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Five-Year Review Report

Second Five-Year Review Report for the

New Bedford Harbor Superfund Site

Bristol County, Massachusetts

September 2010

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

SDMS DocID 470549

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

EPA
New England

Approved by:

Date:

9/30/10

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Office of Site Remediation and Restoration
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NEW BEDFORD HARBOR FIVE-YEAR REVIEW REPORT

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LIST OF ACRONYMS

AAR	After Action Report
ARAR	Applicable and Relevant and Appropriate Requirement
ARRA	American Recovery and Reinvestment Act
CAD	Confined Aquatic Disposal
CDE	Cornell Dubilier Electronics, Inc.
CDF	Confined Disposal Facility
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CSO	Combined Sewer Overflow
cy	cubic yard
EA	Early Action
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Difference (documents changes to a ROD)
FS	Feasibility Study
HDC	New Bedford Harbor Development Commission
IA	Inter-Agency Agreement
ICs	Institutional Controls
LHCC	Lower Harbor CAD Cell
MA	Massachusetts
MassDEP	Massachusetts Department of Environmental Protection
MDPH	Massachusetts Department of Public Health
MDMF	Massachusetts Department of Marine Fisheries
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)
NRWQC	National Recommended Water Quality Criteria

NTCRA	Non-Time Critical Removal Action
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
USEPA	U.S. Environmental Protection Agency
WHG	Woods Hole Group

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(c); National Contingency Plan (NCP), 40 C.F.R. § 300.400(f)(4)(ii); and OSWER Directive 9355.7-03B-P (June 2001). This is the second Five-Year Review for the Site covering the years 2005 through 2010.

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 to date by three Explanations of Significant Differences (ESDs) issued in 2001, 2002 and 2010)[1]. The OU1 remedy, as modified by the ESDs, includes removal of roughly 900,000 cy (approximately 260 acres) of PCB-contaminated sediment, and disposal of this sediment both offsite and in three shoreline confined disposal facilities (CDFs) in the upper harbor. Based on typical funding rates experienced to date, the OU1 cleanup will take many more years to complete. 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. All OU2 contaminated sediments were disposed in a licensed off-site disposal facility. 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 have been, or are in the process of, being controlled to the maximum extent practicable. As described further below, the three exposure pathways of concern are: 1) consumption of local PCB-contaminated seafood, 2) dermal contact with PCB-contaminated shoreline sediments, and 3) 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 has been and will continue to be problematic until remediation is complete. In addition, as discussed further in this report, based on annual seafood monitoring performed by the Massachusetts Department of Environmental Protection (MassDEP) since 2003, EPA has determined that based on CERCLA risk standards, a state fishing ban issued in 1979 is not sufficiently protective regarding the human consumption of certain species of fish and shellfish in particular areas of the Harbor, including by certain sensitive populations. In addition to warning signs posted by EPA around the Harbor, EPA has recently reached agreement with the Massachusetts Department of Public Health (MDPH), the Massachusetts Division of Marine Fisheries (MDMF), and MassDEP to augment the 1979 fishing

[1] A fourth draft ESD proposing use of a confined aquatic disposal (CAD) cell was issued in June 2010 but has not yet been finalized .

restrictions by providing information about updated risks from consumption of locally caught seafood to targeted groups including nursing mothers, women of child-bearing age, the medical community, recreational sportfishermen and recreational shellfishermen. Despite these efforts, consumption of local PCB-contaminated seafood will likely continue. EPA will continue to explore additional approaches to keep local seafood consumption within identified risk levels.

Ecological risks will also continue until after site remediation is completed (approximately 10 years after the completion of contaminated sediment removal based on a 1990 computer model, Battelle 1990). Current water column PCB levels are greater than ten times the National Recommended Water Quality Criteria (NRWQC) of 0.03 ppb which is based on a Final Residue Value protective of the marine food chain for the protection of aquatic receptors.

In addition to the seafood pathway, EPA has focused on minimizing dermal contact risks from PCB-contaminated shoreline areas. Accelerated cleanups were performed in 1999, 2002 and 2005 to remediate the highest priority residential and public access areas at the site along the Acushnet River north of the Wood Street bridge. Despite this progress, the large scale of the site and the long remedial time frame result in areas remaining that have potential dermal contact risks. To control these risks until full remediation occurs, EPA will continue to use shoreline fencing and signage as appropriate and will continue to investigate additional measures that may be taken to supplement the existing institutional controls.

Along with evaluating the protectiveness of the remedy, this Five-Year Review presents potential issues and recommendations. Many, but not all, of the issues presented in the last Five-Year Review remain the same, but significant progress has been made. This progress includes, among others things, removal of highly contaminated shoreline sediments abutting the Aerovox facility, obtaining ARRA funds to accelerate the removal of the most highly contaminated remaining sediments, and proposing the use of a lower harbor CAD cell in the 4th ESD to shorten the remedial timeframe. This Five-Year Review presents a summary of this work and provides recommendations to continue to improve the remedial progress at the Site.

The Protectiveness Statement outlined in this Report is as follows:

OU1

The remedy for OU1 is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks have been, or are in the process of, being controlled to the maximum extent practicable.

OU2

The remedy for OU2 currently protects human health and the environment because 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. However, in order for the remedy to be protective in the long-term, this geographical area will also be addressed under OU1. All future work, including institutional controls, for this area will be a part of OU1.

OU3

A remedy has not been selected for OU3, thus a protectiveness statement for it can not be made at this time.

FIVE-YEAR REVIEW SUMMARY FORM

Site Identification		
Site Name: New Bedford Harbor	**EPA ID:** MAD980731335	
Region: 1	**State:** MA	**City/County:** New Bedford/Bristol County
Site Status		
NPL Status: Final		
Remediation status: Under Construction		
Multiple Operable Units (OUs): (Y) 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 (N) (except for a limited number of shoreline developments in areas that have already been remediated – Tisbury Towing Marine Terminal, River View park in Acushnet, River End park in New Bedford, and licensed use by commercial fishing vessels of the Area D marine bulkhead)		
Review Status		
Who conducted the review? EPA Region 1		
Author names: David Dickerson, Elaine Stanley & Kimberly White	**Author titles:** Remedial Project Managers	
Author affiliation: U.S. EPA, Region 1		
Review period: 9/31/2005 - 9/30/2010	**Date(s) of site inspection:** 1/22/10, 7/9 &7/15/10	
Highlight: (Statutory) Policy	**Policy Type:** N/A	**Review Number**: Second Review
Triggering action event: signature date of the first Five-Year Review report		
Trigger action date: 09/30/2010	**Due date:** 09/30/2010	

Five-Year Review Summary Form, cont'd

Issues:

1. Review of recent seafood monitoring data indicates the 1979 fishing ban needs to be augmented to be protective regarding the human consumption of certain species of fish and shellfish in particular areas of the Harbor, including by certain sensitive populations. Although, updated consumption guidance has been completed and is being distributed, follow-up measures to further address the human consumption of contaminated seafood from the Site will require continued assessment.

2. While the highest priority PCB-contaminated shoreline areas have been remediated, or addressed with fencing or warning signs, other contaminated shoreline areas (typically remote saltmarsh or industrial areas) remain unremediated.

Recommendations and Follow-up Actions:

1. EPA should distribute the new seafood consumption brochure to target audiences (sportfishermen and recreational shellfishermen); post the new seafood guidance on project website and on shoreline bulletin boards, and make it available at public meetings; coordinate execution of medical grand rounds to include advice for sensitive populations; and continue to explore new solutions to keep local seafood consumption to a minimum.

2. EPA should continue the use of institutional controls, such as fencing and signage, to ensure that dermal contact risks from yet-to-be remediated shoreline areas are controlled. Long term institutional controls should also be developed for remediated shoreline areas to protect against development that is inconsistent with clean up standards for each area. The potential for increased recreational boating in the upper harbor will also be addressed through educational materials and coordination with the City of New Bedford.

Protectiveness Statement:

OU1

The remedy for OU1 is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks have been, or are in the process of, being controlled to the maximum extent practicable.

OU2

The remedy for OU2 currently protects human health and the environment because 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. However, in order for the remedy to be protective in the long-term, this geographical area will also be addressed under OU1. All future work, including institutional controls, for this area will be a part of OU1.

OU3

A remedy has not been selected for OU3, thus a protectiveness statement for it can not be made at this time.

Other Comments:
At the current funding rate, the OU1 cleanup will take many years to complete. EPA will continue to implement the 1998 OU1 ROD and subsequent ESDs, and simultaneously evaluate innovative and alternative cleanup strategies that have the potential to accelerate the cleanup time frame.

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 residential and recreational. If such land use changes occur prior to remediation, or if they are expected to occur in the near future, EPA will evaluate whether site use will need to be restricted through institutional controls or if the ROD's more stringent shoreline cleanup standards will need to be used to permit less restricted uses.

In addition, the City may be interested in redeveloping part of EPA's Sawyer Street facility while the facility is still being used for the remediation. This may require reconfiguring the facility and performing an accelerated final remediation of Cell #1 and the pilot study CDF along the shoreline on the eastern side of the property.

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1.0 INTRODUCTION

The purpose of this Five-Year Review is to determine whether the remedy selected for the New Bedford Harbor Superfund Site (the Site) in New Bedford, Massachusetts is protective of human health and the environment. This report summarizes the Five-Year Review methods, findings and conclusions, including: investigations and remedial actions taken at the Site; an evaluation of Site monitoring data; a review of the Applicable or Relevant and Appropriate Requirements (ARARs); and a discussion of any deficiencies found during the review and recommendations to address them.

The United States Environmental Protection Agency (EPA), Region 1 prepared this Five-Year Review in accordance with the statutory requirements of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) §121 and the National Contingency Plan (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 judgment 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 Site consists of three Operable Units (OUs): OU1- the upper and lower harbor, OU2 - the “hot spot” (distinct locations near the former Aerovox facility), and OU3 - the outer harbor south of the New Bedford Harbor hurricane barrier. This Five-Year Review primarily addresses OU1 and OU2, since a Record of Decision has not been issued for OU3. Current conditions and actions taken in OU2 and OU3 are presented here, along with discussions of their effects on the protectiveness of the overall Site.

This is the second Five-Year Review for the Site. The triggering action for this statutory review is the signature date of the first Five-Year Review, completed in September 2005. This review is required by statute because the selected remedy for the Site 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.

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 SITE INVESTIGATIONS AND REMEDY SELECTION EVENTS

Date	Major Site Investigation and Remedy Selection Event
1976-1982	Discovery of widespread contamination of PCBs and heavy metals in sediment and marine life throughout the Harbor.
1983	EPA adds the 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 Confined Disposal Facility (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 the Community Forum. The Outer 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.

TABLE 1.A: CHRONOLOGY OF MAJOR SITE INVESTIGATIONS AND REMEDY SELECTION EVENTS *(Cont'd)*

Date	Major Site Investigation and Remedy Selection Event
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.
Sept. 2005	First Five-Year Review completed
November 2009	Field sampling for the Remedial Investigation/Feasibility study of the Outer Harbor OU3 begins.
March 2010	EPA issues the third ESD for the OU1 ROD which addresses the use of Cell #1 at EPA's Sawyer Street facility for temporary storage of PCB-contaminated sediments.
June 2010	EPA issues a draft fourth ESD for public comment for the OU1 ROD which proposes use of a Confined Aquatic Disposal (CAD) Cell in the lower harbor for disposal of contaminated sediments.

TABLE 1.B: CHRONOLOGY OF MAJOR REMEDIAL ACTION EVENTS

Date	Major Remedial Action Event
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 Sawyer Street 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 (relocation necessary to allow Area D).
July 2005	The pilot underwater cap in the vicinity of the Cornell-Dubilier mill is completed.
September 2005	The second annual season of full scale dredging is initiated near Aerovox.
August 2006	The third annual season of full scale dredging is continued in area along and immediately north of the former Aerovox facility.

TABLE 1.B: CHRONOLOGY OF MAJOR REMEDIAL ACTION EVENTS *(CONT'D)*

Date	Major Remedial Action Event
August 2007	The fourth season of dredging begins, focused on two areas: one just north of the former Aerovox facility; and the second off shore of the northern Cliftex Mill.
August 2008	The fifth round of full-scale dredging begins, including mechanical excavation of the highly contaminated sediments along the former Aerovox facility and hydraulic dredging in Pierce Mill Cove between Sawyer Street and Coffin Avenue.
April 2009	EPA receives $30 million in funding from the American Recovery and Reinvestment Act (ARRA or "the Recovery Act"), allowing dredging of a larger volume of contaminated sediment from the upper harbor due to the extension of the dredging season by approximately four extra months in 2009 and one extra month in 2010.
June 2009	The sixth round of full scale dredging begins in the northern portion of the upper harbor.
May 2010	The seventh round of full scale dredging begins in the northern portion of the upper harbor.

3.0 BACKGROUND

3.1 PHYSICAL CHARACTERISTICS AND LAND AND RESOURCE USE

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, Site Location Map). The Site has been divided into three areas consistent with geographical features of the area and gradients of contamination. 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 outer harbor is comprised of approximately 17,000 acres with its southern extent (and the Site's boundary) formed by an imaginary line drawn from Rock Point (the southern tip of West Island in Fairhaven) southwesterly to Negro Ledge and then southwesterly to Mishaum Point in Dartmouth. The Site is also defined by three fishing closure areas, promulgated by the state in 1979, extending approximately 6.8 miles north to south and encompassing approximately 18,000 acres in total (Figure 2).

The City of New Bedford (the City), 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 renowned center of the whaling industry, which attracted a large community of immigrants from Portugal and the Cape Verde islands. As of 2000, approximately 37.8% of New Bedford's 93,768 residents spoke a language other than English in their homes (US Census Bureau, 2000). Including the neighboring towns of Acushnet, Fairhaven and Dartmouth, the combined 2000 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 and open space in the upper harbor and residential and commercial/industrial 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, combined sewer overflows (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 generally in the 10-150 ppm range near the Cornell-Dubilier facility, CSOs and the City's sewage treatment plant's outfall pipes (again, however, the area of highest contamination near the Cornell-Dubilier mill was capped in 2005). Further characterization of the outer harbor OU3 area continues as part of the OU3 RI/FS, initiated in 2009.

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 addition to listing the harbor and pursuing a remedial action for the Site, separate CERCLA removal actions have been conducted in past years, as described below, to address various mainland sources of PCBs that have contributed contamination to the Harbor.

Prior to the listing of the Site on the NPL, in 1982 signs were erected around the Site warning against fishing and wading. Upon listing, EPA's site-specific remedial 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 (USEPA, 1998).

Information collected by the remedial investigations identified the Aerovox facility as the primary source of PCBs to the Site[2]. 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. Additional inputs of PCBs were also made from the Cornell Dubilier Electronics, Inc. (CDE) facility just south of the New Bedford hurricane barrier[3].

In May 1982, Aerovox, Inc. signed an administrative consent order pursuant to section 106 of CERCLA, as part of a separate CERCLA removal action, 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, as part of a separate CERCLA removal action, requiring CDE to remove PCB-contaminated sediments from portions of the municipal sewer system downstream of the

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[2] The Aerovox facility is a separate CERCLA removal site (in addition to being regulated under TSCA and State authority) and is not part of the harbor NPL Site.

[3] The CDE facility is a separate CERCLA removal site (in addition to being regulated under TSCA and the Clean Water Act) and is not part of the harbor NPL Site.

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, as part of a separate CERCLA removal action, 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[4].

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 government's 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 remedial 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 remedial 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 remedial response costs. This decree was approved and entered by the Court in November 1992.

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[4] The City's sewer system and wastewater treatment plant are not part of the harbor NPL Site, but has previously been addressed under EPA's CERCLA removal and State authority, and currently is regulated under TSCA and the federal Clean Water Act.

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 (USEPA, 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 (USEPA, 1998) and discussed in Section 7 below.

4.0 REMEDIAL ACTIONS

The 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). A summary of the remedy selection and implementation is presented below for OU1 and OU2. The ROD for OU3 is currently unscheduled pending the completion of the RI/FS investigations in the outer harbor.

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[5];

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 NRWQC[6] by reducing PCB sediment concentrations.

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

1. construction of four shoreline confined disposal facilities (CDFs) and water treatment facilities;
2. dredging of sediments and shoreline soils with PCB concentrations above the selected cleanup goals, as listed below:
    a. upper harbor subtidal and mudflat areas: 10 ppm PCBs
    b. lower harbor subtidal and mudflat areas: 50 ppm PCBs
    c. intertidal areas with abutting residential land use: 1 ppm PCBs
    d. intertidal areas with public access or abutting recreational land use: 25 ppm PCBs
    e. 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, 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 and the New Bedford Harbor Development Commission (HDC), with oversight by EPA. It serves to increase the remedy's protectiveness since lower concentration PCB-contaminated sediments, not covered by the OU1

[5] Although risks were identified from cadmium, copper, and lead, these metals were co-located with PCB contaminated sediments so only cleanup standards for PCB were established under the ROD.

[6] The standards were referred to as Ambient Water Quality Criteria (AWQC) at the time of the ROD, but have since been renamed.

ROD, are removed and disposed of as part of the port's navigational dredging program. As discussed below in sections 4.2.4 and 4.2.7, the SER has 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) (USEPA, 2001). This ESD described five refinements of the remedy that arose as the design phase progressed following issuance of the 1998 ROD. These changes included: (i) the use of mechanical dewatering for the dredged sediments (to among other things reduce the volume of processed sediments needing disposal); (ii) the incorporation of a rail spur; (iii) a revised wall design at CDF D – the largest of the CDFs, (iv) ongoing use of the pilot CDF at EPA's Sawyer Street facility as an interim TSCA facility; and (v) the remediation and monitoring of two additional intertidal areas near residential land use areas in the upper harbor along the Acushnet River, in order to reduce dermal contact risks. The 2001 ESD also noted that the estimate of in situ sediments requiring disposal pursuant to the ROD could be as high as 800,000 cy.

In August 2002 EPA issued a second ESD for the 1998 OU1 ROD (USEPA, 2002). This ESD eliminated the construction of the 17 acre CDF D, and instead selected offsite disposal for the dredged and dewatered PCB contaminated sediment slated for the CDF. A smaller shoreline facility, now known as Area D, replaced CDF D in the same area to support both the sediment dewatering building and the rail car (or truck or barge) loading area required for offsite disposal of the dredged sediments.

In March 2010 EPA issued a third ESD for OU1 (USEPA, 2010a), which documents EPA's use of Cell #1 (located at Sawyer Street) for temporary storage of both PCB- and hazardous waste-contaminated sediments from OU1[7]. EPA invoked a CERCLA waiver of the Massachusetts Hazardous Waste Regulations that requires temporary storage facilities to have a double liner rather than the single liner. The basis for the waiver was that the single liner, in combination with site conditions and facility monitoring, is equally as protective as a double liner for the temporary storage facility. In addition, this ESD documented that Cell #1 does not pose a risk to health and the environment due to the temporary storage of PCBs under TSCA, and that the use of Cell #1 for temporary storage of contaminated sediments is consistent with a previous risk-based finding concerning the facility made in 2001 in the first OU1 ESD.

A fourth draft ESD for OU1 (USEPA, 2010b) for the 1998 ROD was issued for public comment in June 2010 and has not yet been finalized. It proposes to modify the OU1 remedy to include the construction and use of a confined aquatic disposal (CAD) cell in the lower harbor for disposal of approximately 300,000 cy of mechanically dredged sediments with PCB levels above the ROD action levels. These are sediments that were, pursuant to the 1998 ROD, to be disposed of in CDF D, and which, pursuant to the second ESD, are to be disposed of off-site. The 4th draft

[7] A limited area of removed contaminated sediments abutting the former Aerovox facility (as discussed in Section 4.2.5, below) contained sufficient volatile organic compounds (VOCs) to exceed thresholds for being regulated as hazardous waste. No other contaminated sediments removed from the Harbor, to date, have exceeded hazardous waste standards and, so only applicable TSCA standards have applied to these PCB-contaminated sediments under the CERCLA remedy.

ESD also documents an increase in the estimate of total *in situ* sediment above the 1998 ROD's action levels; the volume is currently estimated to be approximately 900,000 cy based on an assessment performed in 2003, and including an allowance for over-dredging.

ESDs as well as other Site information are available for review at the New Bedford Free Public Library at 613 Pleasant Street, New Bedford (in the reference section) and at EPA's Boston records center at 5 Post Office Square and on-line at the New Bedford Harbor web site (www.epa.gov/ne/nbh).

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 actions were followed by the accelerated cleanup of approximately six acres of the Acushnet River north of the Wood Street bridge, including the riverbed and shoreline areas. 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 stretch of the river. Two temporary dams were built to dewater this stretch of the river, to allow approximately 15,600 cy of contaminated sediments to be excavated in near-dry conditions. Approximately 2,500 cy (2,606 tons) of vegetated soil was excavated and trucked off-site for disposal. The remaining excavated soil and sediment was transported to EPA's Sawyer Street facility and placed in cell #1 for interim storage.

Upon removal of the contaminated sediments to the target PCB clean-up levels applicable to each area, the shorelines were restored with imported clean fill and native riparian plantings. As part of this shoreline restoration, large stands of the invasive common weed (*Phragmites australis*) were removed and replaced with a higher value native saltmarsh. This North of Wood Street (NWS) cleanup was completed in March 2003, with the saltmarsh and upland plantings completed in June 2003 (TTFW, 2005a). Annual post-remediation monitoring of the NWS area identified two small areas on the eastern shoreline requiring additional remediation, which was performed in 2005. Judging from the monitoring data and the fact that this area had been thickly vegetated when initially sampled, it is believed that these two areas are areas that the initial NWS characterization missed, rather than areas that were recontaminated from the harbor to the south.

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). Dredging of a clean corridor across the upper harbor to relocate thirteen submerged high voltage power cables was completed in 2001. Construction of a five acre sediment dewatering and transfer facility (the dewatering facility or Area D) at Hervey Tichon Avenue in New Bedford for processing the dredged sediments was completed in 2004. Relocation of two CSOs that previously discharged in the area of the dewatering facility at Area D was also completed in 2004. Relocation of a commercial barge pier necessary for construction of Area D was completed in 2005, including removal of abandoned fishing vessels and associated environmental dredging (TTFW, 2005b).

Figure 3 shows the locations of the major components of the full scale dredging process. Dredged sediments are sent through a pipeline in the harbor to the desanding facility at EPA's Sawyer Street facility, where sand, gravel, shells and other coarse material within the dredged slurry are removed. The slurry is then sent through an underwater pipeline in the harbor to the dewatering facility at Area D. Using a series of mechanical processes, the plant squeezes most of the water out of the slurry so that a "filter cake" is produced. The "filter cake" is then sent off-site to a TSCA disposal facility in Michigan via rail or truck.

4.2.3 Full Scale Dredging

Full scale dredging of the upper harbor started in August 2004 and has continued every year though the current 2010 dredging season. From 2005 to 2008, the typical annual funding rate of $15 million allowed for approximately 2.5 to 3 months (or an average of about 40 days) of dredging each year and approximately 20,000 to 25,000 cy of sediments removed per year. In 2009, $30 million in supplemental funds from the American Recovery and Reinvestment Act (ARRA or "the Recovery Act") was received for Site cleanup. This funding allowed for a longer 2009 dredging season, which began in June and was completed in early December for a total of 120 days of dredging. Since not all of the ARRA funds were spent in 2009, remaining funds were used to extend the 2010 dredging season as well, from 40 days to 59 days. A summary of all remedial efforts at the Site to date, including the full scale dredging program, is provided below in Table 2.

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 OU1 cleanup. In 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 HDC and a multi-agency steering committee to design and implement an effective underwater cap that met the port's available budget. Approximately 20 acres of contaminated sediment was capped under the pilot. Overall, the purpose for the pilot study was to evaluate capping as option for addressing PCB-contaminated sediments at the Site.

Bathymetric and sediment PCB monitoring of the pilot cap area has been performed annually, with the conclusion to date that the pilot cap is performing well. More information about the pilot cap can be found in the first Five-Year Review Report (USEPA, 2005) and on-line at www.epa.gov/ne/nbh. Sediment chemistry and biological monitoring data for the cap area through 2010 is presented in section 6.0

4.2.5 Excavation of Aerovox Shoreline

In early summer 2008, EPA and the USACE excavated highly contaminated shoreline sediments immediately adjacent to the vacant Aerovox mill on Belleville Avenue in New Bedford. The area of sediment remediated extended approximately 100 feet from the shore and extended north-south along the entire eastern border of the Aerovox property. The dredging team was prevented from hydraulically dredging this area due to the very high levels of trichloroethene (TCE) in these sediments; some areas contained percent levels of PCBs and solvents. The excavated sediment was stabilized at Aerovox with portland cement and trucked in water tight containers to EPA's Sawyer Street facility, where they are currently being temporarily stored in Cell #1 pursuant to OU1 ESD #3. A layer of clean soil has been placed on top of these sediments during temporary storage, and surface water runoff is drained to a separate holding area and tested (and treated, if required) prior to discharge.

