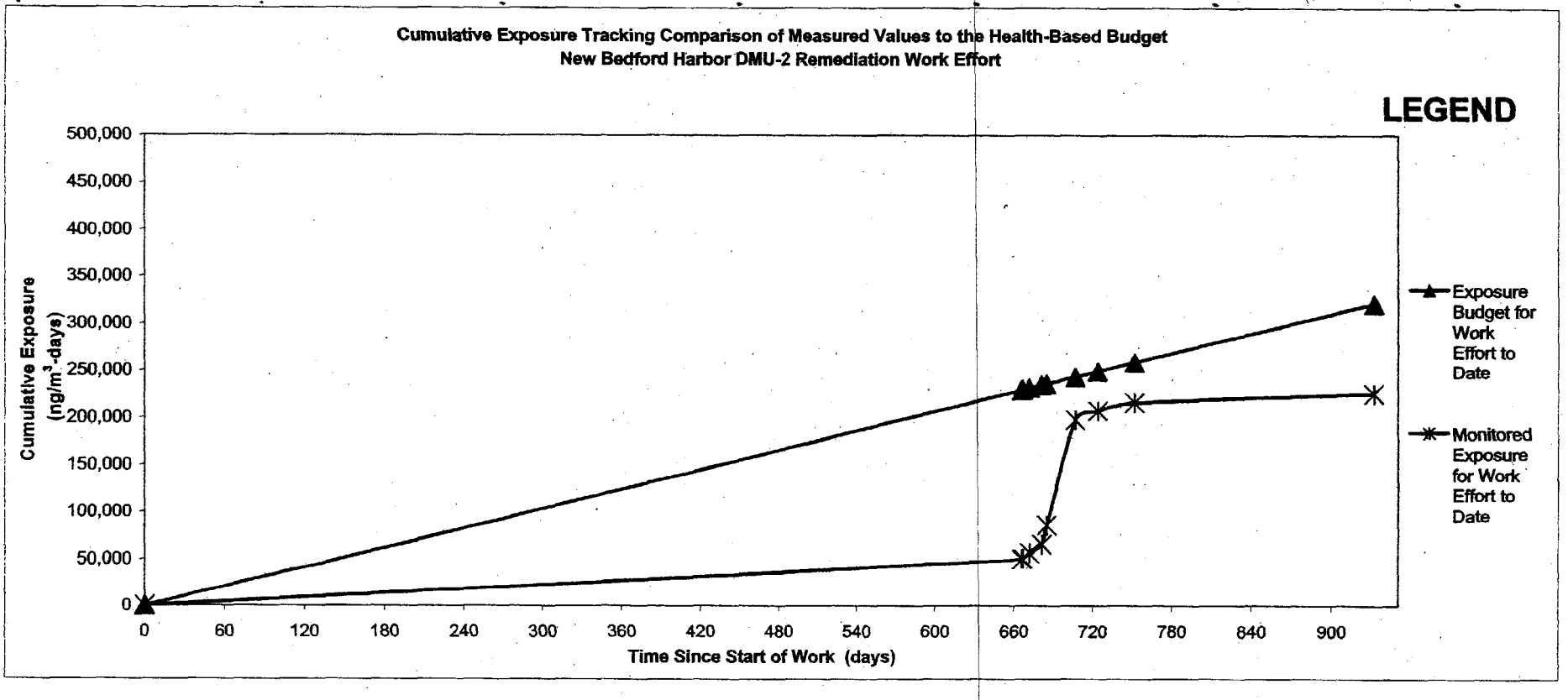


Figure 7 - Public Exposure Tracking System (PETS) for Airborne PCBs
Former Aerovox Facility - page 1 of 3

35BG0103 3/21/2005

Air Sampling Status

New Bedford Harbor Superfund Site

Station #: 24 Aerovox
Exposure Budget Slope (EBS) = 344 (ng/m^3-day)

Collection Date: 12/3/2004

Construction Activity: The DMU-2 dredging activities were completed on November 9, 2004 and the winterization activities were completed on November 18, 2004. No activities were completed in DMU-2 between November 9 and the December 3, 2004 sampling event. The December 3, 2004 results are draft (non-validated).