An extensive air monitoring program at both the Aerovox and Sawyer St locations showed that the project was performed safely without cause for concern to the local abutters. EPA continues to monitor airborne PCBs and VOCs at the Sawyer Street facility (as well as groundwater) while these sediments are temporarily being stored. Based on air monitoring data to date, no airborne PCB levels were detected that pose a health risk to cleanup workers or area residents. Air monitoring results are presented in Table F-1 in Appendix B of this report along with a map of the sampling locations; this data is also available on-line at the New Bedford Harbor web site - www.epa.gov/ne/nbh - under "Air Data".

4.2.6 Summary of Sediment Areas Remediated to Date

TABLE 2: SUMMARY OF SEDIMENT AREAS REMEDIATED TO DATE

Project	**Remediated Area** *(as shown on Figure 4)*	**Date**	**Sediment volume remediated (cy)**
1. First pilot study	Pilot Study 1 & 2	1988/89	2,900
2. Hot spot dredging (OU2)	Hot Spots B - E, & G	1994/95	14,000
3. Early action area	EAA-A & -B	2000	3,000
4. Pre-design field test (PDFT)	PDFT	2000	1,985
5. North of Wood Street (NWS)	NWS	2002/03	15,619
6. North Lobe Dredging	North Lobe	2003	3,952
7. Full scale dredging - season 1	Area A	2004	12,000
8. Full scale dredging - season 2	Area A, B & NWS	2005	25,179
9. Pilot underwater cap	Cap south of hurricane barrier near NB shore	2005	10,000
10. Full scale dredging - season 3	Area G & H	2006	20,096
12. Full scale dredging - season 4	Area G & H	2007	23,307
13. Full scale dredging - season 5	Area B, A & NWS	2008	26,800
14. Full scale dredging - season 6	Area J,L, M & G	2009	49,809
15. Full scale dredging – season 7	Area M, G, J, K & N	2010	26,200 (estimated)
Total remediated volume to date (OU1 and OU2)		**1988-2009**	**234,847 cy**

In addition, it should be noted that approximately 13,000 cy of additional *navigational* sediments were dredged in 2004/05 as part of the commercial barge business relocation discussed above in section 4.2.2[8].

[8] This sediment was used to fill a pier as part of the relocated barge-loading facility.

4.2.7 State Enhanced Remedy

As discussed above in section 4.1, the Commonwealth in conjunction with the City is performing navigational dredging pursuant to the state enhanced remedy (SER) portion of the 1998 OU1 ROD. As of September 2010, numerous dredging projects have been undertaken pursuant to the SER. The City has used an existing depression in the harbor bottom (the "borrow pit") and a series of excavated CAD cells for the disposal of contaminated navigational sediments. Clean glacial material excavated to create the CAD cells has been used for EPA's pilot capping project in the outer harbor or disposed of at an approved open water disposal site.

These projects are summarized in Table 3 below. As part of the reporting for the SER, based on pre- and post-dredging sediment PCB levels, it has been estimated that over 2,000 pounds of PCBs have been dredged along with the navigational sediments. EPA has issued a TSCA finding that limited areas of PCB-contaminated sediment above 50 ppm removed as part of the SER navigational dredging could be permanently disposed of in a SER CAD cell and would not pose an unreasonable risk of injury to health or the environment (Apex, 2010).

TABLE 3: SUMMARY OF STATE ENHANCED REMEDY NAVIGATIONAL DREDGING PERFORMED TO DATE

State Enhanced Remedy Project	**Date**	**Approximate Sediment Volume (cy)**
Phase I Dredging to borrow pit CAD – 9 Projects	January 2005 to January 2006	52,000
Top of CAD #1 contaminated sediments to borrow pit CAD	Summer 2005	20,000
Clean bottom of CAD #1 sand to EPA pilot underwater cap	*Summer 2005*	*84,000**
Phase II contaminated sediments dredged to CAD#1	2005 - 2006	72,000
Top of CAD #2 contaminated sediments to CAD #1	Summer 2008	34,000
Clean bottom of CAD #2 to Cape Cod Bay Disposal Site	*Summer 2008*	*120,000*
Phase III Dredging to CAD #2 – 11 Projects	September 2008 to September 2009	53,000
Phase II and III - Total volume of *contaminated* sediments, including top of CADs, dredged (i.e., not including the clean bottom of CAD material)		**231,000**

**Note that it was the 84,000 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.*

4.2.8 Long Term Site Wide Monitoring

The two largest long term monitoring programs for the site are the annual seafood monitoring program (run by the MassDEP) and EPA's long term benthic quality monitoring program. In summary, while the long-term monitoring program has shown improvements in the lower harbor area, these two programs demonstrate the continued need for the harbor PCB cleanup.

A variety of other environmental 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.

4.2.9 Seafood Advisories and Other Institutional Controls

As noted above, annual seafood monitoring data collected by MassDEP indicates that based on CERCLA risk standards, the state fishing ban issued in 1979 is not sufficiently protective regarding the human consumption of certain species of fish and shellfish in particular areas of the Harbor, including by certain sensitive populations. EPA has recently reached agreement with the three relevant state agencies (MDPH, MDMF and MassDEP) to provide augmented fish consumption information to targeted populations such as pregnant women, nursing mothers, women of child-bearing age, the medical community, sportfishermen and recreational shellfishermen, and the roll-out of this new information to the public is being developed. Medical "grand rounds" will be presented to ensure the medical community is aware of the risks from local seafood and is able to communicate these risks to their clients and patients. Information guides augmenting the 1979 fishing bans will be included in the saltwater fishing licenses and applications that are now required in Massachusetts. Similar guides will also be provided to the recreational shellfishing community, whose licenses are issued at the local level, as well as posted on the project web site, community bulletin boards and made available at public meetings.

For control of unremediated shoreline dermal-contact areas, EPA will continue to rely on fencing and signage until such time as these areas are remediated. EPA will continue to inspect these on a regular basis and replace as necessary. Additional institutional controls will be developed, as appropriate, to increase the protectiveness of the remedy.

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 were to:

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 consisted 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. passive dewatering of 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 OU 2 ESD (USEPA, 1992) 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 at EPA's Sawyer Street facility.

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 over an area covering five acres began in April 1994 and was completed in September 1995.

In October 1995, EPA issued a second OU2 ESD (USEPA, 1995) to document the need for interim storage of the dredged Hot Spot sediments in Cell #1 at EPA's Sawyer Street facility 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 (USEPA, 1999) which calls for off-site landfilling instead of on-site incineration. The amended cleanup plan consisted 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 (USEPA, 1997) and the Remedial Action Report for OU2 (USEPA, 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 Cell #1 at EPA's Sawyer Street facility 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. The sediments were stabilized with lime, excavated from Cell #1, and loaded on to trucks for off-site disposal. 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.

In order for the remedy to be protective in the long-term, this geographical area will also be addressed under OU1. All future work, including institutional controls, for this area will be a part of OU1.

4.5 OPERABLE UNIT 3 (OUTER HARBOR) REMEDY SELECTION

The EPA has not yet selected a remedy for the 17,000 acre OU3, but is currently performing a remedial investigation for this area.

As mentioned above, in 2005 EPA in partnership with the MassDEP, the City of New Bedford and the HDC completed a pilot underwater cap for the most highly contaminated area in the outer harbor near the Cornell-Dubilier mill, which is part of OU1. The clean sandy material used for the cap came from the bottom portion of a CAD cell being excavated in the lower harbor

by the HDC for disposal of navigational dredged material. The capped area has been monitored annually for bathymetry and sediment PCB levels, and these results continue to show that the cap is functioning successfully to prevent the release of PCBs into the marine environment. The monitoring reports are available on-line at www.epa.gov/ne/nbh (select "Pilot Underwater Cap" on the main page). The success of this pilot will be evaluated in developing remedial alternatives for OU3.

5.0 PROGRESS SINCE THE LAST REVIEW

This section summarizes the protectiveness statements, recommendations and follow-up action since the last review.

5.1 PROTECTIVENESS STATEMENTS FROM LAST 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 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." (USEPA, 2005)

5.2 STATUS OF RECOMMENDATIONS AND FOLLOW-UP ACTIONS FROM THE LAST REVIEW

Issue from Previous FYR	**Recommendations and Follow-Up Actions**	**Actions Taken**	**Date of Action**
1. Consumption of local PCB-contaminated seafood	Continue educational and outreach programs, as well as search for new solutions, to minimize consumption of PCB-contaminated local seafood	EPA's updated risk evaluation found that the 1979 state closure regulations are no longer protective based on seafood data collected since the last Five-Year Review. EPA has reached agreement with the MDPH, MDMF and MassDEP to provide updated fish and shellfish consumption warnings to targeted populations and user groups. Roll-out of this message is underway.	Ongoing

Issue from Previous FYR	Recommendations and Follow-Up Actions	Actions Taken	Date of Action
2. Dermal contact with unremediated shoreline areas	Continue the use of institutional controls such as fencing and signage to ensure areas are controlled	Fencing and signage are checked on a regular basis and replaced as necessary	Ongoing
3. Elevated airborne PCBs in the vicinity of the Aerovox shoreline	Pursue the remediation of the abandoned Aerovox mill	EPA reached a settlement with AVX Corp. for approximately $13 million which will ensure the demolition of the building, off-site disposal of all demolition debris, and Site capping through a separate CERCLA removal, as well as through TSCA and State cleanup actions, that are not part of the harbor remediation. EPA removed the highly contaminated shoreline sediments abutting the Aerovox mill as part of the harbor remediation. Recent airborne PCB levels at Aerovox are at much lower, acceptable levels now compared to those reported in the first Five-Year Review.	April 2010 June 2008
4. Long time frame of current remedial approach	Evaluate innovative and alternative cleanup strategies	EPA issued the fourth draft ESD proposing use of a CAD cell to reduce the cleanup timeframe. EPA will continue to evaluate additional measures to reduce the time to complete the remedy.	June 2010 (public comment closes 9/24/10) Ongoing

Issue from Previous FYR	Recommendations and Follow-Up Actions	Actions Taken	Date of Action
5. Long term changes in shoreline land use	Continue to develop long term institutional controls for remediated shoreline areas to protect against higher land use without further remediation	Remediated shoreline areas continue to be monitored annually. Status of shoreline redevelopment plans are tracked. Potential changes in shoreline use to be considered when planning a shoreline cleanup. Continued coordination with area municipalities concerning local residential, recreational, and commercial development plans for the Harbor.	Ongoing

The OU1 remedy has not changed since the last Five-Year Review, except for measures taken under the third OU1 ESD to address hazardous waste generated by the remediation (which had not been identified at the time of the first Five-Year Review. The third ESD issued a waiver of certain requirements for Cell #1 at EPA's Sawyer Street facility for the temporary storage of hazardous waste. This waiver does not change the remedy or its protectiveness. An evaluation of the protectiveness of the OU1 remedy is presented in Section 6.0, along with interim actions taken to control the potential exposure pathways. An update on the progress of the ongoing remedy is presented in Section 4 above.

In addition, a fourth draft ESD was issued for public comment in June 2010, with a comment period end date of 9/24/10. This fourth draft ESD proposes to create and use a CAD cell in the lower harbor for disposal of approximately 300,000 cy of CERCLA contaminated sediments from roughly Sawyer Street south. EPA's evaluation of this proposal, as documented in the draft ESD, finds that the proposed CAD cell would be a protective and permanent alternative for the harbor cleanup.

6.0 FIVE-YEAR REVIEW PROCESS

6.1 ADMINISTRATIVE COMPONENTS

The New Bedford Harbor site's Five-Year Review team was led by Ms. Kimberly White with assistance from Ms. Elaine Stanley and Mr. David Dickerson, EPA remedial project managers at EPA Region 1. The review components included:

- site inspections;
- review of project documents and post-dredging reports;
- review of data reports;
- review of cleanup levels and risk calculations; and
- 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
Reference Department - 2nd floor
613 Pleasant Street
New Bedford, MA 02740

EPA – Region 1 (New England) Superfund Records Center
Five Post Office Square, 1st floor
Boston, MA 02109-3912

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, local radio talk show appearances, and local cable TV interviews. The mailing list for the NBH site contains nearly 4,000 contacts.

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. The public notice was published in the New Bedford Standard Times on February 15, 2010. Another public notice will be sent to the same newspaper once this second Five-Year Review is complete; and the results of the review and the report will be made available to the public at the New Bedford Free Public Library, the EPA Region 1 Superfund Records Center in Boston, and on-line 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 EPA Five-Year Review Guidance and the bathymetric and environmental monitoring data received to date from the 2010 full scale dredging program.

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 USACE have developed a site-specific turbidity-based monitoring program as a protective and quantitative approach to monitoring the dredging process as it happens, rather than having to wait days to receive laboratory data. The objective of the water quality monitoring program is to minimize environmental impacts, limit recontamination of previously dredged areas, ensure that the dredging activities are conducted in a manner which does not hinder the seasonal migration of anadromous fish to and from the Acushnet River, and to determine the degree and extent of sediment plumes advecting away from the site during dredging operations.

The monitoring program was initially based on detections of turbidity levels, above background, of 50 NTU (nepthelometric turbidity units) or greater at 300 feet down current from dredging activities as an early warning threshold. This level would trigger the collection of water samples for chemical and toxicity analyses as a follow up. If detected at 600 feet down current, dredging operations would be stopped, reevaluated and modified as necessary to lessen turbidity. In 2009, the 50 NTU criterion was reevaluated and determined based on additional toxicity testing to be overly protective. In order to allow remedial operations to continue and remain ecologically protective, the turbidity criterion and compliance threshold was modified to 100 NTU. A toxicity evaluation dilution study was conducted during the 2009 dredge season, which demonstrated that turbidity plumes of 100 NTU had no adverse toxic effect on the test species (WHG, 2010c). Based on the results of this study, modifications to the water quality monitoring program and to the project-based compliance (turbidity) criterion were employed during Phase II of the 2009 monitoring season, in August 2009. Figures 5 and 6 show the modified systematic basis of this monitoring program in flow chart format.

Phase II greatly improved the efficiency of the monitoring approach, satisfied monitoring objectives, and was less restrictive on the remedial operations, while remaining ecologically protective as partially demonstrated by the toxicity evaluation. During the Phase II approach, no exceedances of the turbidity criterion (100 NTU) were observed.

The extensive water quality monitoring data base collected since the last Five-Year Review shows that all in-water construction and dredging operations performed to date have complied with the turbidity criterion, with only minor and short-lived exceptions (Battelle, 2007a; Battelle, 2008a; Battelle, 2009a; WHG, 2010b). Turbidity plumes that were observed during dredge and dredge related activities have generally been confined to within 100 feet of active operations. The continuous monitoring systems employed have also documented that high turbidity events can occur naturally when no dredging operations are underway (e.g., WHG, 2010b). Fish and wildlife have also been observed using the area during the dredge seasons and do not appear to be restricted in its use.

In addition, best management practices have reduced turbidity impacts due to sediment scour from workboats, prop-wash and pipeline groundings, and the unintended consequence of silt curtains causing turbidity when in contact with sediment during low tide in shallow water. Overall, the PCB and toxicity data, along with the in-situ water quality measurements, confirm the project-based compliance criterion is ecologically protective of direct toxic effects, while allowing remediation efforts to progress (WHG, 2010c).

6.4.2 Air Monitoring

A comprehensive data base of airborne PCB levels has been developed for the NBH site, beginning with the hot spot dredging operations in 1994-95 (USEPA, 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 and NLD AARs). 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 for the PETS curve for the Aerovox monitoring location. 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 Data.”

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 community 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 does not

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 Region 1 (MassDEP, 2010). Edible tissues of a variety of locally caught species from all three seafood closure areas (USEPA, 2003) are monitored yearly for PCB levels - both Aroclors and congeners. The seafood monitoring reports are posted on the New Bedford Harbor website www.epa.gov/ne/nbh, under "Technical Documents" as they become available.

The state seafood monitoring is augmented by a long term monitoring program of blue mussels (*Mytilus edulis*) performed twice annually by EPA's Office of Research & Development, Atlantic Ecology Division laboratory in Narragansett, Rhode Island. Both monitoring programs demonstrate that PCB tissue levels in sampled species are above the site-specific goal of 0.02 ppm for PCBs in seafood (Figure 8-1 through 8-6). PCB tissue levels vary by species and closure area, and generally show a decreasing north to south gradient, i.e., samples closer to the Aerovox source area have higher PCB residues than those further south.

The main goal of the benthic community long term monitoring program is to assess the overall effectiveness of the remedy in terms of marine bottom (benthic) species abundance and richness (Nelson *et al.*, 1996). The program includes measurement of 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. The focus of this program is the top few inches of sediment, rather than deeper levels, so that recent impacts may be evaluated. Since the benthic community is not expected to change significantly in any one year, the program is conducted periodically (episodic) - 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 five separate rounds of benthic long term monitoring have been conducted; in 1993, 1995, 1999, 2004 and 2009 (see data in Appendix B) (Nelson *et al.*, 1996, USEPA 1998, ENSR 2001, Battelle 2005).

The results of the long-term benthic community monitoring in Appendix B indicates:

- Levels of sediment PCB and toxicity, are generally highest in the Upper Harbor and decrease along a gradient to the Outer Harbor;
- The remedial dredging has not increased the stress on the benthic community in the Lower and Outer Harbor areas, and may in fact have lessened it; impacts have been localized to the Upper Harbor area;
- Higher contaminant concentrations of sediment PCBs and metals are associated with lower biological diversity and impacted benthic community;
- Dredging between 1999 and 2009 has significantly reduced PCBs in Upper Harbor surficial sediments compared to 1993; similar decreases noted in the Lower and Outer Harbor areas in 2004 and 2009;
- The benthic community condition index showed a statistically significant increase (improvement) in overall benthic quality in 2009 in the Lower and Outer Harbor areas compared to the 1993 baseline data;

- Biological variability does occur between sampling events; however, this doesn't mask the detection of contaminant effects in the three harbor areas evaluated; and
- Mussel PCB concentrations demonstrate natural variability due to seasonal and biological factors, such as spawning, but differences in the data between sampling stations are still detected.

In addition to these two long term monitoring programs, the site team undertakes a variety of sediment PCB monitoring projects as needed to assist in the 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 NWS 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). As discussed above in section 4.2.1, this annual monitoring also identified a previously-heavily vegetated shoreline area in Acushnet with elevated PCB levels which the 2002-2003 cleanup had missed. This shoreline area was then remediated separately in December 2005, with restoration saltmarsh planting completed in spring 2006. This experience demonstrates that EPA's oversight and sampling efforts are sufficiently robust to identify ongoing problem areas.

Monitoring data collected in 2009 for NWS indicates that total PCB concentrations in river sediment samples ranged from 0.23 milligrams per kilograms (mg/kg) to 21.23 mg/kg dry weight. These values are significantly lower than the concentrations observed during previous years of monitoring. Shoreline NWS soil samples were all below the applicable recreational cleanup criteria (25 mg/kg) at all shoreline locations in 2010 (WHG, 2010b). See section 7.1.1 for additional discussion.

6.5 SITE INSPECTION

Site inspections for the OU1 remedy are conducted routinely throughout each year since EPA and the USACE are frequently on site. In addition, inspections occur daily during the dredging season by the USACE, with additional oversight from EPA. An overall evaluation of the operations is prepared and documented yearly in a year-end dredge data report prepared by the USACE contractor. For this second Five-Year Review, EPA also conducted inspections on January 22, 2010 and July 9 and 15, 2010. A copy of the site inspection checklist, along with site photographs and a copy of the lessons learned from the 2009 Dredge Season Data Submittal (Jacobs, 2010b) is provided in Appendix C; a brief summary of the findings are provided below.

Signage for Seafood Advisories and Signage and Fencing for Contaminated Shorelines

EPA inspected the seafood advisory and contaminated sediment signage along the upper, lower and outer harbor areas. As indicted in the map in Appendix C, the signs were in good condition with exception of two locations in the lower harbor; these areas were identified as locations where signage should be placed, where previously none existed. Signage will continue to be monitored by EPA, USACE and their contractors and missing and/or damaged signs will be

replaced as needed. Fencing in areas with contaminated shoreline sediments adjacent to parks and residential areas (near the Ropes Works building) was also inspected and found to be in good repair. Fencing in these areas will continued to be monitored by EPA, USACE and their contractors and missing and/or damaged fending will be replaced as needed.

Dredging, Desanding and Dewatering Operations

Dredging operations (including desanding and dewatering activities) are continuously monitored by the USACE during the dredging season. In general, recommendations for improvements to the operations (lessons learned) are made at the end of each season. These lessons learned since the first Five-Year Review are documented in the dredge season-end reports (Jacobs, 2010b, Jacobs 2009, Jacobs 2008, Jacobs 2007, Jacobs 2006). During the EPA site inspections dredging, desanding and dewatering operations were observed. Based on interviews conducted with the USACE engineers, all operations were being implemented as planned without delay, and recommended improvements to the operations have been incorporated into current year operations. During off-dredging season periods, operations facilities and temporary waste disposal areas are inspected by USACE staff based at the Site, as well as by contracted security personnel.

6.6 INTERVIEWS/QUESTIONNAIRES

Although EPA coordinates on a daily basis with the USACE implementation team, and regularly with other harbor stakeholders, interviews/questionnaires were conducted for this Five-Year Review period. EPA requested that community stakeholders, city representatives and construction contractors fill out the questionnaire, but not all stakeholders responded. A copy of the responses that were submitted are attached in Appendix D; respondents included the Coalition for Buzzards Bay, the New Bedford Harbor Development Commission, and the MassDEP.

The general sentiment about the project from this feedback is that despite the large scale and extensive clean-up time of the project, it is well coordinated and the team is responsive to community needs and questions. There is a great interest from the community to utilize the harbor without having any Superfund stigma, as well as frustration in the potentially lengthy cleanup timeframe. Again, this is why EPA continues to evaluate alternative methods to accelerate the clean-up timeframe (e.g., OU1 ESD #4).

Overall, EPA will continue to solicit public comment and input through a variety of outreach methods, including, among others, monthly public meetings, formal comment periods as necessary, presentations at neighborhood group meetings, radio and cable TV shows, and newspaper adds in order to ensure that the surrounding communities and local officials are informed and engaged in the harbor cleanup.

7.0 TECHNICAL ASSESSMENT

The technical assessment was only conducted for OU1, since OU2 is complete and requires no further action (including no O&M) and a ROD has not yet been issued for OU3.

7.1 QUESTION A: IS THE REMEDY FUNCTIONING AS INTENDED BY THE DECISION DOCUMENTS?

Yes. The remedy is being implemented in accordance with the requirements of the 1998 ROD; the 2001, 2002 and 2010 ESDs; and design specifications. The remedy is expected to be protective when it is completed, which is not for many years due to the volume of sediments requiring remediation (900,000 cy) and the current funding rates. Key remedial actions at the site are provided below along with a summary of how they are meeting the intent of the decision documents.

7.1.1 Saltmarsh excavations, restorations and monitoring

Excavation and restorations activities were completed as part of the Early Action and North of Wood Street (NWS) cleanup actions at the Site, including fringing shoreline saltmarshes, in 2000 and 2002, respectively. See also section 4.2.1 above. These areas were targeted for accelerated cleanups due to the residential and recreational shoreline land use and the high levels of PCB contamination (prior to cleanup) in these areas. Theses areas are currently being monitored annually for soil and sediment PCB levels to assess whether re-contamination due to tidal action is occurring.

Monitoring has shown that the NWS area is a highly dynamic system with river sediment PCB levels showing high levels of temporal variation. Overall, PCB concentrations for river sediments analyzed in 2010 were lower than concentrations observed during previous years, likely due to extremely high spring 2010 rainfall and river flow rates. The thirteen river sediment samples taken in April 2010 averaged 7.7 ppm, which is in compliance with the applicable 10 ppm cleanup criteria in the 1998 ROD.

Shoreline soil samples in 2010 were also acceptably low, with an average from 8 samples (not counting an outlier at station NWS-37, just north of an unused parking lot on the eastern shoreline) from *both* recreational and residential areas of 1.0 ppm, which is in compliance with the 1 ppm cleanup criteria for residential shoreline land use. Station NWS-37, in a potential recreational area, had a PCB level of 16.7 ppm, which is in compliance with the applicable 25 ppm cleanup criteria for recreational shoreline land use. Annual monitoring will continue in these areas as needed to monitor for potential recontamination. For more information see WHG, 2010b.

7.1.2 Construction of Confined Disposal Facilities

The 2002 ESD eliminated the construction of CDF D, in favor of offsite disposal of an equal volume of sediments that could have been disposed in it. EPA is currently not pursuing

construction of the three upper harbor CDFs A, B and C and will issue an additional decision document to address these in the future.

A pilot CDF was constructed just north of the end of Sawyer Street as part of the 1988/89 pilot study, and has been used for interim disposal of contaminated sediments from the harbor cleanup. This pilot CDF was modified in the early 1990s as part of the hot spot ROD implementation to allow construction of a lined sediment holding cell (Cell #1). The original contents of the pilot CDF are now contained along the shoreline directly to the east of Cell #1; it is this shoreline area that is now referred to as the pilot CDF (sediments from the original pilot study that were located within the footprint of Cell #1 were first relocated to this shoreline pilot CDF area prior to construction of Cell #1). Cell #1 has also been used for interim disposal of contaminated sediments from the harbor cleanup. EPA has determined that there are no existing risks associated with the temporary disposal in the pilot CDF or Cell #1 (USEPA, 2001; USEPA, 2010b; respectively). These areas are covered with clean fill; and the walls and bottom of Cell #1 are lined with a 60 mil HDPE liner. An impervious natural clay layer also underlies the area.

Groundwater and air monitoring is conducted in the area on an on-going basis. Groundwater samples collected in 2009 were analyzed for VOCs, PCBs, selected metals (cadmium, chromium, copper, and lead) and total suspended solids. Analytical results indicate that no analytes exceed the applicable MCP GW-3 groundwater standards (MACTEC, 2010). In addition, there have been no exceedences of worker safety action levels for airborne PCB or VOCs near Cell #1 (see Table 2 of the third ESD, USEPA 2010b). When funding allows, EPA intends to remove the material from Cell #1 and dispose of it at an appropriately licensed landfill. Any permanent disposal of material in this area would require EPA to issue an additional decision document.

7.1.3 Dredging of Harbor Sediments

USACE continues dredging activities in the upper harbor, typically in the summer months and as funding allows. Figure 4 shows the areas where dredging has occurred to date. Table 2 above lists all site sediment remediation efforts and volumes to date, and Table 3 above lists the navigational sediments that have been dredged to date.

The depth to which sediments have to be removed in a particular dredge area are based on core sampling data, a z-star (z*) predictive model for dredging depth, and bathymetric survey data. In order to determine progress in meeting the target dredge elevation and to confirm the removal of contaminated sediments to concentrations at or below the remediation criteria, sediment conditions are assessed during and following dredging operations. The results indicate that the overall thickness of the highly contaminated sediment layers in the northern reaches of the upper harbor have been significantly reduced across all dredged regions, as presented in the sediment monitoring data since the first Five-Year Review (WHG, 2010a; Battelle, 2009; Battelle**,** 2008; Battelle, 2007). As compared to pre-dredging PCB concentrations, post-dredge concentrations have varied, but in general indicate that PCB concentrations are lower in areas where little overlying organic silt remains (i.e., where native sediment, typically clay in the northern upper harbor, was reached). The post-dredge PCB sediment chemistry data from the 2010 dredging

season were not available as of this report's release. The post-dredge monitoring also suggests that, at least in the highly contaminated northern reaches of the upper harbor, the z* predictive model may be underestimating the required depth of dredging.

7.1.4 Construction and Operation of Water Treatment Facilities

A 2,000 gpm water treatment system is part of the dewatering facilities at Area D. A desanding facility at Area C, which receives slurry from the dredge to separate coarse grained materials (e.g. sand, gravel, shells, etc.) prior to dewatering, is also part of the sediment processing process. Both facilities have been in operation since the start of the dredge season in 2004. Since the start of full-scale dredging, a ferric sulfate injection system was added upstream of the desanding facility, along with other operational measures, to address the formation of hydrogen sulfide (H_2S) in the building. Overall, the treatment systems are functioning as intended as the effluent concentrations for PCBs and selected metals are in compliance with the stringent project effluent discharge criteria (Jacobs, 2005 – *Table D-6;* Jacobs, 2006 – *Table C-4*; Jacobs, 2008 – *Table C-4*; Jacobs, 2009 – *Table 4.2-4*, Jacobs, 2010b – *Table C-4*).

7.1.5 Seafood advisories and other institutional controls

Several interim controls have been implemented to minimize and, where possible, prevent exposure to contamination that could result in unacceptable risk, including:

- *Fishing restrictions and advisories.* Fishing restrictions for New Bedford Harbor are codified in Massachusetts regulations, and enforcement is the responsibility of the state. As discussed herein, EPA continues to work with the MDPH, MDMF and MassDEP to augment the 1979 state closure regulations by providing updated seafood consumption risk information to targeted populations, such as sensitive populations, sport fishermen, and recreational shellfishermen. The most recent update on fish and shellfish advisories is included as Appendix E to this Report.

- *Fencing.* Fencing has been erected along the New Bedford shoreline in residential and recreational shoreline areas. The USACE and its contractors are responsible for maintaining the fencing, and based on a June 2010 site inspection conducted by EPA the barriers are intact. Fencing is monitored on an ongoing basis and repaired as needed.

- *Signage.* Signage is used extensively at the Site, both to communicate the fishing advisory as well as to warn against dermal contact with PCB-contaminated sediments. Four outdoor bulletin boards located in popular shoreline recreational areas in New Bedford and Fairhaven are also used to keep the public apprised of cleanup progress and remaining site risks. The signs and bulletin boards are monitored on an ongoing basis and maintained as needed.

- *Additional Educational Materials.* A brochure has been developed in anticipation of the City's goal of increasing recreational boating, and will be distributed at boating or crew-racing events where boaters may be present in the upper harbor (particularly in shallow

areas) where there is a higher risk of exposure to contaminated sediments. The brochure explains the risks from exposure to contaminated sediments and the measures boaters can take to avoid exposure. This brochure is attached as Appendix E.

- *ICs for CDFs and other EPA property*. The only CDF that has been constructed to date is the pilot CDF. Since a final decision on its permanence has not yet been made, no ICs for it have yet been created. However, the property it is located on is part of EPA's Sawyer Street facility. Groundwater and air monitoring has been and will continue to be performed in and around the pilot CDF; current data shows that contaminants are not migrating from it. EPA maintains security, including fencing and security staff, around all of its facilities where contaminated sediment is treated or stored. EPA has issued licenses to the HDC and a local fisheries company to be able to use EPA's marine bulkhead at the Hervey Tichon dewatering facility for marine industrial uses (primarily for docking commercial fishing boats) that are compatible with the remedial activities being conducted at the property.

7.1.6 Long-term site wide monitoring

The two largest long term monitoring programs for the site are the annual seafood monitoring program (run by the MassDEP) and EPA's long term benthic community monitoring program. See discussion above in section 6.4.3. Although monitoring data indicates progress towards achieving the 1998 ROD's sediment cleanup goals, the site is still considered under construction and these goals are not expected to be achieved until construction is complete.

The seafood monitoring program measures the PCB concentrations in edible seafood species caught in New Bedford Harbor and surrounding Buzzards Bay. The species monitored are modified as needed, based on prior years sampling experiences and whether a species is caught in sufficient quantity to enable a statistical analysis; but in general, samples are collected for: Quahog (pre- & post-spawn), fish (Black Sea Bass, Scup, Alewife and Flounder), Blue Crab, and Lobster (meat & tomalley). For this monitoring effort, both 5 Aroclors and 136 individual congeners have been measured to date to assist in the comparison with previous site data, as well as to further understand the similarities and differences of these two analytical approaches. The results are compared to the current FDA criteria for PCBs in commercial seafood of 2 ppm, MDPH's goal of 1 ppm PCBs in seafood, and to the site-specific goal of 0.02 ppm PCBs. Overall, the levels of PCBs in NBH area seafood continue to be above the site-specific goal and are consistent with levels expected during ongoing, long-term, active sediment remediation (Figures 8-1 through 8-5). However, in comparison to historic PCB monitoring of NBH area lobster dating to the mid 1980s, current data shows a significant decrease in levels over time (MassDEP, 2010).

The long-term benthic community monitoring program assesses the overall remedial effectiveness by quantifying long-term ecological effects on species abundance and richness from exposure to Upper, Lower and Outer Harbor sediments and water column. The plan incorporates a comprehensive sampling and analysis effort of chemical and biological parameters (including sediment chemistry, sediment toxicity, and quantifying benthic invertebrates) at 79 separate stations within these areas. Baseline sampling was conducted in October 1993 and four subsequent rounds were completed in 1995, 1999, 2004 and 2009. As discussed above in section

6.4.3, overall this long-term benthic community monitoring confirms that the cleanup activities to date have resulted in significant improvement in benthic quality in 2009 compared to the 1993 baseline data, for the lower and outer harbor areas (Appendix B).

It should also be noted that EPA, working closely with the USACE, has initiated a new food chain modeling effort to update the results of the 1990 food chain model (Battelle, 1990). While this is still a work in progress, EPA hopes to gather updated conclusions on the estimated "lag time" required, after completion of the OU1 remediation, to reach the 1998 ROD's 0.02 ppm PCB fish tissue goal. EPA will make this new modeling report available to the public as soon as it is completed.

Summary

In summary, the remedy is proceeding as intended, although the time frame to complete the remedy is currently many years away. Long term benthic monitoring shows an improvement in overall benthic quality in the lower and outer harbor areas compared to 1993 baseline data, and annual seafood monitoring indicates that remedial operations are not causing tissue PCB residues in the three fish closure areas to significantly increase. Performances standards will likely be met when the remedial action is complete. In the interim, EPA will continue to work with project stakeholders to improve seafood advisories, continue to monitor PCB levels in seafood, continue to monitor overall benthic quality, and develop shoreline ICs. At this time, there are no known problems with the remedy that would affect its long term protectiveness.

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?

Yes, as evaluated in this section, the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection are still valid for OU1. It should be noted that in 2008, sediments containing high levels of VOCs exceeding hazardous waste thresholds were encountered along the Aerovox facility, and such VOC levels were not identified in the ROD. These additional contaminants were addressed by the third ESD.

No evaluation is needed for OU2 because all hot spot sediments have been disposed off-site. An evaluation was not conducted of OU3, since a remedy has not yet been selected.

7.2.1 Remedial Action Objectives

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 NRWQC).

7.2.2 ARAR Review

In order to evaluate the protectiveness of the remedy a review of the Applicable or Relevant and Appropriate Requirements (ARARs) in the ROD were checked for changes in standards; newly promulgated standards, and TBCs (to be considered) were also evaluated. An ARAR Review was only conducted for OU1, since the OU2 remedy is complete and requires no operation and maintenance, and the ROD for OU3 has not been issued.

The 1998 ROD for OU1 (USEPA, 1998) set forth the following ARARs for the selected remedy:

<u>Chemical-Specific ARARs:</u>

- Federal Food, Drug and Cosmetic Act
- Clean Water Act (CWA), Ambient Water Quality Criteria (since renamed National Recommended Water Quality Criteria)
- Massachusetts Surface Water Quality Standards

<u>Location Specific ARARs:</u>

- Floodplain Management – Executive Order 11988 (standards called for under the Executive Order, which were promulgated in 40 C.F.R. Part 6, Appendix A and cited as the ARAR have since been rescinded)
- Wetland Protection – Executive Order 11990 (standards called for under the Executive Order, which were promulgated in 40 C.F.R. Part 6, Appendix A and cited as the ARAR have since been rescinded)
- Fish and Wildlife Coordination Act (cited regulations at 40 C.F.R. § 302(g) have been rescinded, but the statutory requirements are still in effect)
- Federal Endangered Species Act (cited regulations at 40 C.F.R. § 302(h) have been rescinded, but the statutory requirements are still in effect)
- Preservation of Historical and Archeological Data Act of 1974
- Federal and State Coastal Zone Management Acts
- Massachusetts Wetlands Protect Act
- Massachusetts Administration of Waterways License Law
- Massachusetts Prohibition Against Certain Fishing in New Bedford Harbor

<u>Action Specific ARARs:</u>

- Toxic Substances Control Act (TSCA), PCB Disposal Requirements
- TSCA PCB Remediation Waste
- TSCA Chemical Waste Landfill Standards
- TSCA Decontamination
- Clean Water Act (CWA), Section 402, National Pollutant Discharge Elimination System (NPDES)
- CWA, Section 402, NPDES, Prohibitions
- CWA, Section 404, Dredge & Fill Activities

- Rivers and Harbors Act
- Clean Air Act (CAA), National Emissions Standards for Hazardous Air Pollutants (NESHAPS)
- Massachusetts Hazardous Waste Management – Identification and Listing
- Massachusetts Hazardous Waste Management Requirements for Generators of Hazardous Waste
- Massachusetts Hazardous Waste Management – Management Standards for all Hazardous Waste Management Facilities
- Massachusetts Supplemental Requirements for Hazardous Waste Management Facilities
- Massachusetts Solid Waste Management
- Massachusetts Surface Water Discharge
- Massachusetts Surface Water Quality Standards
- Rules for the Prevention and Control of Oil Pollution in the Water of the Commonwealth
- Massachusetts Operation and Maintenance Pretreatment Standards for Wastewater Treatment Works and Indirect Dischargers
- Massachusetts Certification for Dredging, Dredged Material Disposal and Filling in Waters
- Massachusetts Ambient Air Quality Standards
- Massachusetts Air Pollution Control

Additional policies, criteria, and guidance were identified in the ROD as TBC, including:

- Cancer Slope Factors (CSFs)
- Reference Dose (RfDs)
- PCBs: Cancer Dose – Response Assessment and Application to Environmental Mixtures
- Massachusetts Coastal Zone Management Policies
- TSCA PCB Spill Cleanup Policy
- Total Maximum Daily Load (TMDL) Program Supplemental Guidance: The TMDL Concept
- Guidance on Remedial Actions for Superfund Sites with PCB Contamination
- Massachusetts Water Quality Standards Implementation Policy of Toxic Pollutants in Surface Waters
- MassDEP – Recommended Threshold Effect Exposure Limits (TELs) and Allowable Ambient Limits (AALs)
- Massachusetts Allowable Sound Emissions

The first ESD revised the ROD ARARs by determining that the pilot study CDF at EPA's Sawyer Street facility met standards under 40 C.F.R. § 761.61(c) of TSCA for the temporary storage of PCB containing waste. The pilot CDF was found not to pose an unreasonable risk to health or the environment as long as the following conditions are maintained: (1) groundwater and air monitoring of the area is continued as long as the PCB contaminated sediment remains in place; (2) subsurface conditions remain intact; (3) surface PCB levels remain low or, alternatively, a clean soil cover (approximately six inches thick) is placed so that it does not pose an unreasonable risk to health or the environment; and (4) a final resolution of the facility is made in a later decision document..

The second ESD, which changed a component of the ROD remedy from disposing of sediments into CDF D to off-site disposal of the sediments that would have been disposed in it, added the following requirements under 40 C.F.R. § 761.61(c) of TSCA:

> The ESD's plan to transport dredged PCB-contaminated sediment offsite for disposal instead of containing the sediment in CDF D does not pose an unreasonable risk to health or the environment as long as the following conditions are met:
>
> 1. All dredged sediment is disposed of in accordance with TSCA based on *in situ* PCB levels and not subject to dilution.
> 2. Protocols, developed in accordance with TSCA, will be developed and maintained for the following activities:
> a. Sampling of all dredged material (including separated sand and gravel) before it is transported offsite; and
> b. Best efforts are used to rinse desanding and dewatering equipment when handling TSCA and non-TSCA material to avoid mixing.
> 3. Stockpiled material shall be bermed while awaiting transport to capture runoff. Runoff shall be collected and treated to applicable water quality standards.
> 4. Groundwater and air monitoring and dust suppression measures as described in the ESD are maintained until the desanding, dewatering and transporting of PCB-contaminated sediment ceases.

These revised standards have been maintained by the implementation of the remedy to date.

The third ESD documents EPA's use of Cell #1 at Sawyer Street for temporary storage of PCB-contaminated sediments from OU1, including VOC-impacted sediments removed from the Aerovox shoreline. The ESD also modifies a previous finding under an ESD for OU2 that Cell #1 meets applicable standards for the temporary disposal of hazardous waste, as well as PCBs. However, in making this finding, it was necessary for EPA to invoke a waiver under Sections 121(d)(4)(A) and (B) of CERCLA, 42 U.S.C. §§ 9621(d)(4)(A) and (B) of certain Massachusetts hazardous waste surface impoundment regulations. Specifically requirements: (1) for a leak detection, collection and removal system, 310 CMR 30.612(3); (2) for two feet of freeboard be maintained (freeboard refers to the distance from the top of the dredged sediments to the top of the surrounding cell wall), 310 CMR 30.612(6); and (3) that the cell have a double liner, 310 CMR 30.612(1). EPA determined that the single liner present in the cell, in combination with the underlying clay layer and the extensive monitoring plan for the facility is equally protective as a double liner and is suitable for a temporary hazardous waste surface impoundment facility (EPA, 2010b).

Based on a review of Table 8 in the 1998 ROD and the ARARs identified in the subsequent ESDs, the actions to be taken to attain the ARARs are being met during remedy implementation, as described herein.

7.2.3 Exposure Assumptions

The environmental media which were considered in the 1998 ROD include surface water, harbor sediment, marine biota and site area air. Direct contact with and incidental ingestion of shoreline sediment and ingestion of marine biota were identified as the human health exposure pathways of primary concern. Screening results performed under conservative exposure conditions indicted that exposure to PCBs in surface water did not represent a significant exposure pathway; therefore, this pathway was not evaluated further. These exposure assumptions remain valid for the site.

7.2.4 Changes in Land Use of the Site and Physical Site Conditions

As discussed herein, EPA has observed an overall trend towards a more publically accessible shoreline in the upper harbor (e.g., Riverside Park and River Road Park in New Bedford and Riverview Park in Acushnet) as well as towards conversion of shoreline mills to residential use (e.g., Rope Works building, Whalers Cove assisted living, etc.). It is expected that additional shoreline properties developed before remediation occurs will trigger the more stringent shoreline cleanup levels. Institutional controls to advise future users of restrictions on higher use of the area beyond that envisioned when the cleanup occurred will also be required, unless the landowner conducts further cleanup action. In addition, EPA has consolidated it facilities at Sawyer Street, so that part of the property will be available to the City (EPA leases the land from the City) for redevelopment. EPA will continue to work with the local municipalities and private shoreline landowners to assess changes in shoreline land use and incorporate them into the remedy.

It should also be noted that the City is promoting increased recreational boating in the upper and lower harbor, including plans for a boat house for racing shells to be located just south of EPA's Sawyer Street facility. Increased use of the upper harbor for recreational boating will need to be coordinated with ongoing dredging and other remedial activities to prevent recreational exposure to contaminated sediments, as well as safety hazards.

7.2.5 Summary of Toxicity Data and Cleanup levels

With the exception of high levels of VOCs discovered along the Aerovox shoreline, no new contaminants or contaminant sources have been identified since the 1998 ROD. The sediment cleanup levels and fish-tissue goals remain as stipulated in the 1998 ROD. Annual seafood sampling has identified the need for more stringent seafood consumption advisories, beyond those contained in the 1979 state regulations, to be protective of human health in the interim until the remedy is completed.

7.3 QUESTION C: HAS ANY OTHER INFORMATION COME TO LIGHT THAT COULD CALL INTO QUESTION THE PROTECTIVENESS OF THE REMEDY?

No, no other information has come to light that could call into question the protectiveness of the remedy.

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.

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 continues to work with state and local officials to control these risks to the maximum extent possible through the 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 timeframe, complete interim control of these potential risk pathways remains problematic. In addition, ecological risks from the PCB contamination continue in the interim until the remedy is complete.

8.0 ISSUES

Table 4 (below) summarizes the main issues with regard to protection of human health at the site identified to date.

TABLE 4: ISSUES

Issues	Affects Current Protectiveness	Affects Future Protectiveness
1. Review of recent seafood monitoring data indicates the 1979 fishing ban needs to be augmented to be protective regarding the human consumption of certain species of fish and shellfish in particular areas of the Harbor, including by certain sensitive populations. Although, updated consumption guidance has been completed and is being distributed, follow-up measures to further address the human consumption of contaminated seafood from the Site will require continued assessment.	Yes	No
2. While the highest priority PCB-contaminated shoreline areas have been remediated, or addressed with fencing or warning signs, other contaminated shoreline areas (typically remote saltmarsh or industrial areas) remain unremediated.	Yes	No

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 herein, EPA continues to work with MDPH, MDMF and MassDEP to augment the 1979 state fishing ban regulations by providing

updated seafood risk information to targeted populations and user groups. However, consumption of local PCB-contaminated seafood will likely continue until the remedy is complete. EPA will continue to explore new solutions to keep local seafood consumption to a minimum.

In addition to the seafood pathway, EPA has focused on minimizing dermal contact risks from PCB-contaminated shoreline areas. The worst areas for dermal contact were remediated in 2000 and 2002, and secondary areas have been fenced and/or warning signs have been erected. Again, however, given the large scale of the site and the long remedial timeframe, some dermal contact risk in remote saltmarsh and industrial areas remain. In addition for shoreline areas subject to land use changes, EPA will continue to work with the City and landowners to develop long-term controls to notify landowners of allowable uses once remediation is complete. EPA will also work closely with the City on increased development of recreational boating in the upper harbor.

The time frame for completing the remediation is completely dependant on annual funding rates, and based on typical funding rates will take many years to complete. Site risks will exist until cleanup standards are achieved, so an extended remediation period will result in ongoing site risks for many years. EPA Region 1 will continue to investigate more efficient, cost-effective remedial alternatives that offer the potential to reduce the time period to achieve remedial cleanup standards throughout the Site.

9.0 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

TABLE 5: RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Issue	Recommendation and Follow-up Actions	Parties Addressing the Issue	Over-sight Agency	Mile-stone Date	Affects Protectiveness	
					Current	Future
1. Review of recent seafood monitoring data indicates the 1979 fishing ban needs to be augmented to be protective regarding the human consumption of certain species of fish and shellfish in particular areas of the Harbor, including by certain sensitive populations. Although, updated consumption guidance has been completed and is being distributed, follow-up measures to further address the human consumption of contaminated seafood from the Site will require continued assessment.	Distribute new seafood consumption brochure to target audiences (sportfishermen and recreational shellfishermen). Post new seafood guidance on project web site and on shoreline bulletin boards, and make available at public meetings. Coordinate execution of medical grand rounds to include advice for sensitive populations. Continue to explore new solutions to keep local seafood consumption to a minimum.	EPA, MDPH, MDMF, MaDEP	EPA	9/2010	Y	N*

Issue	Recommendation and Follow-up Actions	Parties Addressing the Issue	Over-sight Agency	Mile-stone Date	Affects Protectiveness	
					Current	Future
2. While the highest priority PCB-contaminated shoreline areas have been remediated, or addressed with fencing or warning signs, other contaminated shoreline areas (typically remote saltmarsh or industrial areas) remain unremediated.	Continue the use of institutional controls, fencing and signage to ensure that dermal contact risks from yet-to-be remediated shoreline areas are controlled. Long term institutional controls will also be developed for remediated shoreline areas to protect against development that is inconsistent with clean up standards for each area. Increased recreational boating in the upper harbor will also be addressed through educational materials and coordination with the City of New Bedford.	EPA/ USACE	EPA	ongoing	Y	N*

** Upon remedy completion*

10.0 PROTECTIVENESS STATEMENT

OU1

The remedy for OU1 is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks have been, or are in the process of, being controlled to the maximum extent practicable.

OU2

The remedy for OU2 currently protects human health and the environment because 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. However, in order for the remedy to be protective in the long-term, this geographical area will also be addressed under OU1. All future work, including institutional controls, for this area will be a part of OU1.

OU3

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 2015.