This report summarizes sample results for the above referenced location and date. The samples were collected on polyurethane foam (PUF)/XAD sample media with a glass fiber pre-filter using a BGI, PQ-1 Low-Vol sampler. The samples were analyzed using high-resolution mass spectrometry (HRGCMS) for total PCB homologue groups. Results are evaluated relative to the Exposure Budget Tracking Process described in the Development of PCB Air Action Levels for the Protection of the Public, New Bedford Superfund Site, August 2001. Cumulative data for this reporting period are included on pages 2 and 3. Sample Station Information is summarized in attached Table 1 and illustrated on Figure 1. Air concentration trigger information is presented in attached Table 2.

Summary of This Sampling Period:

The results from the Baseline Ambient Air Sampling program were used to assign background concentrations for each air sampling location. For Station 24 Aerovox, the annual average ambient air PCB concentration of 75.0 ng/m3, for the June 1999 through May 2000 baseline sampling was used as a background concentration. These background concentrations were used for the inactive field times from 11/12/02 through 9/8/04 and for the period from 12/2/04 through 6/1/05 to close the inactive field season. No triggers identified, therefore, no response necessary.

Figure 7 - Public Exposure Tracking System (PETS) for Airborne PCBs
Former Aerovox Facility - page 2 of 3

Sample Results, Calculated Budget and Exposure Values

(A) Event	(B) Sampling Date	(C) Days Since Previous Sampling Event	(D) Work Effort Elapsed Time	(E) Estimated Work Effort Remaning	(F) PCB Concentration Result	(G) Average of Most Recent Two Concentration Results	(H) Weighted Average of Concentration Results	(I) Exposure Budget for the Period	(J) Cumulative Exposure Budget for Work Effort to Date	(K) Measured Exposure During the Period	(L) Calculated Cumulative Exposure for Work Effort to Date	(M) Exposure Budget Expended During the Period	(N) Cumulative Exposure Expended for Work Effort to Date
[#]	[month/day/year]	[days]	Runnig Sum of Column (C) to Date [days]	[days]	[ng/m^3]	[ng/m^3]	Column (L)/Column (D) [ng/m^3]	EBS[1] * Column (C) [ng/m^3-days]	Sum of Column (I) [ng/m^3-days]	Column (G)* Column (C) [ng/m^3-days]	Sum of Column (K) [ng/m^3-days]	Column (K) /Column (I) [%]	Column (L) /Column (J) [%]
1	11/12/2002	0	0	9495	75	75	75	NC	NC	NC	NC	NC	NC
2	9/8/2004	666	666	8829	75	75	75	229104	229104	49950	49950	21.8%	21.8%
3	9/9/2004	1	667	8828	1024	550	76	344	229448	550	50500	159.7%	22.0%
4	9/14/2004	5	672	8823	1449	1237	84	1720	231168	6183	56682	359.4%	24.5%
5	9/23/2004	9	681	8814	588	1019	97	3096	234264	9167	65849	296.1%	28.1%
6	9/27/2004	4	685	8810	9557	5073	126	1376	235640	20290	86139	1474.6%	36.6%
7	10/19/2004	22	707	8788	559	5058	279	7568	243208	111276	197415	1470.3%	81.2%
8	11/5/2004	17	724	8771	578	569	286	5848	249056	9665	207079	165.3%	83.1%
9	12/3/2004	28	752	8743	30	304	287	9632	258688	8512	215591	88.4%	83.3%
10	6/1/2005 *	180	932	8563	75 *	53	241	61920	320608	9450	225041	15.3%	70.2%

Note:

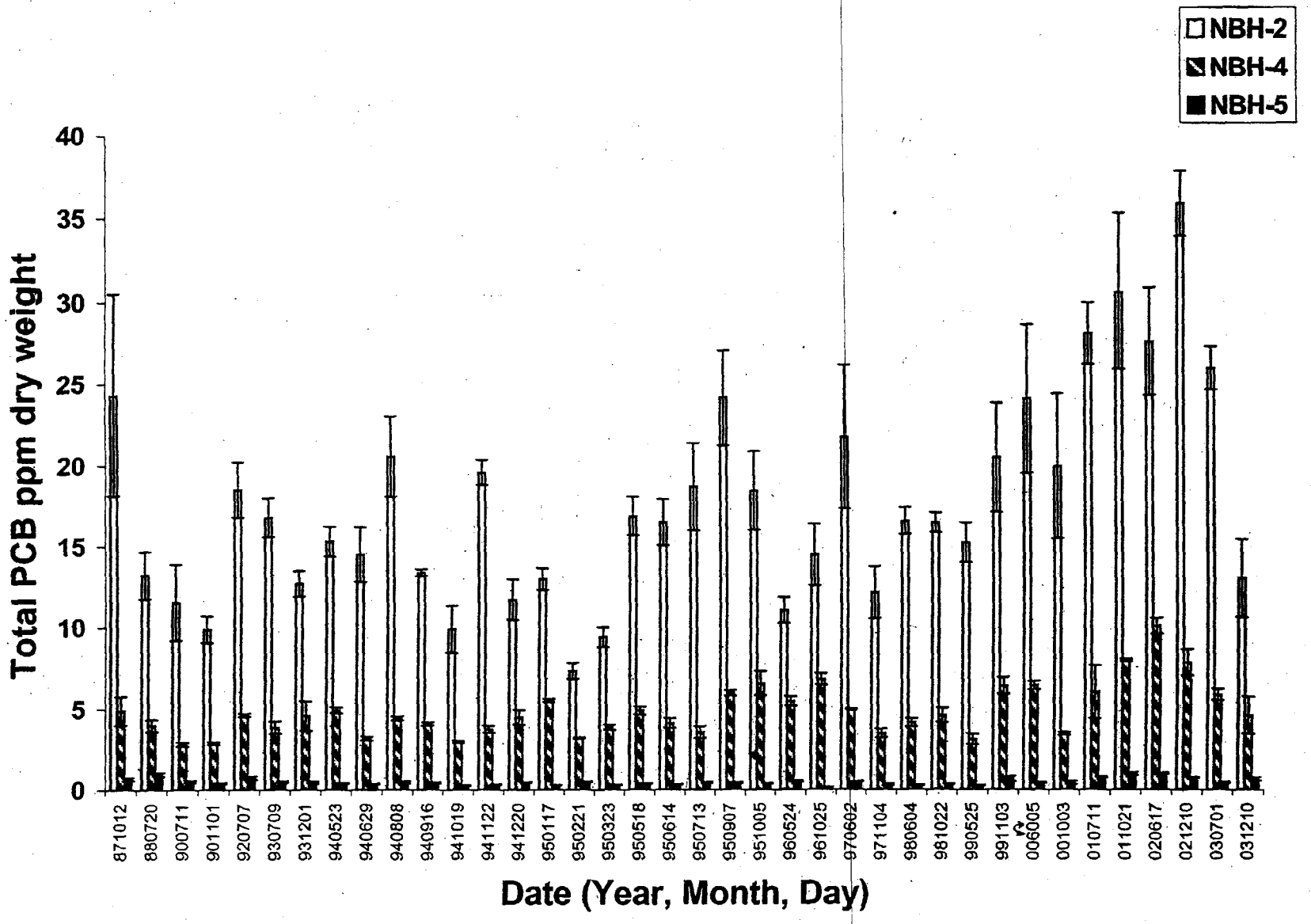
[1]EBS: Exposure Budget Slope= ng/m^3-day

NC = Not Calculated

* DATA IS FROM PRE-RA BASELINE MONITORING PERFORMED IN 1999/2000

Figure 7 - Public Exposure Tracking System (PETS) for Airborne PCBs
Former Aerovox Facility - page 3 of 3

Figure 8 - Total PCB in mussels deployed for 28 days in New Bedford Harbor, MA (US EPA NHEERL)



Note: reported concentrations are the total of the ten most prevalent congeners (52, 101, 118, 128, 138, 153, 180, 195, 206, 209). NBH-2 is at the Coggeshall Street bridge, NBH-4 is at the hurricane barrier, and NBH-5 is the reference station at West Island in Fairhaven.