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FIGURES

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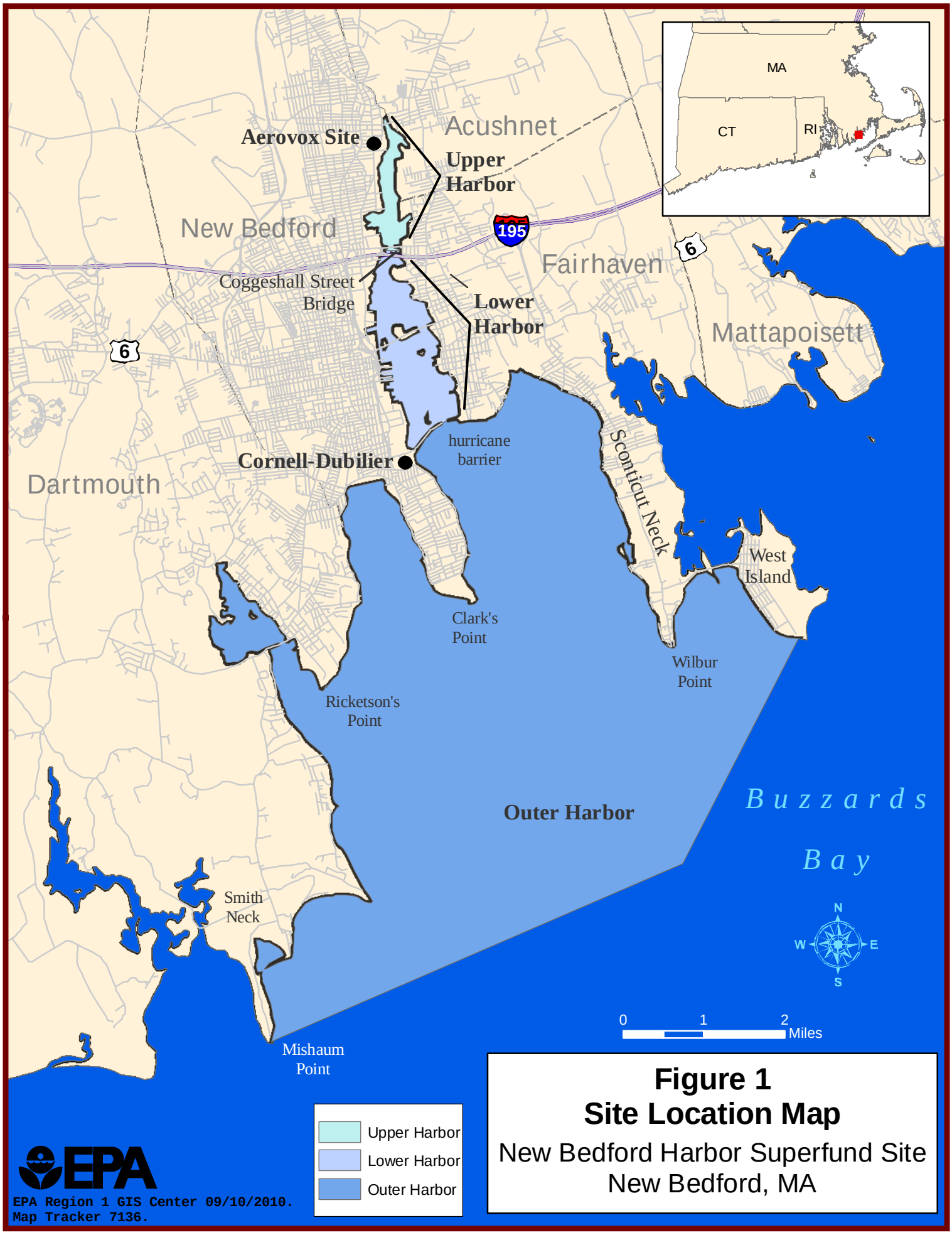
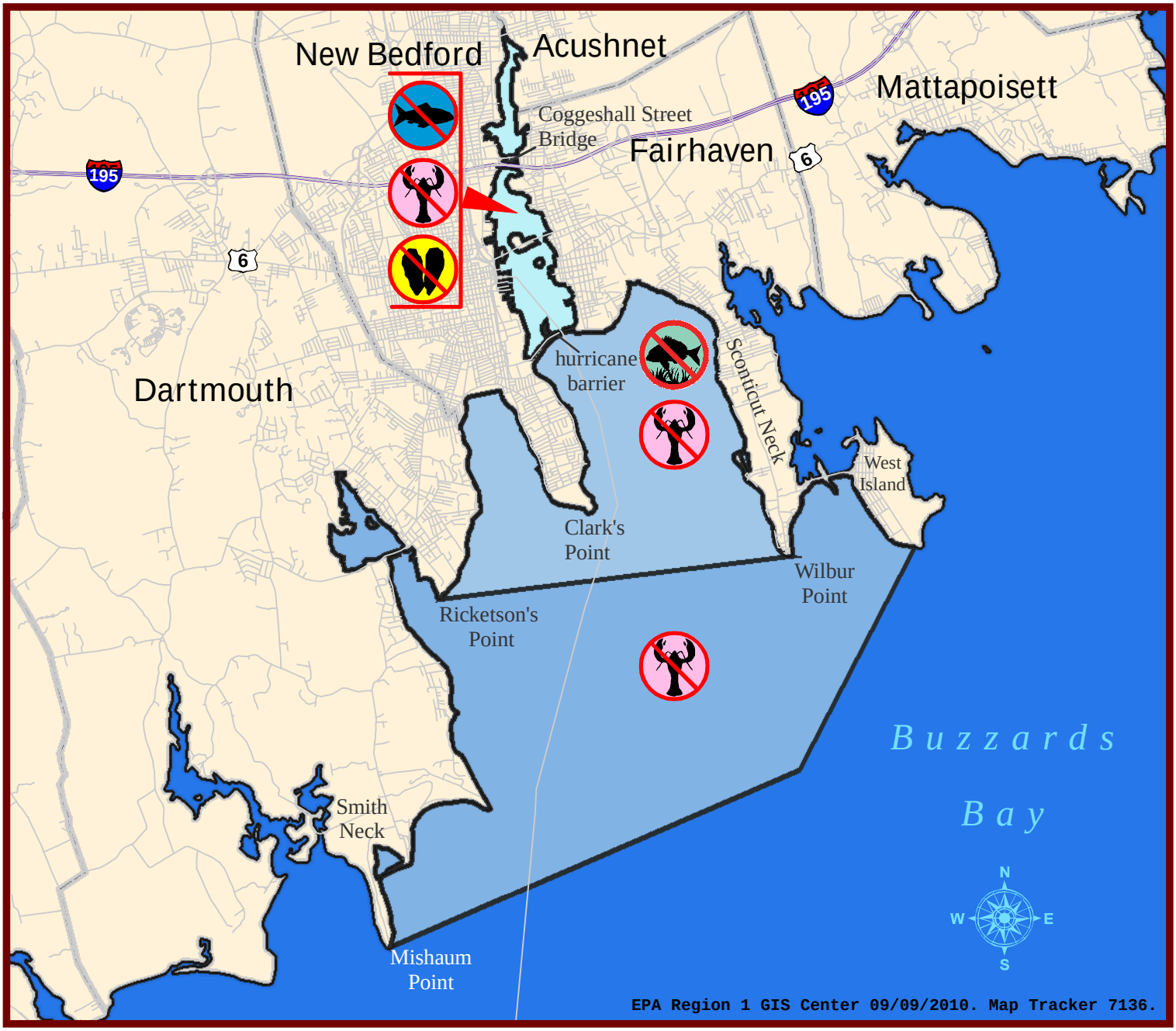


Figure 1
Site Location Map
New Bedford Harbor Superfund Site
New Bedford, MA



Do NOT eat any fish
No coma pescado
Não coma peixe

Do NOT eat any lobster
No coma langosta
Não coma lagosta

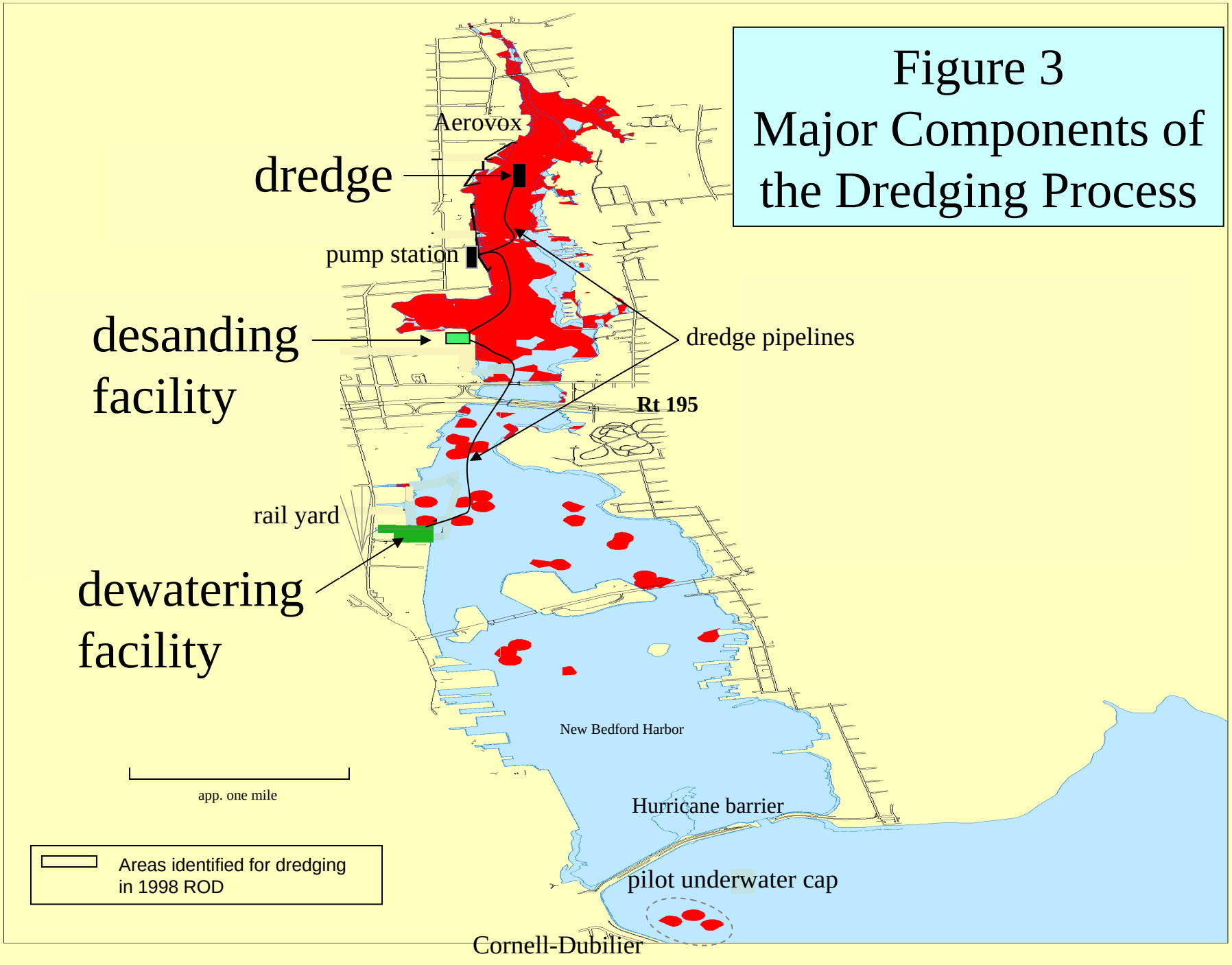
Do NOT eat any bottom fish:
No coma pescado de fondo:
Não coma peixe de fundo:

- flounder
- lenguado
- solha
- tautog
- tautoga
- bodião da ostra
- scup
- sargo
- sargo
- eel
- anguila
- anguila

Do NOT eat any shellfish
No coma mariscos
Não coma mariscos

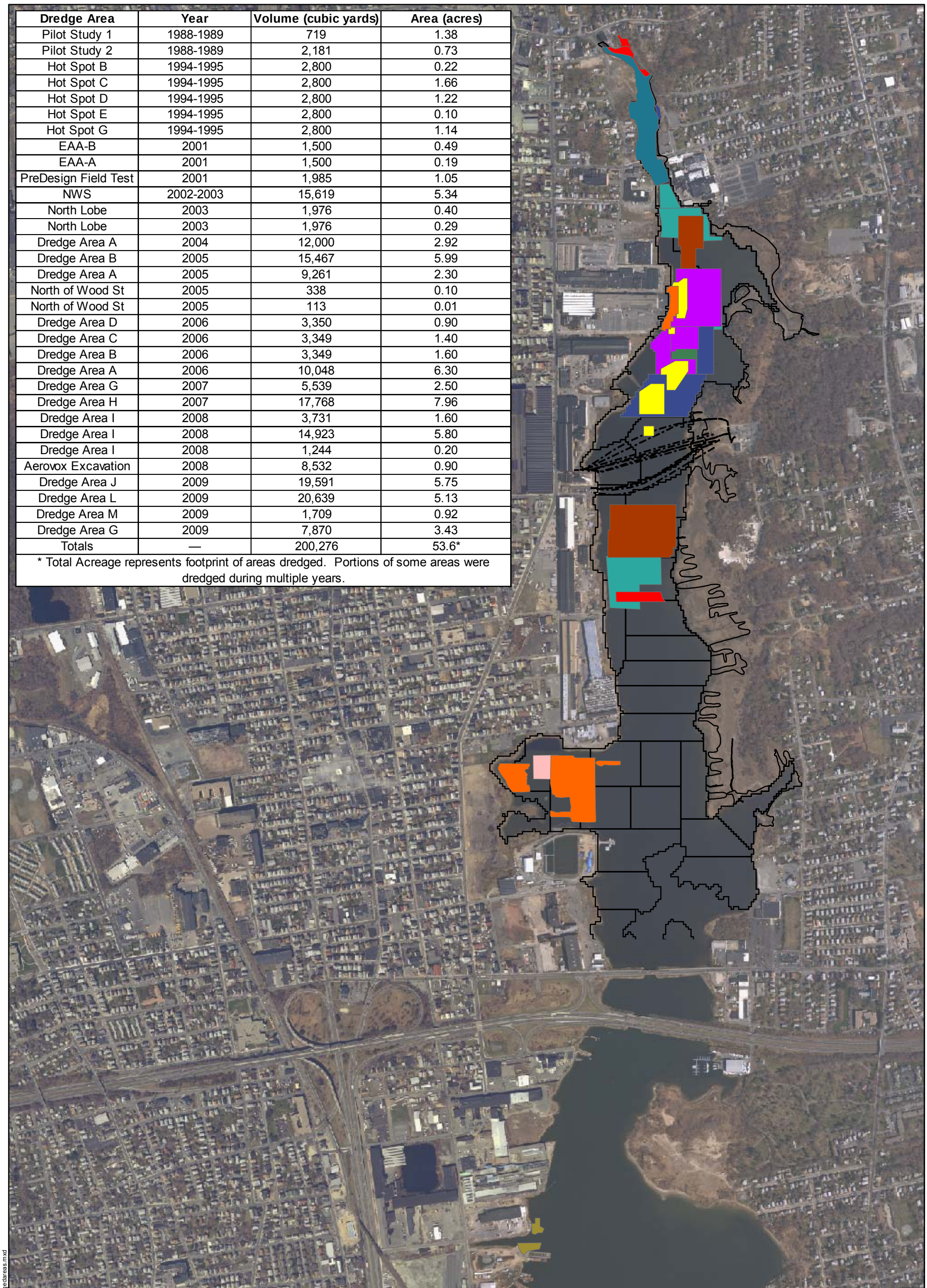
Figure 2
New Bedford Harbor Superfund Site
New Bedford, MA
The 1979 State Fishing Ban

Figure 3
Major Components of the Dredging Process



Dredge Area	Year	Volume (cubic yards)	Area (acres)
Pilot Study 1	1988-1989	719	1.38
Pilot Study 2	1988-1989	2,181	0.73
Hot Spot B	1994-1995	2,800	0.22
Hot Spot C	1994-1995	2,800	1.66
Hot Spot D	1994-1995	2,800	1.22
Hot Spot E	1994-1995	2,800	0.10
Hot Spot G	1994-1995	2,800	1.14
EAA-B	2001	1,500	0.49
EAA-A	2001	1,500	0.19
PreDesign Field Test	2001	1,985	1.05
NWS	2002-2003	15,619	5.34
North Lobe	2003	1,976	0.40
North Lobe	2003	1,976	0.29
Dredge Area A	2004	12,000	2.92
Dredge Area B	2005	15,467	5.99
Dredge Area A	2005	9,261	2.30
North of Wood St	2005	338	0.10
North of Wood St	2005	113	0.01
Dredge Area D	2006	3,350	0.90
Dredge Area C	2006	3,349	1.40
Dredge Area B	2006	3,349	1.60
Dredge Area A	2006	10,048	6.30
Dredge Area G	2007	5,539	2.50
Dredge Area H	2007	17,768	7.96
Dredge Area I	2008	3,731	1.60
Dredge Area I	2008	14,923	5.80
Dredge Area I	2008	1,244	0.20
Aerovox Excavation	2008	8,532	0.90
Dredge Area J	2009	19,591	5.75
Dredge Area L	2009	20,639	5.13
Dredge Area M	2009	1,709	0.92
Dredge Area G	2009	7,870	3.43
Totals	—	200,276	53.6*

* Total Acreage represents footprint of areas dredged. Portions of some areas were dredged during multiple years.



Legend

Areas Dredged through 2009

- 1988-1989
- 1994-1995
- 2001
- 2002-2003
- 2003
- 2004
- 2005
- 2006
- 2007
- 2008
- 2009

- Management Units
- NSTAR Cable Crossing
- Mean Lower Low Water
- Mean Low Water
- Mean High Water
- Mean Higher High Water

N

0 450 900 Feet

1:10,800

JACOBS™

Areas Dredged in New Bedford Harbor through 2009

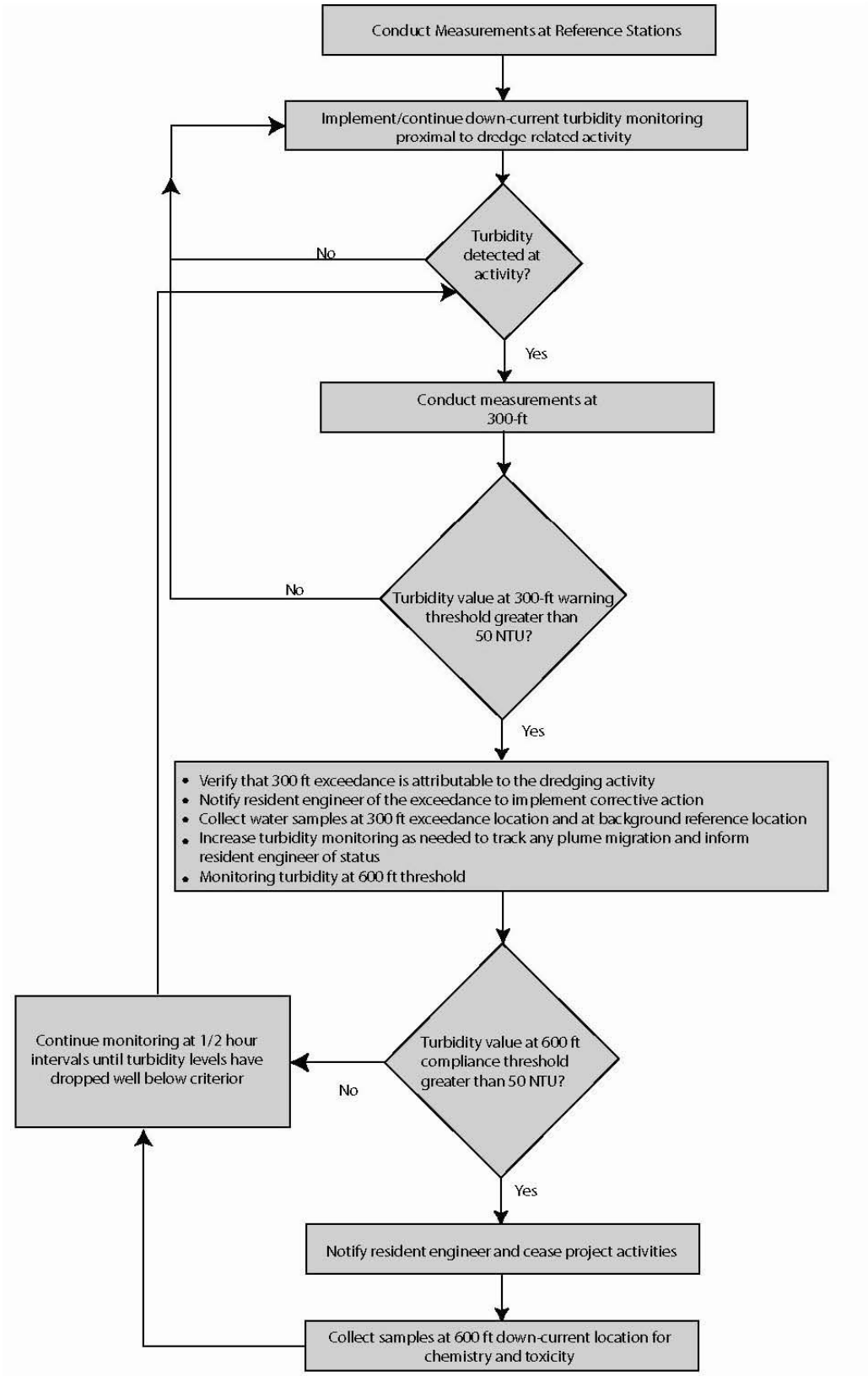
New Bedford Harbor Superfund Site

NAME: croberts DATE: 02/22/2010

Figure 4

Y:\NBH\Projects\35BG08011\20100222\ArcGIS\Fig1-1_NBH_dredgedareas.mxd

Source: 2009 Dredge Season Data Submittal New Bedford Harbor, Jacobs Engineering



Notes: 1:50 NTU value was defined as 50 NTU above background turbidity level

Figure 5. Decision sequence for 2009 water quality monitoring – Phase I

Source: Water Quality Monitoring Summary Report, Woods Hole Group, July 2010

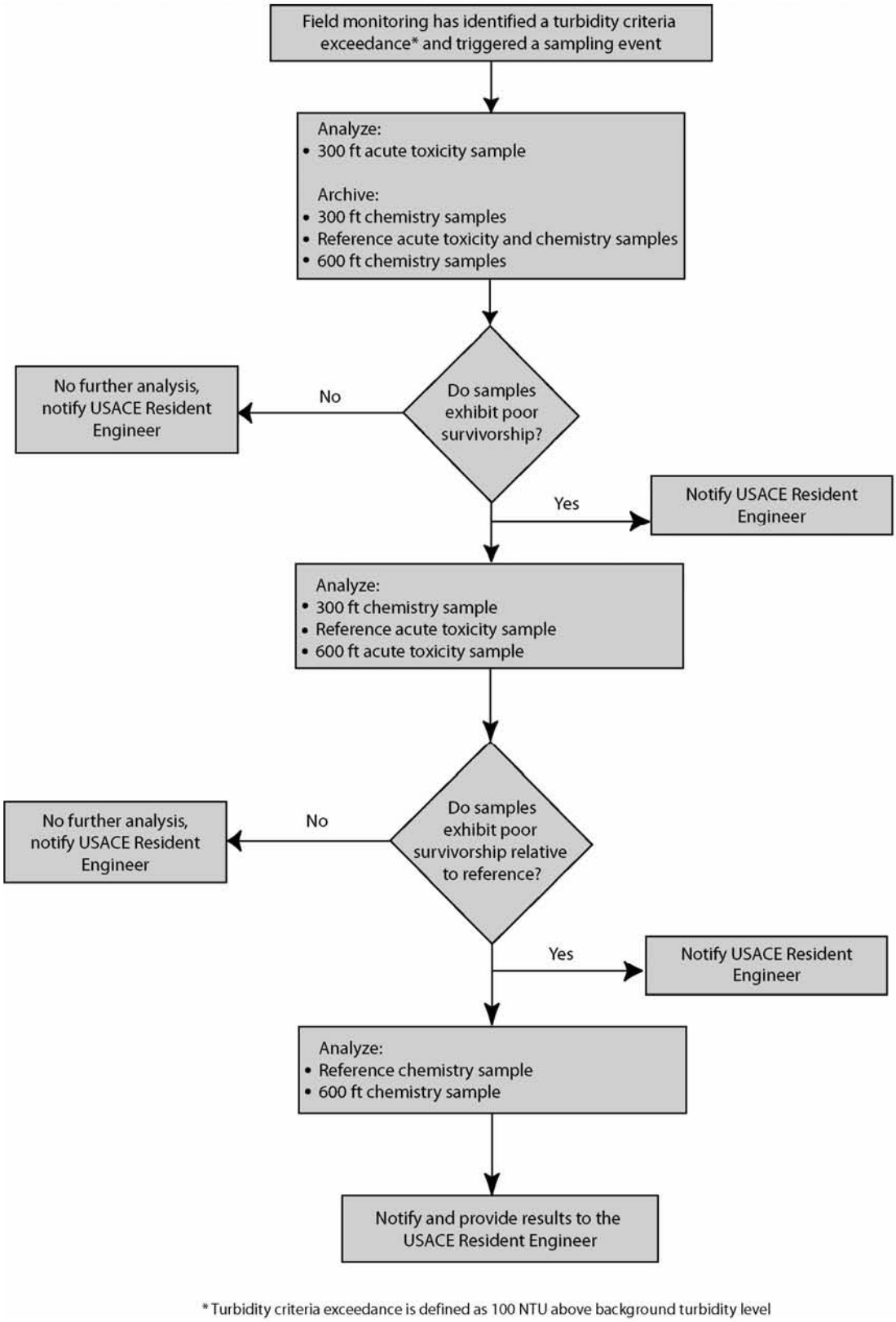


Figure 6. Decision sequence for Level III water quality sample analysis

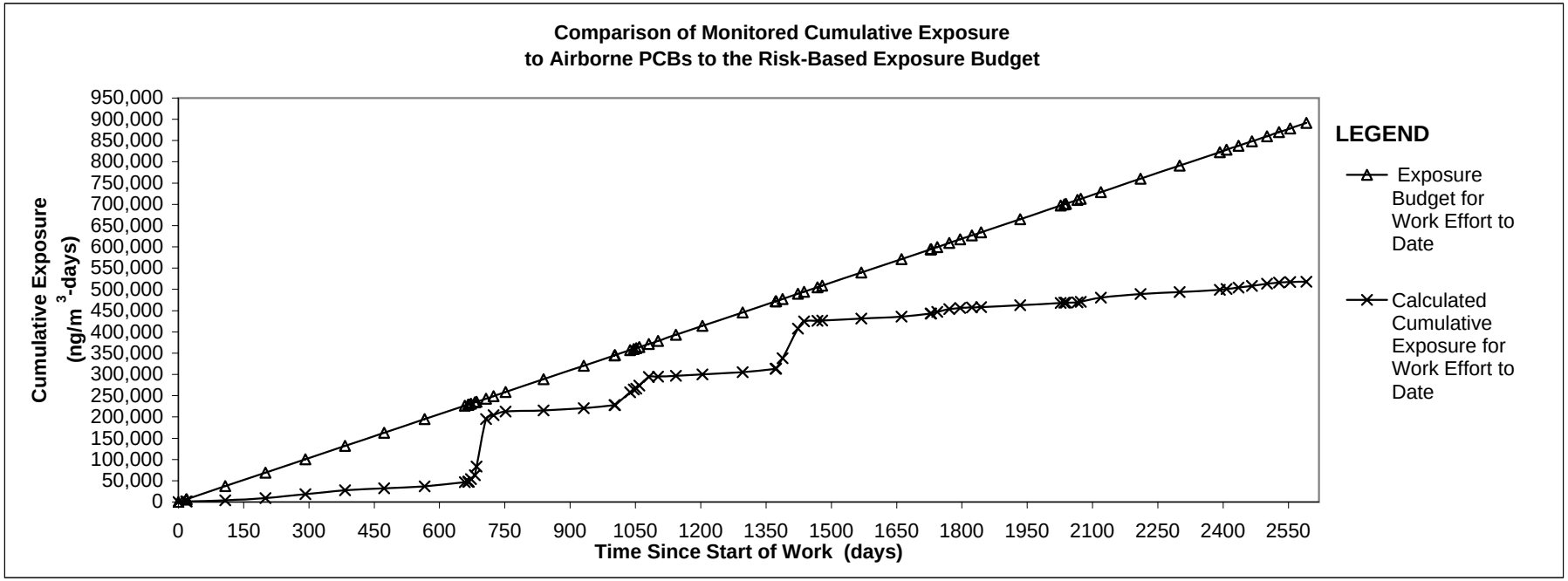
Source: Water Quality Monitoring Summary Report, Woods Hole Group, July 2010

Figure 7 - Public Exposure Tracking System (PETS Curve)

Air Sampling Status Report
New Bedford Harbor Superfund Site

Sample Station :	24 Aerovox
Collection Date:	12/16/2009
Measured PCB Concentration (ng/m^3):	2.59
Exposure Budget Expended During This Period:	6.9%
Cumulative Exposure Budget Expended to Date:	58.2%
Response Level:	No Triggers Identified
Response:	No Response Necessary

Triggers:



Notes:
a) 2004 dredge season, including pre- and post-dredging sampling events, were from 667 to 752 days since start of work (September 9 through December 3, 2004).
b) 2005 dredge season, including pre-and post-dredging sampling events, were from 1003 to 1143 days since start of work (August 11 through December 29, 2005).
c) 2006 dredge season, which did not include a pre-dredge sampling event, was from 1388 to 1468 days since start of work (August 16 through October 18, 2006).
d) 2007 dredge season, which did not include a pre-dredge sampling event, was from 1729 to 1823 days since start of work (August 7 through November 9, 2007).
e) 2008 dredge season which did not include a pre-dredge sampling event was from 1934 to 2119 days since start of work (June 1 through November 5, 2008).
f) 2009 dredge season which did not include a pre-dredge sampling event, but did include a post-dredge sampling event was from 2393 to 2591 days since start of work

(June 5 through December 1, 2009).

Source: 2009 Dredge Season Data Submittal New Bedford Harbor, Jacobs Engineering Group, April 2010

Air Sampling Status Report

New Bedford Harbor Superfund Site

Station #: 24 Aerovox

Exposure Budget Slope (EBS) = 344 nanograms per cubic meter per day (ng/m^3-day)

Collection Date: 11/30/2008

Construction Activity: The 2008 Excavation dredging activities were initiated on June 2, 2008 and completed on July 22, 2008.

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-Volume 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 Harbor Superfund Site, August 2001. Cumulative data for this reporting period are included on pages 4 and 5.

Summary of This Sampling Period:

The results from the Foster Wheeler, Baseline Ambient Air Sampling program (June 1999 through May 2000) were used to assign background concentrations for each air sampling location. For Station 24 Aerovox, the Foster Wheeler quarterly average ambient air PCB concentrations for the June 1999 through May 2000 baseline sampling were used as background concentrations. These background concentrations were used to project the PCB concentrations during for the inactive field times from 11/12/02 through 9/8/04, for the period from 12/4/04 through 8/10/05, from 12/28/05 through 8/15/06, and from 11/19/06 through 8/6/07 to close the recent inactive field season. In addition, to better simulate the 2006 dredging season, the ambient air concentrations from the August 31, 2006 sampling event were used as the concentrations detected at Station 24 Aerovox from August 16, 2006 (the start of dredging activities). To better simulate the 2007 dredging season, the ambient air concentrations from the August 21, 2007 sampling event were used as the concentrations detected at Station 24 Aerovox from August 7, 2007 (the start of dredging activities).

Coordinating the sampling date with the start of dredging better simulates the ambient air PCB concentrations present at Station 24 Aerovox during the active dredging season. For the first month of the 2004 and 2005 seasons, the sampling was conducted on a weekly basis. However, since monthly sampling was conducted in 2006, and the first 2006 sampling event was conducted two weeks after the start of dredging, this new variation of the PETs curve was used. Also, the background concentrations were projected to be at background levels at Station 24 Aerovox on October 19, 2006, which is the day after the 2006 dredging activities were completed. For the 2007 season, the PCB concentrations were projected to be at background levels at Station 24 Aerovox on October 13, 2007, which is the day after the 2007 dredging activities were completed. These changes in the background concentrations and associated active dredging concentrations better match the actual 2006 and 2007 dredging activities. No triggers were identified, therefore, no action is required.

The 2008 season began with mechanical dredging (excavation) off Aerovox on June 2 and ending July 22, 2008. Station 24 was not sampled but Station number 61 (South Fence) was sampled through July 16, 2008. Due to the close proximity of the two stations, Station 61's sample results are inputted for this season. Hydraulic dredging occurred in the Pierce Mill Cove area starting on August 18, 2008. Station 24 was not sampled as dredging did not take place in this part of the Acushnet River, which ended on October 21, 2008. The 2009 dredging season began on June 5th in the northern portion of the Acushnet River. All dredging was done hydraulically until December 2nd. Due to low ambient concentrations of PCBs, no triggers were identified therefore, no action was required to control exposures.

Source: 2009 Dredge Season Data Submittal New Bedford Harbor, Jacobs Engineering

Air Sampling Status Report

New Bedford Harbor Superfund Site

Monitoring Station:		24 Aerovox
Exposure Budget Slope:	[ng/m^3-day]	344
Work Start Date:	[mm/dd/yyyy]	11/12/2002
Projected Work End Date (Per EPA) :	[mm/dd/yyyy]	11/10/2028
Occupational Limit Used as Ceiling:	[ng/m^3]	500,000
TEL for Worker in Public:	[ng/m^3]	50,000
NTEL for Worker in Public:	[ng/m^3]	1,789
Minimum of TEL/NTEL:	[ng/m^3]	1,789
Baseline Average Concentration:	[ng/m^3]	75

Notes:
TEL = Threshold Effects Exposure Limit
NTEL = Non-Threshold Effects Exposure Limits
The EPA periodically assesses this Projected Work End Date, which is subject to change.

Source: 2009 Dredge Season Data Submittal New Bedford Harbor, Jacobs Engineering Group, April 2010

Air Sampling Status Report
New Bedford Harbor Superfund Site

(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]	Running 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	67	67.00	67.00	NC	NC	NC	NC	NC	NC
2	11/30/2002	18	18	9477	67	67.00	67.00	6192	6192	1206.0	1,206.0	19.5%	19.5%
3	12/1/2002	1	19	9476	32	49.50	66.08	344	6536	49.5	1,255.5	14.4%	19.2%
4	2/28/2003	89	108	9387	32	32.00	38.00	30616	37152	2848.0	4,103.5	9.3%	11.0%
5	5/31/2003	92	200	9295	76	54.00	45.36	31648	68800	4968.0	9,071.5	15.7%	13.2%
6	8/31/2003	92	292	9203	130	103.00	63.52	31648	100448	9476.0	18,547.5	29.9%	18.5%
7	11/30/2003	91	383	9112	67	98.50	71.83	31304	131752	8963.5	27,511.0	28.6%	20.9%
8	2/28/2004	90	473	9022	32	49.50	67.58	30960	162712	4455.0	31,966.0	14.4%	19.6%
9	5/31/2004	93	566	8929	76	54.00	65.35	31992	194704	5022.0	36,988.0	15.7%	19.0%
10	8/31/2004	92	658	8837	130	103.00	70.61	31648	226352	9476.0	46,464.0	29.9%	20.5%
11	9/8/2004	8	666	8829	67	98.50	70.95	2752	229104	788.0	47,252.0	28.6%	20.6%
12	9/9/2004	1	667	8828	1024	545.50	71.66	344	229448	545.5	47,797.5	158.6%	20.8%
13	9/14/2004	5	672	8823	1449	1236.50	80.33	1720	231168	6182.5	53,980.0	359.4%	23.4%
14	9/23/2004	9	681	8814	588	1018.50	92.73	3096	234264	9166.5	63,146.5	296.1%	27.0%
15	9/27/2004	4	685	8810	9557	5072.50	121.81	1376	235640	20290.0	83,436.5	1474.6%	35.4%
16	10/19/2004	22	707	8788	559	5058.00	275.41	7568	243208	111276.0	194,712.5	1470.3%	80.1%
17	11/5/2004	17	724	8771	578	568.50	282.29	5848	249056	9664.5	204,377.0	165.3%	82.1%
18	12/3/2004	28	752	8743	30	304.00	283.10	9632	258688	8512.0	212,889.0	88.4%	82.3%
19	2/28/2005	87	839	8656	32	31.00	256.96	29928	288616	2697.0	215,586.0	9.0%	74.7%
20	5/31/2005	92	931	8564	76	54.00	236.90	31648	320264	4968.0	220,554.0	15.7%	68.9%
21	8/10/2005	71	1002	8493	130	103.00	227.41	24424	344688	7313.0	227,867.0	29.9%	66.1%
22	8/11/2005	1	1003	8492	216	173.00	227.36	344	345032	173.0	228,040.0	50.3%	66.1%
23	9/15/2005	35	1038	8457	1490	853.00	248.45	12040	357072	29855.0	257,895.0	248.0%	72.2%
24	9/23/2005	8	1046	8449	178	834.00	252.93	2752	359824	6672.0	264,567.0	242.4%	73.5%
25	9/29/2005	6	1052	8443	383	280.50	253.09	2064	361888	1683.0	266,250.0	81.5%	73.6%
26	10/6/2005	7	1059	8436	1822	1102.50	258.70	2408	364296	7717.5	273,967.5	320.5%	75.2%
27	10/28/2005	22	1081	8414	15.4	918.70	272.14	7568	371864	20211.4	294,178.9	267.1%	79.1%
28	11/18/2005	21	1102	8393	15.9	15.65	267.25	7224	379088	328.7	294,507.6	4.5%	77.7%
29	12/29/2005	41	1143	8352	83.2	49.55	259.44	14104	393192	2031.6	296,539.1	14.4%	75.4%
30	2/28/2006	61	1204	8291	32	57.60	249.21	20984	414176	3513.6	300,052.7	16.7%	72.4%
31	5/31/2006	92	1296	8199	76	54.00	235.36	31648	445824	4968.0	305,020.7	15.7%	68.4%
32	8/15/2006	76	1372	8123	130	103.00	228.02	26144	471968	7828.0	312,848.7	29.9%	66.3%
33	8/16/2006	1	1373	8122	1629	879.50	228.50	344	472312	879.5	313,728.2	255.7%	66.4%
34	8/31/2006	15	1388	8107	1629	1629.00	243.63	5160	477472	24435.0	338,163.2	473.5%	70.8%
35	10/5/2006	35	1423	8072	2357	1993.00	286.66	12040	489512	69755.0	407,918.2	579.4%	83.3%

Source: 2009 Dredge Season Data Submittal New Bedford Harbor, Jacobs Engineering Group, April 2010

Air Sampling Status Report
New Bedford Harbor Superfund Site

(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]	Running 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) [%]
36	10/19/2006	14	1437	8058	41.1	1199.05	295.55	4816	494328	16786.7	424,704.9	348.6%	85.9%
37	11/19/2006	31	1468	8027	41.1	41.10	290.18	10664	504992	1274.1	425,979.0	11.9%	84.4%
38	11/30/2006	11	1479	8016	67	54.05	288.42	3784	508776	594.6	426,573.6	15.7%	83.8%
39	2/28/2007	90	1569	7926	32	49.50	274.72	30960	539736	4455.0	431,028.6	14.4%	79.9%
40	5/31/2007	92	1661	7834	76	54.00	262.49	31648	571384	4968.0	435,996.6	15.7%	76.3%
41	8/6/2007	67	1728	7767	130	103.00	256.31	23048	594432	6901.0	442,897.6	29.9%	74.5%
42	8/7/2007	1	1729	7766	282	206.00	256.28	344	594776	206.0	443,103.6	59.9%	74.5%
43	8/21/2007	14	1743	7752	282	282.00	256.48	4816	599592	3948.0	447,051.6	82.0%	74.6%
44	9/18/2007	28	1771	7724	176	229.00	256.05	9632	609224	6412.0	453,463.6	66.6%	74.4%
45	10/13/2007	25	1796	7699	67	121.50	254.18	8600	617824	3037.5	456,501.1	35.3%	73.9%
46	11/9/2007	27	1823	7672	19.7	43.35	251.05	9288	627112	1170.5	457,671.5	12.6%	73.0%
47	11/30/2007	21	1844	7651	67	43.35	248.69	7224	634336	910.4	458,581.9	12.6%	72.3%
48	2/28/2008	90	1934	7561	32	49.50	239.42	30960	665296	4455.0	463,036.9	14.4%	69.6%
49	5/31/2008	93	2027	7468	76	54.00	230.91	31992	697288	5022.0	468,058.9	15.7%	67.1%
50	6/8/2008	8	2035	7460	34.4	55.20	230.22	2752	700040	441.6	468,500.5	16.0%	66.9%
51	6/12/2008	4	2039	7456	43.1	38.75	229.85	1376	701416	155.0	468,655.5	11.3%	66.8%
52	7/8/2008	26	2065	7430	26	34.55	227.39	8944	710360	898.3	469,553.8	10.0%	66.1%
53	7/16/2008	8	2073	7422	290	158.00	227.12	2752	713112	1264.0	470,817.8	45.9%	66.0%
54	8/31/2008	46	2119	7376	130	210.00	226.75	15824	728936	9660.0	480,477.8	61.0%	65.9%
55	11/30/2008	91	2210	7285	67	98.50	221.47	31304	760240	8963.5	489,441.3	28.6%	64.4%
56	2/28/2009	90	2300	7195	32	49.50	214.74	30960	791200	4455.0	493,896.3	14.4%	62.4%
57	5/31/2009	92	2392	7103	76	54.00	208.56	31648	822848	4968.0	498,864.3	15.7%	60.6%
58	6/16/2009	16	2408	7087	150	113.00	207.92	5504	828352	1808.0	500,672.3	32.8%	60.4%
59	7/13/2009	27	2435	7060	126	138.00	207.15	9288	837640	3726.0	504,398.3	40.1%	60.2%
60	8/13/2009	31	2466	7029	126	126.00	206.13	10664	848304	3906.0	508,304.3	36.6%	59.9%
61	9/17/2009	35	2501	6994	163	144.50	205.26	12040	860344	5057.5	513,361.8	42.0%	59.7%
62	10/14/2009	27	2528	6967	48.8	105.90	204.20	9288	869632	2859.3	516,221.1	30.8%	59.4%
63	11/9/2009	26	2554	6941	45.2	47.00	202.60	8944	878576	1222.0	517,443.1	13.7%	58.9%
64	12/16/2009	37	2591	6904	2.59	23.90	200.05	12728	891304	884.1	518,327.2	6.9%	58.2%

Notes:
[1]EBS: Exposure Budget Slope = ng/m^3-day
NC = not calculated
Shading represents actual sampling data. All other numbers represent projected PCB concentrations for that period.

Source: 2009 Dredge Season Data Submittal New Bedford Harbor, Jacobs Engineering Group, April 2010

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FIGURE 8-1 TO 8-6:
SEAFOOD MONITORING - BIOACCUMULATION DATA, NEW BEDFORD HARBOR

FIGURE NUMBER	SEAFOOD DATA
FIGURE 8-1	SCUP
FIGURE 8-2	QUAHOG (PRE-SPAWN)
FIGURE 8-3	BLACKSEA BASS
FIGURE 8-4	LOBSTER MEAT
FIGURE 8-5	LOBSTER TOMALLEY
FIGURE 8-6	BLUE MUSSEL PCB BIOACCUMULATION

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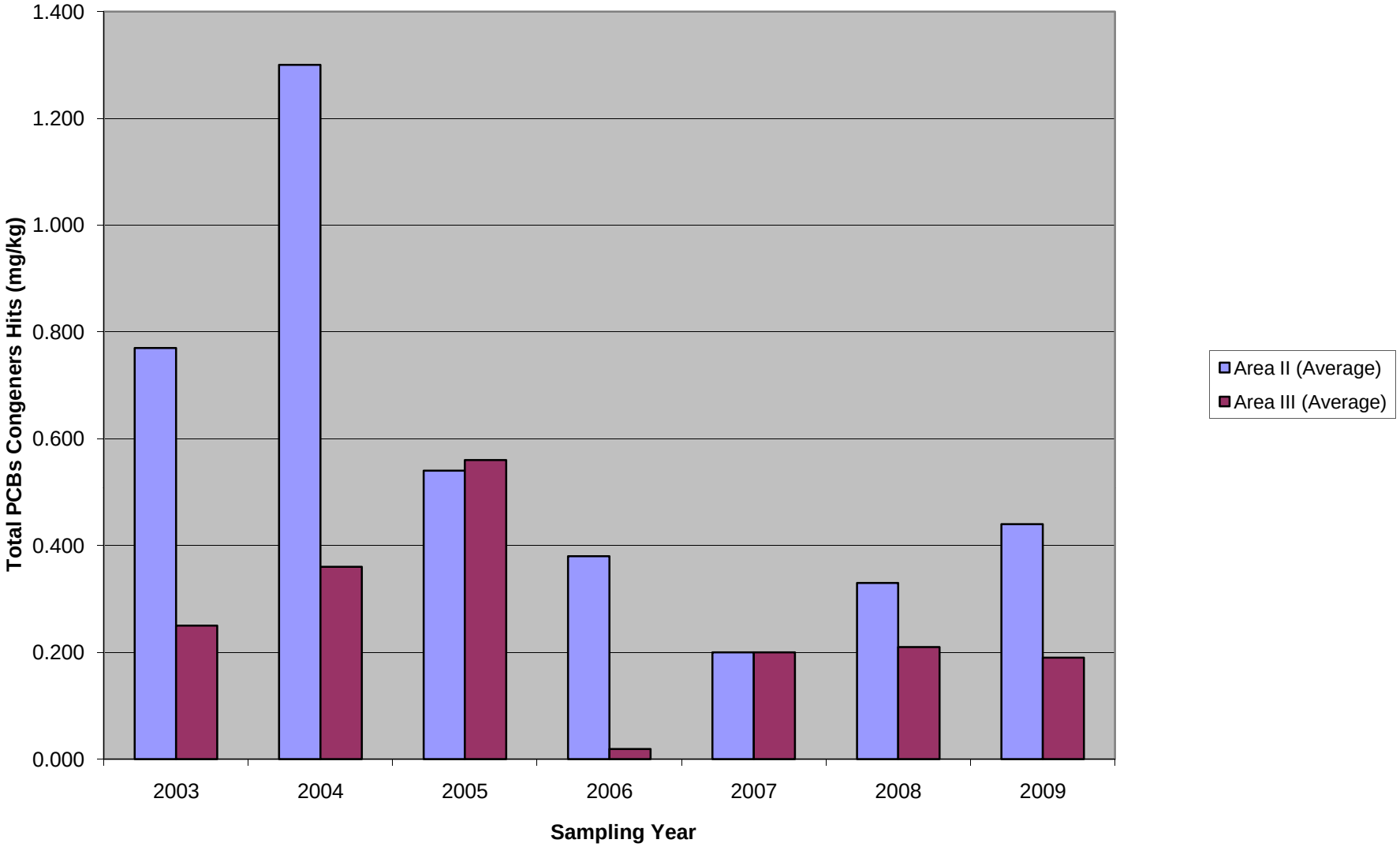
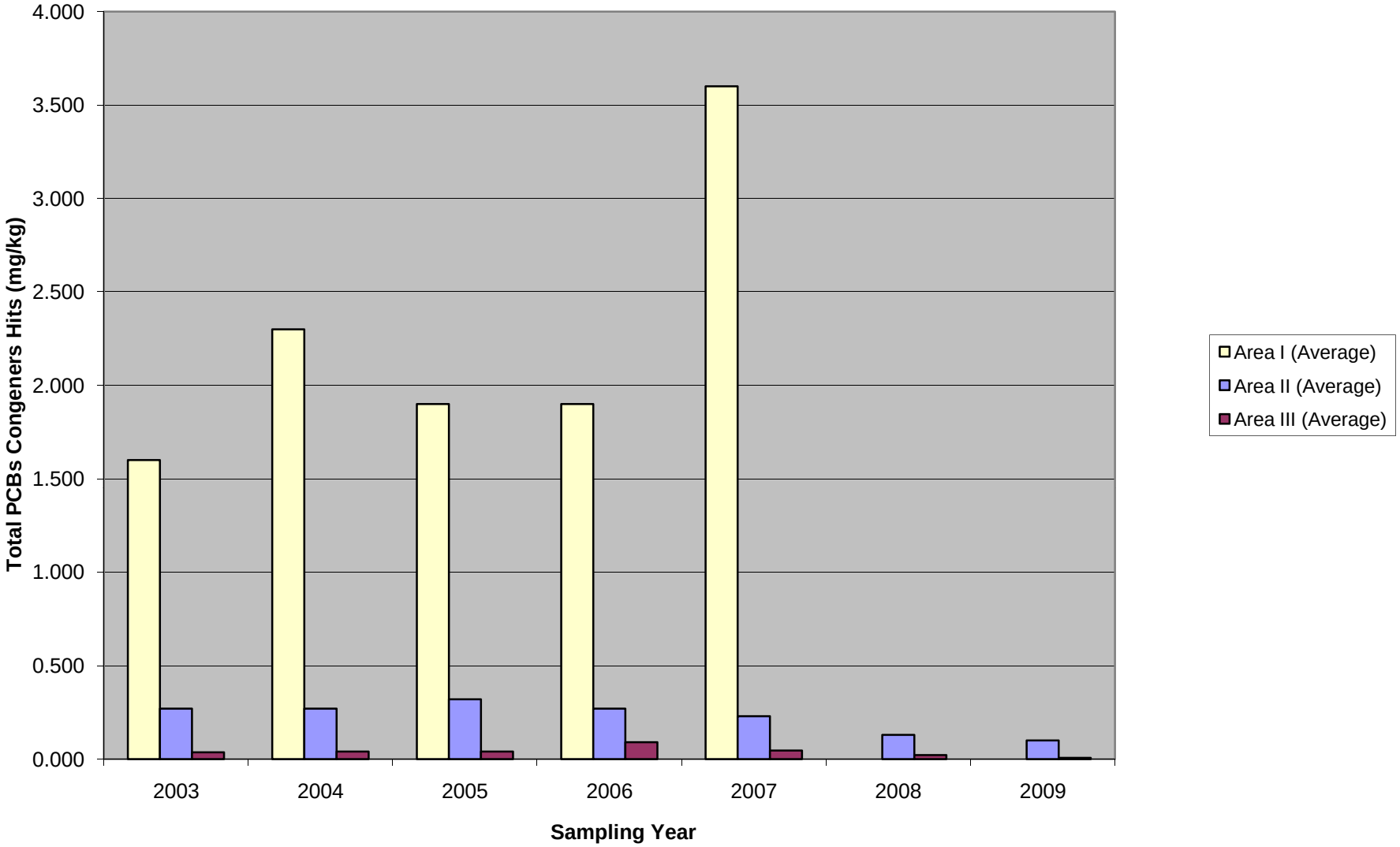
Figure 8-1
Scup



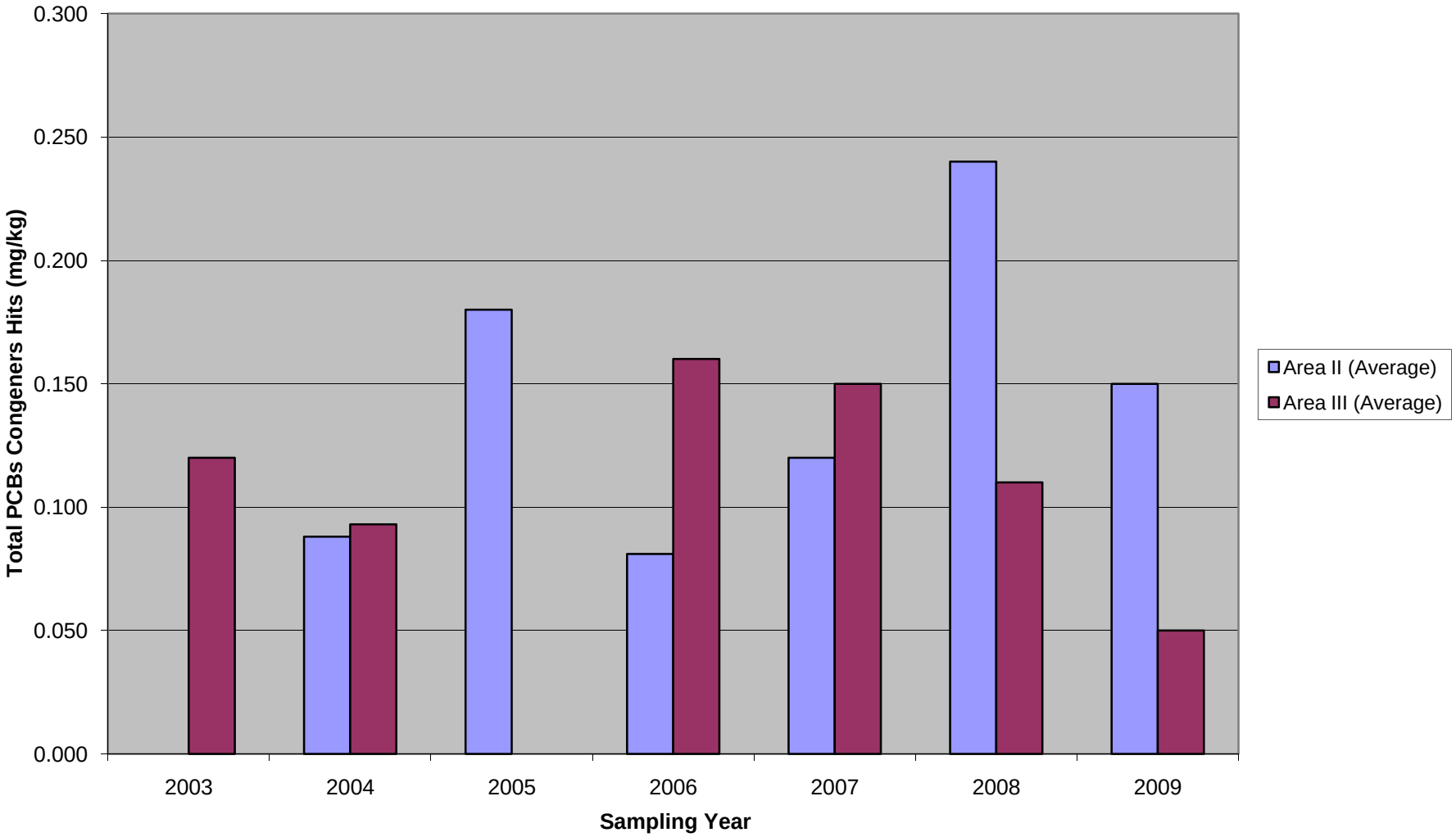
Note: Area I was not sampled

Figure 8-2
Quahog (Pre-Spawn)



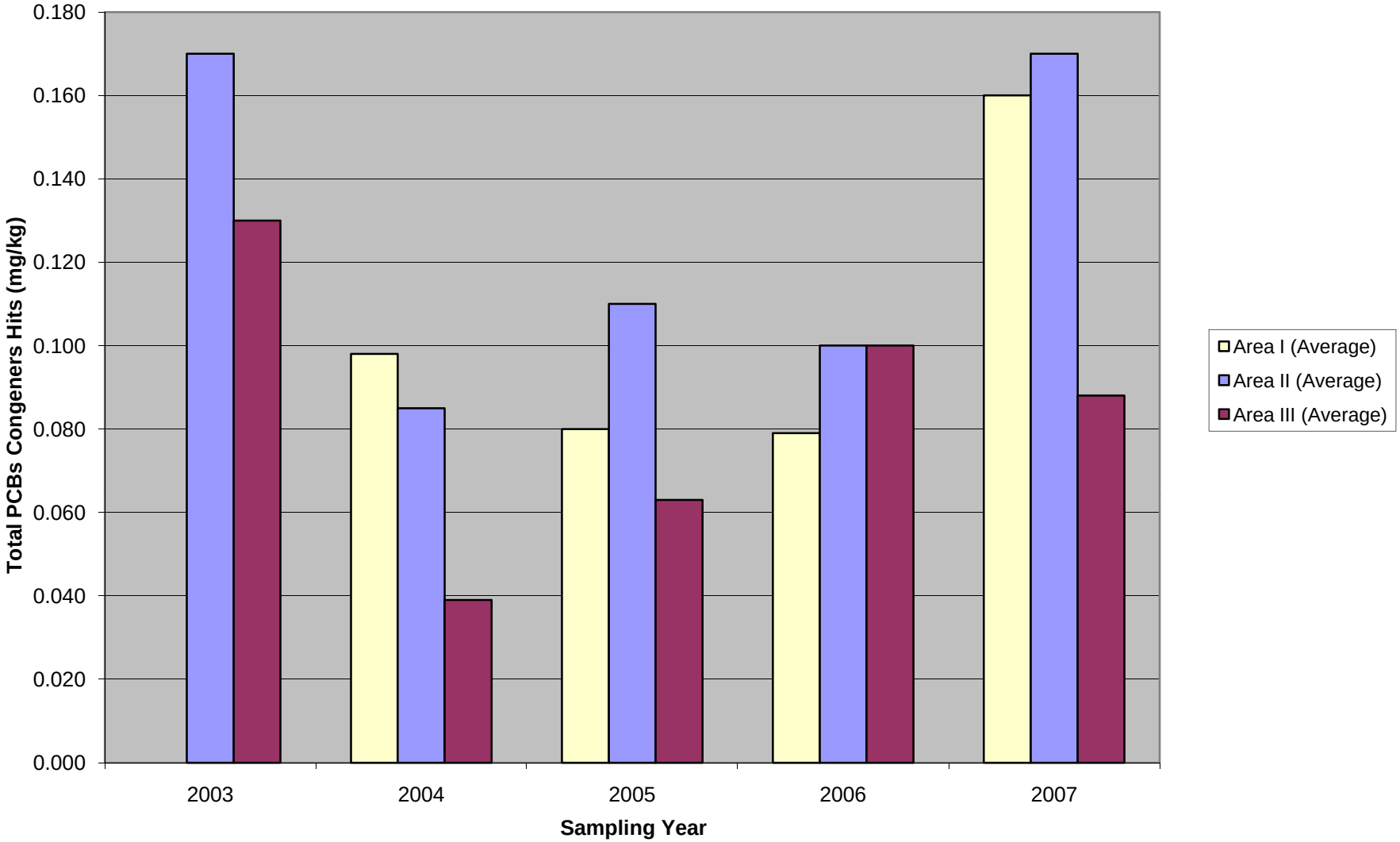
Note: Area I was not sampled after 2007

Figure 8-3
Blacksea Bass



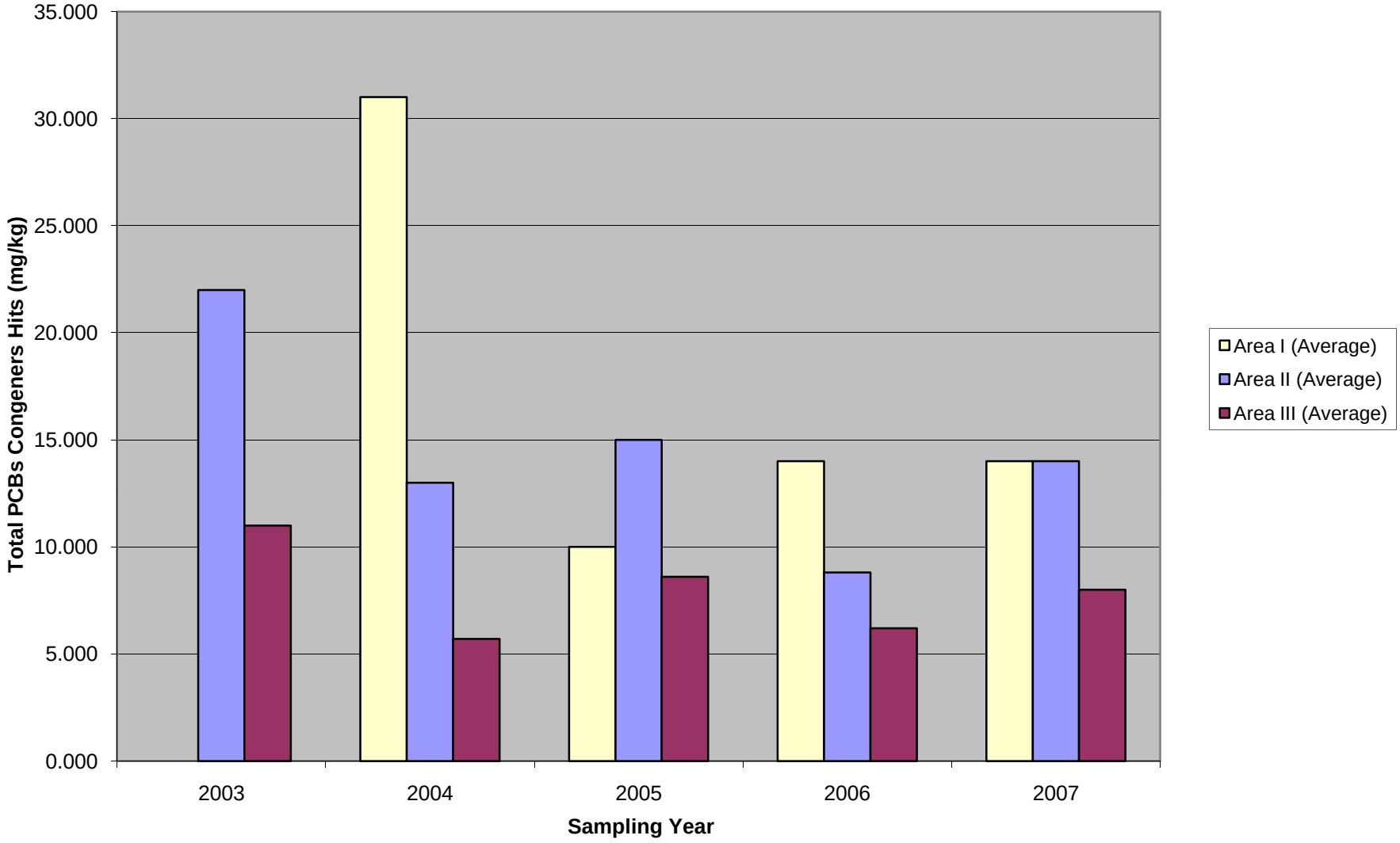
Note: Area I was not sampled

Figure 8-4
Lobster Meat



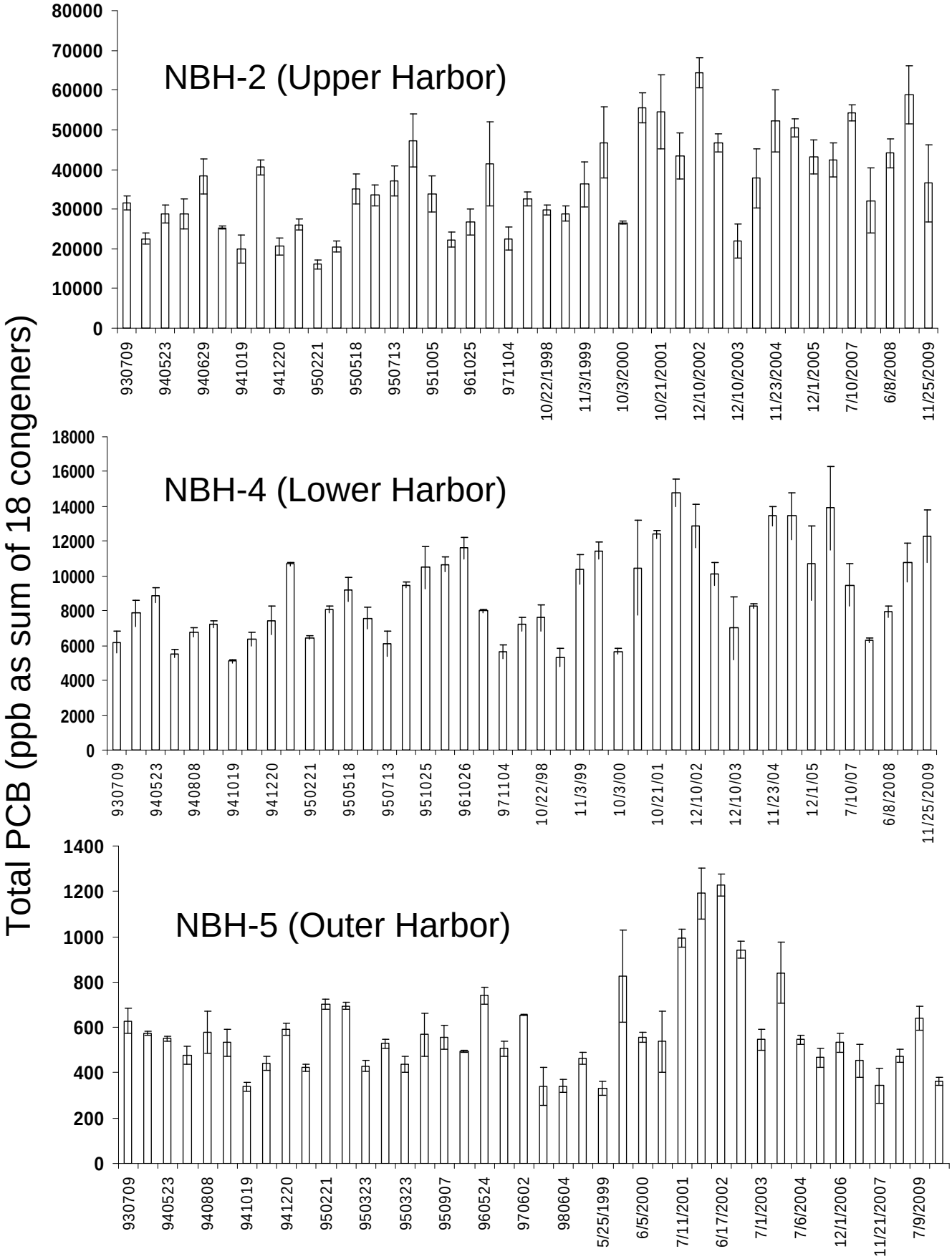
Note: Samples were not collected after 2007

Figure 8-5
Lobster Tomalley



Note: Samples were not collected after 2007

Figure 8-6: Blue Mussel PCB Bioaccumulation



APPENDIX A

PUBLIC NOTICE

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EPA Starts Second 'Five-Year Review' of New Bedford Harbor Superfund Site

The U.S. Environmental Protection Agency (EPA) is beginning its second Five-Year Review of the New Bedford Harbor Superfund Site, New Bedford, MA. Five-Year Reviews are required by law and occur every five years. The reviews determine if the cleanup is protective of human health and the environment. This Five-Year Review will be completed by Sept. 2010 and the results will be publicly available.

Sediment from the upper Acushnet River into Buzzards Bay is contaminated with PCBs. PCBs are man-made, odorless, and colorless chemicals that were used, before they were banned in 1977, in New Bedford in the manufacturing of electrical transformers and capacitors. Because fish, lobster and other seafood from New Bedford Harbor and the Acushnet River contain high levels of PCBs, a state ban on certain fishing, shellfishing and lobstering remains in effect.

The New Bedford Harbor Superfund Site cleanup plan calls for the dredging, dewatering and disposal of PCB-contaminated sediment at an off-site licensed landfill and in three shoreline confined disposal facilities. Dredging of the harbor began in fall 2004. More information about the harbor cleanup can be found on-line at http://www.epa.gov/ne/nbh or at the New Bedford Free Public Library, 613 Pleasant Street, New Bedford.

For more information, contact:
Kimberly White
Toll Free 1-888-372-7341, ext. 8-1752
white.kimberly@epa.gov
www.epa.gov/ne/nbh

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APPENDIX B

ANALYTICAL DATA

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APPENDIX B: ANALYTICAL DATA

AMBIENT AIR SAMPLING STATION LOCATIONS

TABLE G-1: AMBIENT AIR MONITORING PROGRAM - TOTAL DETECTABLE PCB HOMOLOGUES

PCB LEVELS IN TOP 2 CM OF SEDIMENT OVER TIME IN PPM

INCREASE IN BENTHIC COMMUNITY SINCE 1993

EMAP BENTHIC INDEX

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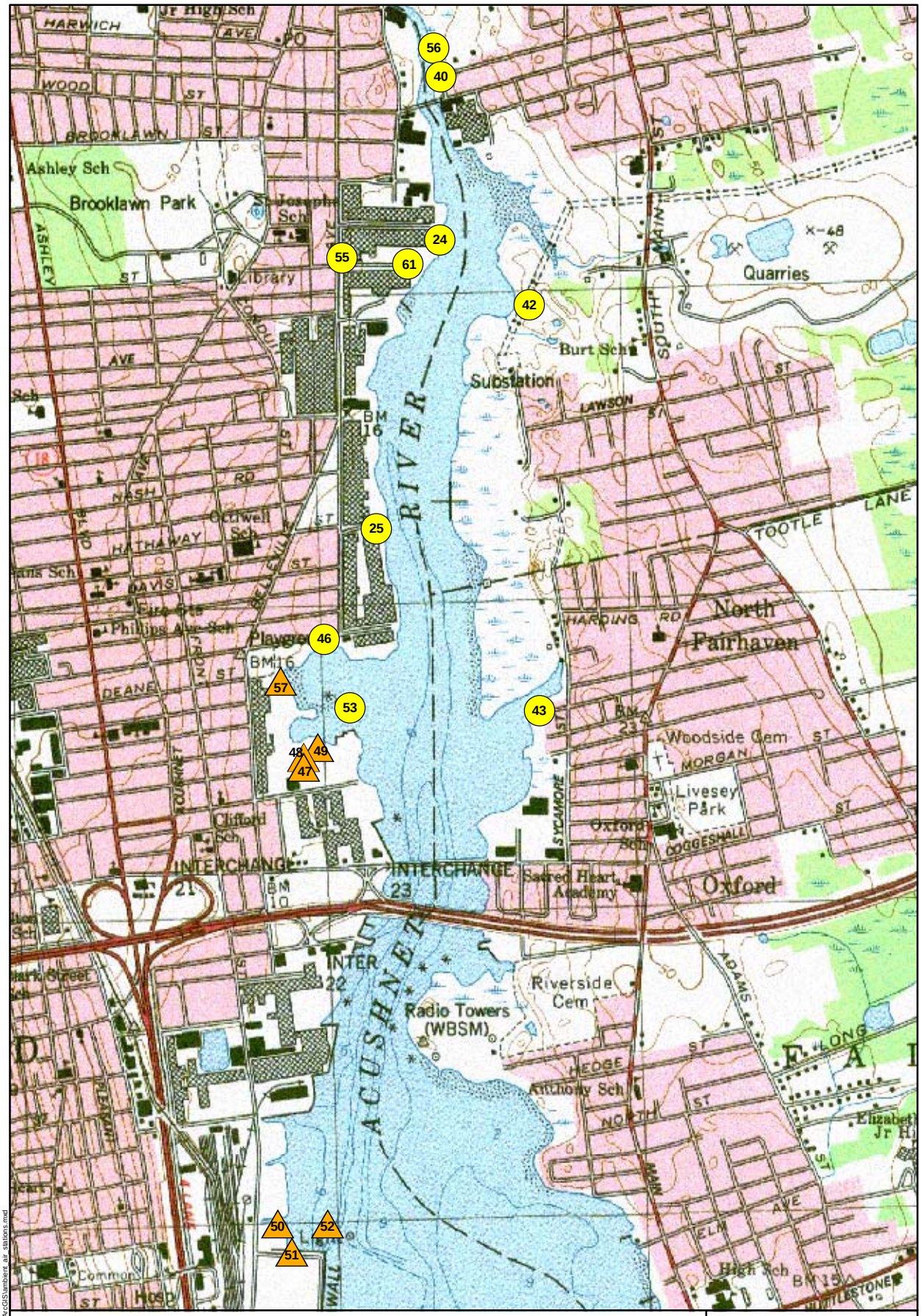


Legend

Ambient Air Sampling Locations

- Mobile Station
- Stationary Station

0 750 1,500 Feet

1:18,000

N

JACOBS

Ambient Air Sampling Station Locations

New Bedford Harbor Superfund Site

NAME: croberts DATE: 09/04/2008

Figure 1

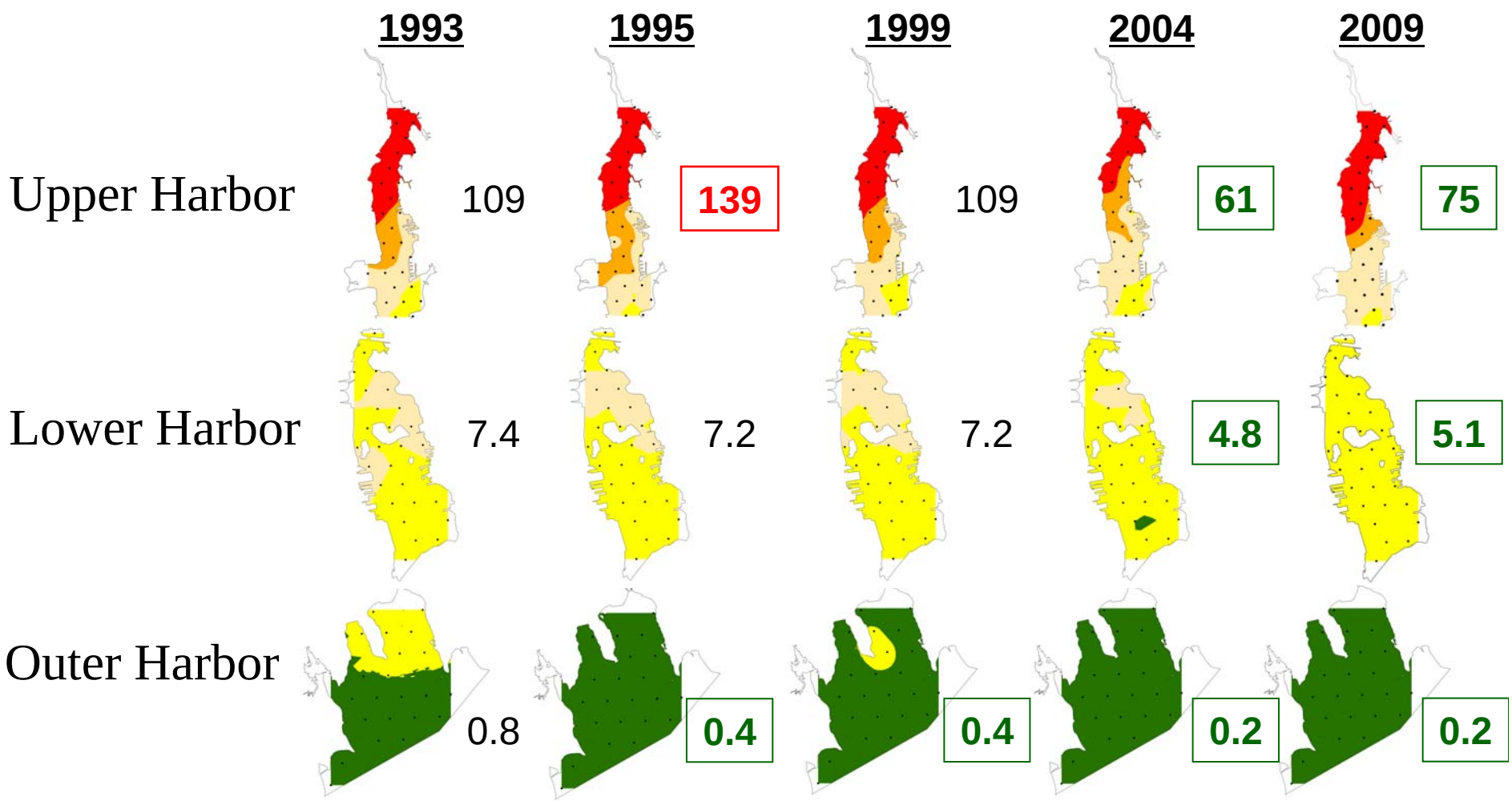
Y:\NBHP\Projects\3380\70\120\080904\ArcGIS\ambient_air_stations.mxd

Table G-1
Ambient Air Monitoring Program - Total Detectable PCB Homologues
New Bedford Harbor Superfund Site

Sampling Date	PCB Concentration (ng/m^3 in 24-hour time-weighted average)																	Activity Period
	24 Aerovox	25 Cliftex	42 NSTARN	43 Veranda	46 Coffin	47	48	49	50	51	52	53 Dredge	55 Aerovox West	56 Acushnet Park	57 Riverside Park	61 South Fence	62 Century House	
07/20/10	270	29	NS	26	47	NS	NS	79/73d	37.0	NS	NS	450	93	26	NS	NS	2.7	2010 Hydraulic Dredging.
06/30/10	120.0	7.3	0.0013	82.0	13	NS	NS	32	3.3	NS	NS	230	3.20	12.00	NS	NS	44/41d	2010 Hydraulic Dredging Resample of 6/23/10 locations. 06/23 samples were destroyed in shipment.
05/21/10	86	NS	0.042	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND/NDd	2010 pre-dredge samples.
12/16/2009	3.3	0.134	23.8	9.12	0.171	NS	NS	1.78	NS	0.184	NS	NS	0.372/0.353d	0.63	NS	NS	NA	After 2009 Dredge Operation
11/9/2009	45.2	20.4/31d	25.3	55.2	32.8	NS	NS	51.8	NS	2.92	NS	205.1	8.31	17.2	NS	NS	NA	2009 Hydraulic Dredging
10/14/2009	48.79	11.77	17.92	10.01	8.8/6.07d	NS	NS	13.26	NS	3.75	NS	0.13	10.00	2.62	NS	NS	NA	
9/17/2009	160	24	2.2	51	13	NS	NS	35	NS	42	NS	180	14	10/9.8d	NS	NS	NA	
8/13/2009	130	21	14	49	14	NS	NS	32	NS	31	NS	130	28/30d	20	NS	NS	NA	
7/13/2009	130	18	39	110	36	NS	NS	77/76d	NS	5.3	NS	290	7.4	6	NS	NS	NA	
6/16/2009	150	77	10	33	35	43	NS	NS	NS	32	NS	120	33	8.2	NS	NS	NA	
11/10/2008	NS	NS	NS	15	1.3	NS	NS	6.2	NS	0.020U	NS	NS	NS	NS	0.11	NS	NA	After 2008 Dredge Operation
10/7/2008	NS	NS	NS	NS	5.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NA	
9/24/2008	NS	NS	NS	18	NS	NS	NS	42	NS	NS	NS	1.5	NS	NS	15.0	NS	NA	
8/21/2008	NS	NS	NS	31.66	121.94	NS	NS	123.4/116.4d	NS	2.85	NS	178.0	NS	NS	37.46	NS	NA	2008 Hydraulic Dredging
7/16/2008	NS	NS	NS	NA	NS	NS	NS	NS	NS	NS	NS	NA	68.6	NS	NA	286.5	NA	2008 Land-based Excavation of Shoreline at Aerovox
7/8/2008	NS	NS	NS	NA	NS	NS	NS	NS	NS	NS	NS	NA	8.7	NS	NA	26.1	NA	
6/25/2008	NS	NS	NS	NA	NS	NS	NS	NS	NS	NS	NS	NA	5.52	NS	NA	NS	NA	
6/19/2008	NS	NS	NS	NA	NS	NS	NS	NS	NS	NS	NS	NA	8.9	NS	NA	NS	NA	
6/12/2008	NS	NS	NS	NA	NS	NS	NS	NS	NS	NS	NS	NA	7.3	NS	NA	43.1	NA	
6/8/2008	NS	NS	NS	NA	NS	NS	NS	NS	NS	NS	NS	NA	25.9	NS	NA	34.4	NA	
11/9/2007	19.7	20.2	15.7	NA	1.86	9.29	NS	NS	NS	4.39	NS	NA	NS	NS	NA	NA	NA	After 2007 Dredge Operation
9/18/2007	176	120	16.3	NA	21.4	57.1	NS	NS	48.7	NS	NS	130	NS	NS	NA	NA	NA	2007 Dredge Operation
8/21/2007	282	147	19.2	NA	36.1	46.9	NS	NS	36.7	NS	NS	138	NS	NS	NA	NA	NA	
11/19/2006	41.1	0.14	NS	NA	4.05	NS	NS	81.4	2.6	NS	NS	NA	NS	NS	NA	NA	NA	After 2006 Dredge Operation
10/6/2006	2,357	451	NS	NA	108	NS	NS	157	NS	NS	197	13430	NS	NS	NA	NA	NA	2006 Dredge Operation
8/31/2006	1,629	176	NS	NA	70.4	39.2	NS	NS	NS	67.3	NS	2336	NS	NS	NA	NA	NA	
12/29/2005	83.2	10.9	21.4	NA	65.1	7.4	NS	NS	NS	2.2	NS	NA	10.8	13.5	NA	NA	NA	After 2005 Dredge Operation
11/18/2005	15.9	0.1	63.6	NA	0.1	NS	0.1	3.7	NS	NS	NS	913.0	0.1	3.8	NA	NA	NA	2005 Dredging Operation
10/28/2005	15.4	NS	32.3	NA	2.1	NS	4.6	12.3	0.0	NS	NS	505.0	4.0	2.7	NA	NA	NA	
10/6/2005	1822.0	251.0	119.0	NA	130.0	NS	60.1	114.0	81.7	NS	NS	6315.0	222.0	180.0	NA	NA	NA	
9/29/2005	383.0	104.0	5.3	NA	124.0	NS	17.3	44.2	24.2	NS	NS	391.0	87.0	77.9	NA	NA	NA	
9/23/2005	178.0	35.2	83.3	NA	115.0	NS	19.1	97.0	0.3	NS	NS	780.0	2.6	23.9	NA	NA	NA	
9/15/2005	1490.0	58.2	22.5	NA	99.8	NS	14.9	83.6	0.5	NS	NS	1280.0	37.6	102.0	NA	NA	NA	
8/11/2005	216.0	103.0	25.9	NA	37.2	NS	NS	29.3	NS	NS	21.3	NA	42.1	49.9	NA	NA	NA	Before 2005 Dredge Operation
12/03/04	30	27	40	NA	15	22	NS	26	22	NS	31	NA	9.33	1.52	NA	NA	NA	After 2004 Dredge Operation
11/05/04	578	61	73	NA	80	NS	NS	28	NS	NS	NS	351	28.42	39.08	NA	NA	NA	2004 Dredging Operation
10/19/04	559	259	NS	NA	36	47	48	66	17	74	100	704	NS	NS	NA	NA	NA	
09/28/04	9557	423	NS	NA	342	35	165	207	80	75	115	2734	NS	NS	NA	NA	NA	
09/23/04	588	97	NS	NA	5	7	10	17	6	5	19	1212	NS	NS	NA	NA	NA	
09/14/04	1449	229	NS	NA	48	64	64	86	38	39	61	98	NS	NS	NA	NA	NA	Initial MU-2 Dredging During Startup
09/09/04	1024	167	NS	NA	145	28	37	56	20	16	47	723	NS	NS	NA	NA	NA	
06/29/04	2286	NS	NS	NA	NS	NS	NS	NS	NS	56	NS	NA	NS	NS	NA	NA	NA	No Dredging Activities.
March-May 2000	76	35	29	NA	35	61	61	61	6.8	6.8	6.8	NA	NS	NS	NA	NA	NA	No Dredging Activities. Data from Foster-Wheeler.
Dec 1999-Feb 2000	32	3.2	9.9	NA	3.2	89	89	89	3.4	3.4	3.4	NA	NS	NS	NA	NA	NA	
Sept-Nov 1999	67	22	24	NA	22	43	43	43	5.9	5.9	5.9	NA	5.2	5.2	NA	NA	NA	
June-August 1999	130	46	31	NA	46	33	33	33	12	12	12	NA	NS	NS	NA	NA	NA	

NA = not applicable
ng/m3 = nanograms per cubic meter of air
NS = not sampled
PCB = polychlorinated biphenyl

PCB levels in top 2 cm of sediment over time in ppm

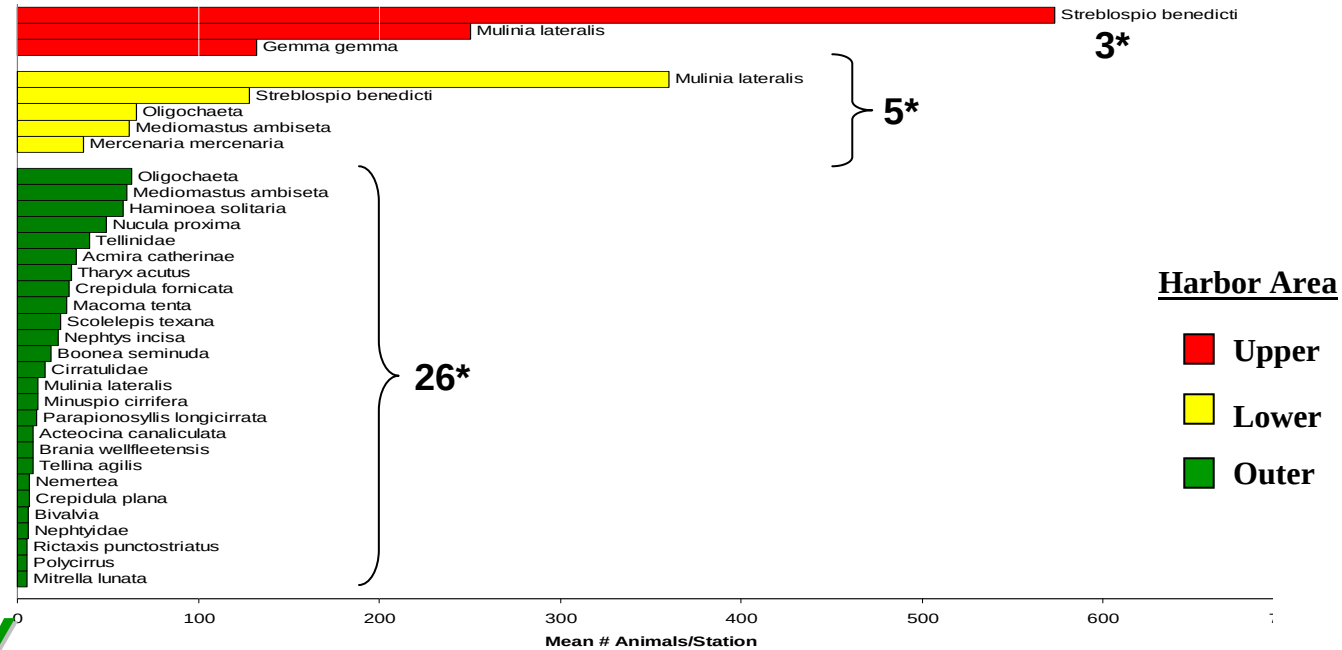


Contamination of lower harbor from upper harbor dredging has NOT been observed to date

United States Environmental Protection Agency

Increase in Benthic Community since 1993

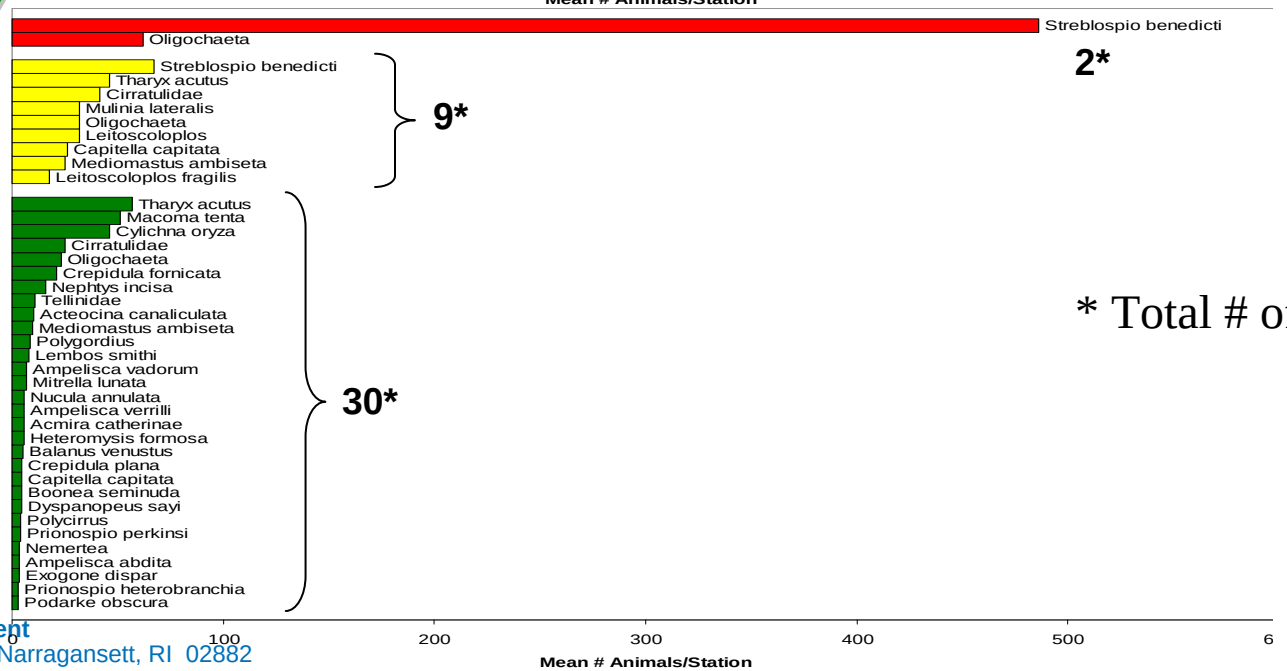
1993



Harbor Area

- Upper
- Lower
- Outer

2009



* Total # of species

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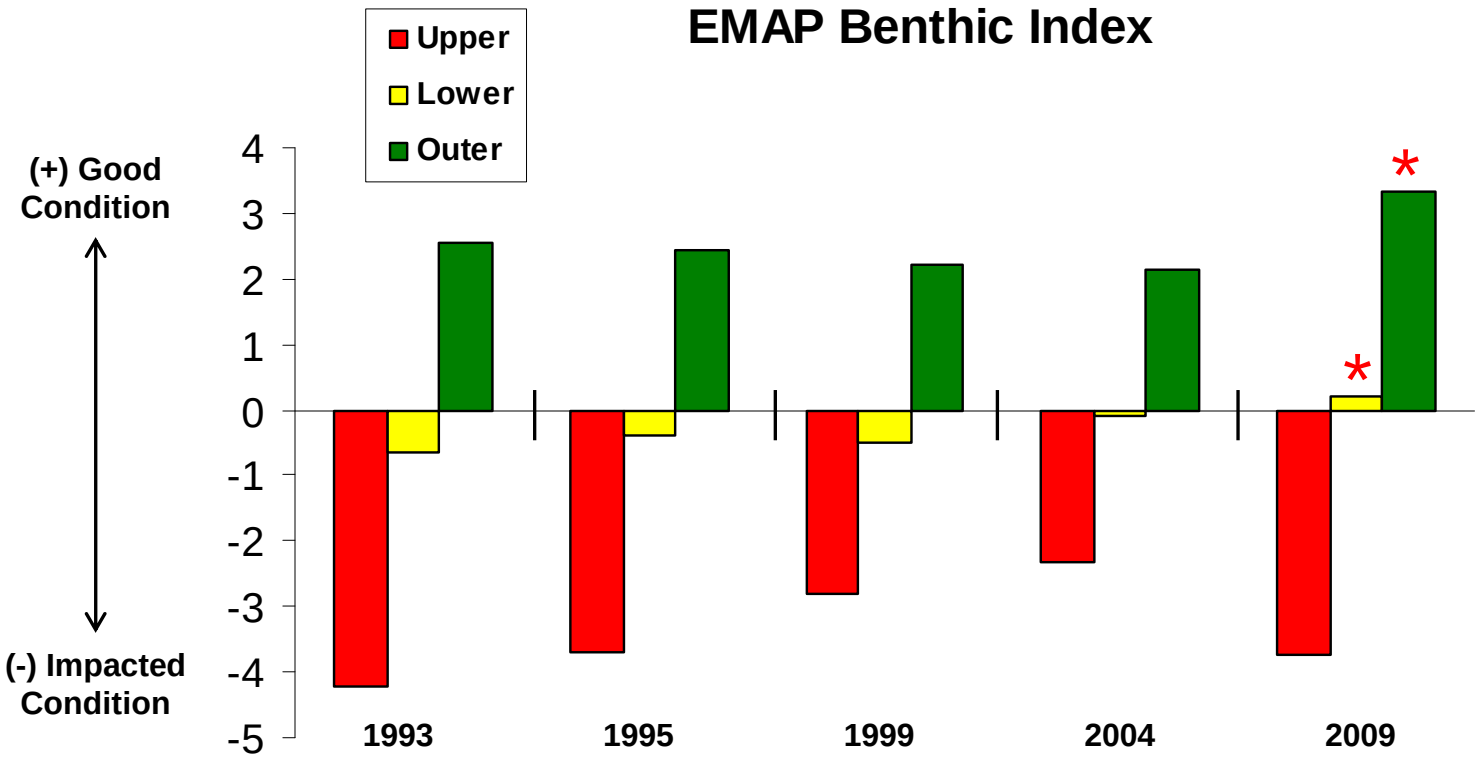
Benthic quality index indicates lower harbor quality improving since 1993



Other New England Coastal System Values:

1.6 Ipswich Bay, MA
0.9 Menemsha, MA
0.3 Pt Judith, RI

-0.1 Gloucester, MA

-1.5 Boston Harbor, MA
-1.5 NY/NJ Harbor
-2.0 New Haven, CT

-5.4 Providence, RI

Spatial Trends:

- *For each year, significant differences between Upper, Lower, and Outer Harbor*

Temporal Trends:

- *Significantly higher benthic condition in 2009 for the Lower and Outer Harbor compared to 1993*

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APPENDIX C

SITE INSPECTIONS AND PHOTOGRAPHS

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Five-Year Review
Site Inspection Checklist

New Bedford Harbor

I. SITE INFORMATION

Site Name: New Bedford Harbor

Location and Region: New Bedford, MA - Region 1 EPA ID: MAD980731335

Date of Inspection: 1/22, 7/9 & 7/15/10 Weather/temperature: Clear

Agency, office, or company leading the 5-year review: USEPA

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls
- ☒ Surface water collection and treatment
- ☒ Other: Confined Disposal Facility & Dredging of Sediments

Attachments: ☐ Inspection team roster attached ☒ Site map attached

II. INTERVIEWS

1. **O&M Site Manager** Paul Heureux | | 1/22/10
   Name | Title | Date

   Interviewed ☒ at site ☐ at office ☐ by phone Phone no.

   Problems, suggestions; Report attached Report not attched;

2. **O&M Staff** | | |
   Name | Title | Date

   Interviewed ☐ at site ☐ at office ☐ by phone Phone no.

   Problems, suggestions; Report attached

II. INTERVIEWS (cont'd)

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency MADEP

Contact	Joseph Coyne	NPL Site Manager	3/8/10	617-348-4066
	Name	Title	Date	Phone no.

Problems, suggestions; Report attached Report included in Appendix D of second 5YR (2010)

Agency New Bedford Harbor Development Commission

Contact	Kristin Decas	Executive Director	4/19/10	(508) 961-3000
	Name	Title	Date	Phone no.

Problems, suggestions; Report attached Report included in Appendix D of second 5YR (2010)

Agency The Coalition for Buzzards Bay

Contact	Mark Rasmussen	President	4/28/10	508-999-6363
	Name	Title	Date	Phone no.

Problems, suggestions; Report attached Report included in Appendix D of second 5YR (2010)

Agency

Contact				
	Name	Title	Date	Phone no.

Problems, suggestions; Report attached

4. **Other interviews** (optional) ☐ Reports attached.

Name of Personnel Title

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

☒ O&M manual:	☒ Readily available	☒ Up to date	☐ N/A
☒ As-built drawings:	☒ Readily available	☒ Up to date	☐ N/A
☒ Maintenance logs:	☒ Readily available	☒ Up to date	☐ N/A

Remarks

2. **Site-Specific Plans**

☒ Health and Safety Plan	☒ Readily available	☒ Up to date	☐ N/A
☒ Contingency plan/emergency response plan	☒ Readily available	☒ Up to date	☐ N/A
☒ Other:	☒ Readily available	☒ Up to date	☐ N/A

Remarks

3. **Training Records**

☐ O&M	☐ Readily available	☐ Up to date	☐ N/A
☐ OSHA	☐ Readily available	☐ Up to date	☐ N/A
☐ Other:	☐ Readily available	☐ Up to date	☐ N/A

Remarks Not inspected

4. **Permits and Service Agreements**

☒ Air discharge permit	☒ Readily available	☒ Up to date	☐ N/A
☒ Effluent discharge	☒ Readily available	☒ Up to date	☐ N/A
☒ Waste disposal, POTW	☒ Readily available	☒ Up to date	☐ N/A
☐ Dumpster for the City	☐ Readily available	☐ Up to date	☐ N/A
☐ Other:	☐ Readily available	☐ Up to date	☐ N/A

Remarks Documented in Site reports

5. **Gas Generation Records**

	☐ Readily available	☐ Up to date	☒ N/A

Remarks H2S has become an issue in the desanding building; no records were requested since it is considered a nusiance odor and not regulated under the air emission permits

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Cont'd)

6. **Settlement Monument Records**

☐ Readily available ☐ Up to date ☒ N/A

Remarks

7. **Groundwater Monitoring Records**

☒ Readily available ☐ Up to date ☐ N/A

Remarks As documented in Site reports

8. **Leachate Extraction Records**

☐ Readily available ☐ Up to date ☒ N/A

Remarks

9. **Discharge Compliance Records**

☒ Air	☒ Readily available	☒ Up to date	☐ N/A
☒ Water (effluent)	☒ Readily available	☒ Up to date	☐ N/A

Remarks As documented in Site reports

10. **Daily Access/Security Logs**

☒ Readily available ☒ Up to date ☐ N/A

Remarks

IV. OPERATION & MAINTENANCE COSTS

1. **O&M Organization**

☐ State in-house	☐ Contractor for State	☐ N/A
☐ PRP in-house	☐ Contractor for PRP	☐ N/A
☐ Federal Facility in-house	☐ Contractor for Federal Facility	☐ N/A

Other: _____

2. **O&M Cost Records**

☒ Readily available ☒ Up to date ☐ N/A
☒ Funding mechanism/agreement in place
☐ Original O&M cost estimate _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From	Date	to Date	Total Cost	☐ Breakdown attached
From	Date	to Date	Total Cost	☐ Breakdown attached
From	Date	to Date	Total Cost	☐ Breakdown attached
From	Date	to Date	Total Cost	☐ Breakdown attached

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS

☐ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged**

☐ Location shown on site map ☒ Gates secured ☐ N/A

Remarks Fencining inspected during July 9 & July 15 site visits; no damage or other breaches were observed

B. Other Access Restrictions

1. **Signs and other security measures**

☐ Location shown on site map ☐ N/A

Remarks

C. Institutional Controls (ICs)

Description :

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented	☐ Yes	☐ No	☐ N/A
Site conditions imply ICs not being fully enforced	☐ Yes	☐ No	☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by)

Frequency

Responsible party/agency

Contact

Name	Title	Date	Phone no.

Reporting is up-to-date	☐ Yes	☐ No	☐ N/A
Reports are verified by the lead agency	☐ Yes	☐ No	☐ N/A
Specific requirements in deed or decision documents have been met	☐ Yes	☐ No	☐ N/A
Violations have been reported	☐ Yes	☐ No	☐ N/A

Other problems or suggestions: ☐ Report attached

V. ACCESS AND INSTITUTIONAL CONTROLS (cont'd)

2. **Adequacy**

☐ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks _____

D. General

1. **Vandalism/trespassing**

☐ Location shown on site map ☐ No vandalism evident

Remarks _____

2. **Land use changes on site**

☐ Redevelopment ☐ N/A

Remarks _____

3. **Land use changes off site**

☐ N/A

Remarks _____

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☒ N/A

1. **Roads damaged**

☐ Location shown on site map ☐ Roads adequate ☒ N/A

Remarks _____

B. Other Site Conditions

Remarks _____

VII. LANDFILL COVERS

☐ Applicable ☐ N/A

A. Landfill Surface

1. **Settlement** (Low spots)

☐ Location shown on site map ☐ Settlement not evident

Areal extent _____ Depth _____

Remarks _____

2. **Cracks**

☐ Location shown on site map ☐ Settlement not evident

Length _____ Width _____ Depth _____

Remarks _____

3. **Erosion**

☐ Location shown on site map ☐ Settlement not evident

Areal extent _____ Depth _____

Remarks _____

4. **Holes**

☐ Location shown on site map ☐ Settlement not evident

Areal extent _____ Depth _____

Remarks _____

5. **Vegetative Cover**

☐ Grass ☐ Settlement not evident

Areal extent _____ Depth _____

Remarks _____

VII. Landfill Covers (cont'd)

6. **Alternative Cover (armored rock, concrete, etc.)**

☐ Additional Layer: Parking Lot

Remarks _____

7. **Bulges**

☐ Location shown on site map ☐ Bulges not evident

Areal extent _____ Height _____

Remarks _____

8. **Wet Areas/Water Damage**

☐ Wet areas/water damage not evident

☐ Wet areas	☐ Location shown on site map	Areal extent	_____
☐ Ponding	☐ Location shown on site map	Areal extent	_____
☐ Seeps	☐ Location shown on site map	Areal extent	_____
☐ Soft subgrade	☐ Location shown on site map	Areal extent	_____

Remarks _____

9. **Slope Instability**

☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability

Areal extent _____

Remarks _____

VII. Landfill Covers (cont'd)

B. Benches
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

☐ Applicable ☐ N/A

1. **Flows Bypass Bench**

☐ Location shown on site map ☐ N/A or okay

Remarks _____

2. **Bench Breached**

☐ Location shown on site map ☐ N/A or okay

Remarks _____

3. **Bench Overtopped**

☐ Location shown on site map ☐ N/A or okay

Remarks _____

C. Letdown Channels
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

☐ Applicable ☐ N/A

1. **Settlement**

☐ Location shown on site map ☐ No evidence of settlement

Areal extent _____ Depth _____

Remarks _____

VII. Landfill Covers (cont'd)

2. **Material Degradation**

☐ Location shown on site map ☐ No evidence of degradation

Material type _____ Areal extent _____

Remarks _____

3. **Erosion**

☐ Location shown on site map ☐ No evidence of erosion

Areal extent _____ Depth _____

Remarks _____

4. **Undercutting**

☐ Location shown on site map ☐ No evidence of undercutting

Areal extent _____ Depth _____

Remarks _____

5. **Obstructions** Type _____

☐ No obstructions

☐ Location shown on site map Areal extent _____

Size _____

Remarks _____

6. **Excessive Vegetative Growth** Type _____

☐ No evidence of excessive growth

☐ Vegetation in channels does not obstruct flow

☐ Location shown on site map Areal extent _____

Remarks _____

VII. Landfill Covers (cont'd)

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled
☐ Good condition ☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A

Remarks _____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled
☐ Good condition ☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A

Remarks _____

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Evidence of leakage at penetration ☐ Routinely sampled
☐ Good condition ☐ Needs Maintenance ☐ N/A

Remarks _____

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Evidence of leakage at penetration ☐ Routinely sampled
☐ Good condition ☐ Needs Maintenance ☐ N/A

Remarks _____

5. **Settlement Monuments**
☐ Located ☐ Routinely surveyed ☐ N/A

Remarks _____

VII. Landfill Covers (cont'd)

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
☐ Good condition ☐ Needs Maintenance

Remarks _____

2. **Gas Collection Wells, Manifolds and Piping**

☐ Good condition ☐ Needs Maintenance

Remarks _____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs Maintenance ☐ N/A

Remarks _____

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A

Remarks _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A

Remarks _____

VII. Landfill Covers (cont'd)

G. Detention/Sedimentation Ponds ☐ Applicable ☐ N/A

1. **Siltation**
   Areal extent _____ Depth _____ ☐ N/A
   ☐ Siltation not evident
   Remarks _____

2. **Erosion**
   Areal extent _____ Depth _____
   ☐ Erosion not evident
   Remarks _____

3. **Outlet Works** ☐ Functioning ☐ N/A
   Remarks _____

4. **Dams** ☐ Functioning ☐ N/A
   Remarks _____

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
   Horizontal displacement _____ Vertical displacement _____
   Rotational displacement _____
   Remarks _____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
   Remarks _____

VII. Landfill Covers (cont'd)

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
   Areal extent _____ Depth _____
   Remarks _____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
   ☐ Vegetation does not impede flow
   Areal extent _____ Depth _____
   Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent _____ Depth _____
   Remarks _____

4. **Discharge Structure** ☐ Functioning ☐ N/A
   Remarks _____

VIII. VERTICAL BARRIER WALLS

☐ Applicable ☐ N/A

1. **Settlement**

☐ Location shown on site map ☐ Settlement not evident

Areal extent _____ Depth _____

Remarks _____

2. **Performance Monitoring**

Type of monitoring _____

☐ Performance not monitored

Frequency _____ ☐ Evidence of breaching

Head differential _____

Remarks _____

IX. GROUNDWATER/SURFACE WATER REMEDIES

☐ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☐ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**

☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A

Remarks _____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks _____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks _____

IX. GROUNDWATER/SURFACE WATER REMEDIES (cont'd)

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☐ N/A

1. **Collection Structures, Pumps, and Electrical**

☐ Good condition ☐ Needs Maintenance

Remarks _____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks _____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks _____

C. Treatment System ☐ Applicable ☐ N/A _____

1. **Treatment Train (Check components that apply)**

☐ Metals removal ☐ Oil/water separation: _____ ☐ Bioremediation
☐ Air stripping ☐ Carbon adsorbers:
☐ Filters _____
☐ Additive (*e.g.*, chelation agent, flocculent) _____
☐ Others _____
☐ Good condition ☐ Needs Maintenance
☐ Sampling ports properly marked and functional
☐ Sampling/maintenance log displayed and up to date
☐ Equipment properly identified

Quantity of groundwater treated annually _____

Quantity of surface water treated annually _____

Remarks _____

IX. GROUNDWATER/SURFACE WATER REMEDIES (cont'd)

2. **Electrical Enclosures and Panels** (properly rated and functional

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks _____

3. **Tanks, Vaults, Storage Vessels**

☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance

Remarks _____

4. **Discharge Structure and Appurtenances**

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks _____

5. **Treatment Building(s)**

☐ N/A ☐ Good condition ☐ Needs repair

Remarks _____

6. **Monitoring Wells** (pump and treatment remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks _____

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks _____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

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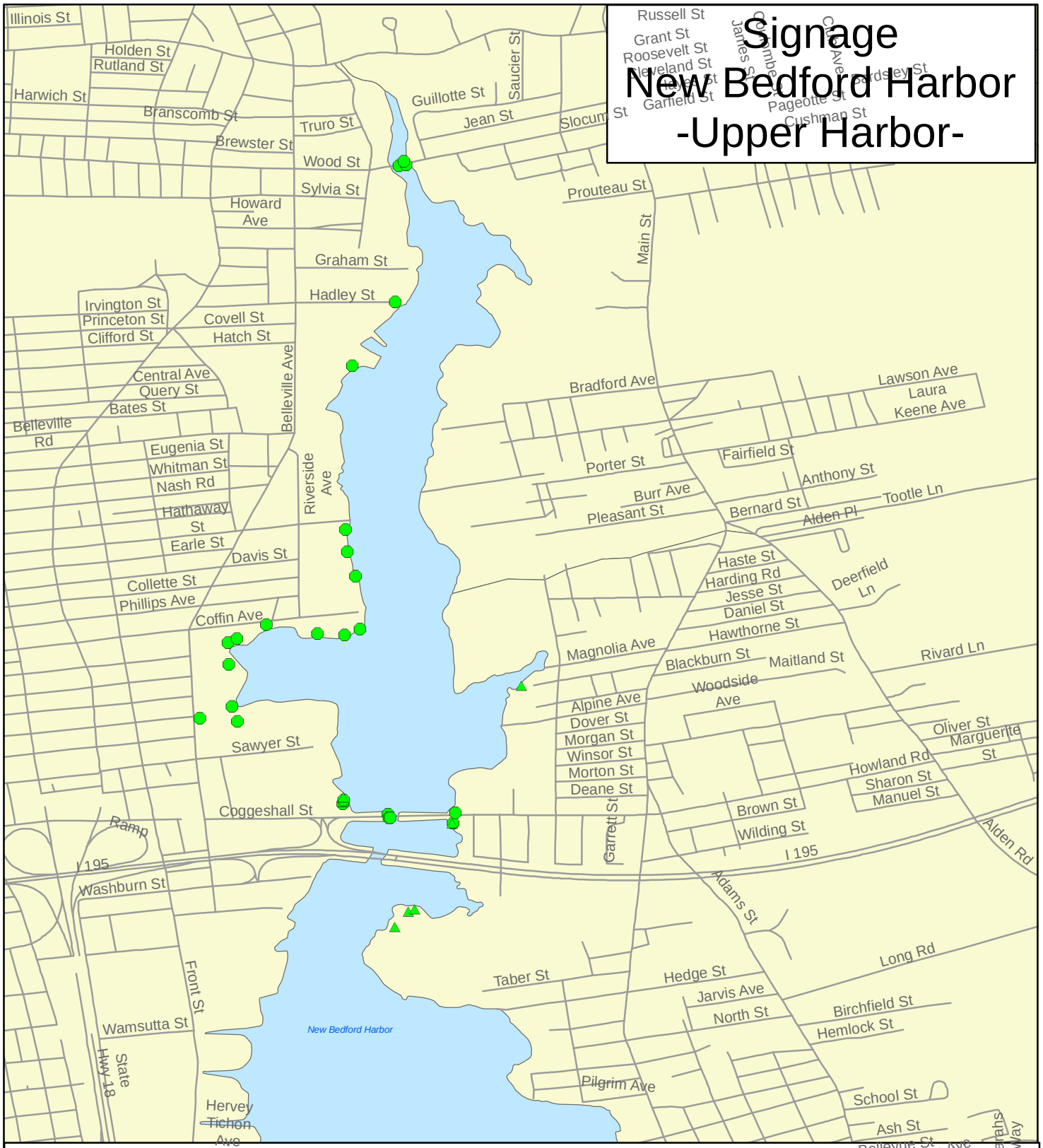
Signage
New Bedford Harbor
-Upper Harbor-



Created by the US EPA Region 1 GIS Center.
Map Tracker ID: 7136

Signage
New Bedford Harbor
-Lower Harbor-

Sign Condition

- Good Condition
- Missing

Sign Type

- Catch & Release
- Kiosk
- No Fishing
- PCB Contaminated Sed

0 0.1 0.2 0.3 0.4 0.5 Miles

Created by the US EPA Region 1 GIS Center.
Map Tracker ID: 7136

NEW BEDFORD HARBOR SUPERFUND SITE
FIVE YEAR REVIEW INSPECTION PHOTO LOG

Photo 1: Catch and Release sign along Rodney French Blvd, along beach area of the Lower Harbor

Photo 2: No Fishing sign in the upper harbor

Photo 3: PCB contaminated sediments warning sign

Photo 4: No Wading, fishing, shellfishing warning sign

Photo 5: No Fishing Signs on Wood Street Bridge

Photo 6: Catch and Release Signage at entrance of a beach area in the lower harbor

Photo 7: Kiosk with Seafood Advisory Signage

Photo 8: Closer view of signage in Kiosk

Photo 9: Pilot CDF Area

Photo 10: Desanding Operations

Photo 11: Booster Pump area

Photo 12: Mechanical Dredging to remove large debris from dredging area

Photo 13: Barge used for hydraulic dredging operations and monitoring activities

Photo 14: Fencing along shoreline

Photo 15: Wide view of dredging operations

Photo 16: Oil Boom on water surfaces surrounding dredging area

Lessons Learned
New Bedford Harbor Superfund Project - 2009 Season

Operation	Activity	Conclusions and Recommendations
Dredging and Associated Activities		
Air Filtration System	Air sampling	**Conclusion -** Previous air sampling port was located on top of carbon vessel. This location was easy to install but required fall protection to sample. **Recommendation -** Re-plumbing sample port will allow sampling from the ground and eliminate the fall hazard during sampling.
Booster Pump Operation	Grinder operation	**Conclusion -** Depending on the type of material to be dredged it is sometimes desirous to bypass the grinder at booster stations. Material types that are not rapidly size reduced and passed through the grinder will back up and clog at the grinder inlet. **Recommendation -** Running the dredge pipeline straight through the booster pump with an upstream optional bypass through a grinder will allow crews to quickly select the most efficient option.
Booster Pump Operation	Removing clogs	**Conclusion -** Cleanout boxes upstream of inline grinder required removing 12 bolts to open and a gasket to seat. Grinder also has a cleanout. **Recommendation -** Removing cleanout box allowed simpler removal of obstructions at grinder inlet thereby reducing dredge downtime.
Dredging	Production maintenance	**Conclusion -** During routine dredging at times crews encountered pockets or areas of high VOC, high H2S, oils or waxes, and gravel or shells. The high VOC and high H2S areas caused elevated levels of potentially toxic gases in the desanding building. Heavy amounts of oils or waxes will blind off filter press cloths causing increased cycle times. Heavy amounts of shells or gravel may clog a pipeline if dredged aggressively. **Recommendation -** When any of the above mentioned conditions are found to affect dredging, alternating between dredge areas allows material to be flushed or diluted during transfer and processing, decreasing downtime and maintenance.
Water Based Activities	Oil boom disposal	**Conclusion -** During removal and disposal of used oil boom, the boom at times tears and falls apart. Recovering the torn boom requires hand nets or rakes and is a time consuming process. **Recommendation -** Pulling the boom up on the deck of the debris barge to drain then bagging in heavy poly trash bags keep the boom intact during the disposal process. This practice saves time and keeps the work site cleaner.

Source: 2009 DREDGE SEASON DATA SUBMITTAL, USACE, April 2010

Lessons Learned
New Bedford Harbor Superfund Project - 2009 Season

Operation	Activity	Conclusions and Recommendations
Debris Removal	Recovering potentially historically significant artifacts	**Conclusion -** In the early discovery and recovery stages of the 2009 sunken vessel discovery some wood parts were brought onshore for storage. Crews were not aware of how to properly store recovered artifacts and some degraded to a condition not useful to an archaeologist. **Recommendation -** A basic procedure for storing potentially historically significant artifacts until an archeologist is consulted would prevent loss of such items.
Area D Operations		
Water Treatment	Transferring water to effluent equalization tank	**Conclusion -** If the water level in the equalization tank is kept high the water does not have the chance to aerate as it falls to the tank, resulting in a low dissolved oxygen condition. **Recommendation** - Setting the water level switch lower allows proper effluent aeration and increases dissolved oxygen levels.

Source: 2009 DREDGE SEASON DATA SUBMITTAL, USACE, April 2010

APPENDIX D

INTERVIEWS

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INTERVIEW RECORD

Site Name: New Bedford Harbor		**EPA ID No.:** MAD980731335	
Subject: Five Year Review - State and Local Considerations		**Time:** 3:25 pm	**Date:** 3/8/10
Type: ☒ Telephone ☒ E-mail ☐ Other ☐ Visit **Location of Visit:**		☐ Incoming ☒ Outgoing	

Contact Made By:

Name: Kimberly White	**Title:** RPM	**Organization:** EPA

Individual Contacted:

Name: Joseph Coyne	**Title:**	**Organization:** MassDEP

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Fax No:	**City, State, Zip:** Boston, Massachusetts 02110

E-Mail Address: Joseph.Coyne@State.MA.US

Summary of Conversation

1. **What is your overall impression of the project? (general sentiment)**

This is a very large but well coordinated field event.

2. **Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.**

Yes there weekly update meetings and monthly site meetings and if needed site walkovers to update the project.

3. **Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.**

No.

4. **Do you feel well informed about the site's activities and progress?**

Yes.

5. **Do you have any comments, suggestions, or recommendations regarding the site's management or operation?**

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INTERVIEW RECORD

Site Name: New Bedford Harbor		**EPA ID No.:** MAD980731335	
Subject: Five Year Review - State and Local Considerations		**Time:**	**Date:** 4/19/2010
Type: ☐ Telephone ☒ E-mail ☐ Other ☐ Visit **Location of Visit:**		☐ Incoming ☒ Outgoing	

Contact Made By:

Name: Kimberly White	**Title:** RPM	**Organization:** EPA

Individual Contacted:

Name: Kristin Decas	**Title:** Executive Director	**Organization:** New Bedford Harbor Development Commission

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Fax No: (508) 979-1517	**City, State, Zip:** New Bedford, MA 02740

E-Mail Address: kristin.decas@newbedford-ma.gov

Summary of Conversation

1. What is your overall impression of the project? (general sentiment)

We would first like to commend EPA and their cleanup partner, the US Army Corps of Engineers (USACE), for advancing the cleanup of the worst of the PCB contaminated sediments in the Harbor. The City is happy to see real cleanup progress occuring after over 20-years of study. The HDC and the City are also appreciative the EPA has extended the cleanup Remedy to the Navigational portions of the Harbor via the State Enhanced Remedy (SER), allowing the City of New Bedford, the Town of Fairhaven, and the State of MA to complete critical navigational infrastructure projects(while simultaneously removing contaminated sediments from the environment) in an expeditious and efficient manner. The HDC and the City recognize that without the benefits the SER process brings to the maintenance of the Port's infrastructure, the Port would be unable to maintain its waterway, and maritime commerce (the life-blood of the City) would suffer. The HDC would also like to commend the EPA and the USACE on it's Health and Safety record and the level of professionalism that the staff working on the project have exhibited to date. We have witnessed that professionalism in the public meetings that the EPA has held through the years, where the EPA and the USACE have explained to a concerned public the details of the Remedy in a manner that the public can grasp.

The Harbor is the life-blood of the community. The population is dependant upon the Harbor. It is the focus of much of the business that supports the area, and also plays a central role in recreation and tourism for the community. The Remedy is having a positive effect on the environment of the Harbor. However, ,the clean-up is a slow, expensive, and complicated process. - For the clean-up to be truly successful, we believe that the ROD/Remedy needs to take into account all the needs of the community: environmental; health and safety; and economic. We understand that the implementation of a Remedy in such a contaminated environment is challenging and requires adherence to processes and procedures that are developed to protect the Superfund workers and the Public. At the same time, we encourage EPA, as part of it's implementation of the Remedy, to be flexible and forward thinking, taking into account all the needs of the community. One concrete example of such forward thinking would be the approval of the MassDEP Remedy Enhancement extension request currently before EPA for it's consideration. Approval of the MassDEP request as originally submitted would provide the State, the Town, the City, and the Community with a process that will allow for critical infrastructure maintenance activities as well as improve the efficiency and effectiveness of the Enhancement to the Remedy, resulting in a cleaner

Harbor (Confined Disposal Facilities).

The HDC is also pleased to see EPA working to expedite it's Remedy through the use of CAD Cells for disposal of some Superfund materials. The City and the HDC support this initiative, which will reduce the cost of the overall remedy and shorten the cleanup timeframe from 40+ years to as little as 18 years. The HDC supports the EPA ESD process that will allow the use of CAD Cells for Superfund material, and urges the EPA to move the ESD forward as quickly as possible in order to expedite the overall Remedy and return the Harbor to maximum productive use as quickly as possible. Ideally, for the Superfund CAD Cell project to mesh with planned Navigational Infrastructure projects (to the benefit of both), the ESD process would be completed by June or July of this year (2010), allowing the design of a CAD to support Superfund material to begin this summer.

We appreciate the efforts that the EPA and USACE are undertaking to advance the Superfund Remedy, and call on the EPA and USACE to embrace and enthusiastically support efforts by all stakeholders in the Harbor to improve the quality of life for the community. In the short term, we would like to see the EPA's support for upcoming projects such as the development of the Crew Course in the Upper Harbor and the redevelopment of South Terminal in the Lower Harbor, and also for medium-term redevelopment efforts such as the North Terminal and Popes Island CDF Developments, redevelopment efforts planned on the Fairhaven portions of the Harbor, as well as for continued support for Harbor Navigational Dredge projects as well as related shoreline infrastructure projects that support the State Enhanced Remedy cleanup and overall value of the Harbor for the residents and users in the community.

2. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.

Yes, regular coordination meetings are held monthly (and more often as necessary) with the Mayors office and project Stakeholders to update the parties to EPA's progress. The EPA holds monthly community meetings in the evenings to brief the community on progress. In addition, the SER committee meets once per month to discuss elements of the Remedy that pertian to SER projects, and EPA has been an active participant and stakeholder in that process (and thus far has not missed an SER meeting). The HDC and the City are grateful for EPA's participation in these forums, and wishes to encourage the EPA to continue the dialogue as all stakeholders move forward with the ultimate goal of cleaning up the Harbor and resotring full utility of the watershed to the residents and users of the Harbor.

3. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.

Yes, there have been questions from the public as to the effectiveness and safety of the Remedy implementation. The HDC believes that the EPA and the USACE have done a very good job in responding to these questions with clear and concise information. We believe tha the EPA is actively addressing the questions and comments from the public concerning the safety of the Remedy implementation. The EPA holds regular public meetings in the City that are well attended by members of the public. The EPA encourages the participation of the public in the process, and endeavors to supply prompt responses to comments. Concerns have revolved around local employment and air quality.

Specific instance: the case of a leaking pipeline (used by the EPA project to transfer dredged materials to the dewatering plant). Once the EPA and USACE became aware of the leak, they acted very quickly, shutting down operations and repairing the leak in an expeditious manner. An assessment of damage was conducted by the EPA and USACE and mitigation measures were instituted immediately.

4. Do you feel well informed about the site's activities and progress?

Yes. There is active and frequent communication between the HDC, the City, the Town, and the EPA (see #2 above). The HDC is pleased to see that the EPA is evaluating methods to expedite the cleanup process, as one complaint that City and Town stakeholders have is that the Remedy is taking too long.

5. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

See General Comments Above. The HDC and the City support any and all efforts to expedite the cleanup process. This includes support for the EPA's ESD currently in progress (to use CAD Cells). The HDC and the City also request that the EPA support the efforts by MassDEP to expedite and enhance the Enhancement to the Remedy by approving and incorporating the provisions requested in the MassDEP's Enhancement request of January (this year) into the overall Remedy as quickly as possible. In particular, the City requests that the EPA expedite it's acceptance of the South Terminal CDF' inclusion into the SER process, so that work on that critical project can begin immediately.

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INTERVIEW RECORD

Site Name: New Bedford Harbor		**EPA ID No.:** MAD980731335	
Subject: Five Year Review - Background Information		**Time:**	**Date:**
Type: ☐ Telephone ☒ E-mail ☐ Other ☐ Visit **Location of Visit:**		☐ Incoming ☐ Outgoing	

Contact Made By:

Name: Kimberly White	**Title:** RPM	**Organization:** USEPA

Individual Contacted:

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E-Mail Address: rasmussen@savebuzzardsbay.org

Summary of Conversation

1. What is your overall impression of the project? (general sentiment)

It's not adequately funded and the timeline for cleanup (30+ years) is unacceptable.

2. What effects have site operations had on the surrounding community?

They continue to prevent the community from using and enjoying the Acushnet River and hinder waterfront economic development.

3. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.

Yes. People are very frustrated by the delays in cleanup.

4. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

No.

5. Do you feel well informed about the site's activities and progress?

Yes. I get answers from EPA staff when needed.

6. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

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APPENDIX E

NEW SEAFOOD ADVISORY

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SUPERFUND

UPDATE ON FISH/SHELLFISH TESTING

New Bedford Harbor New Bedford, MA

U.S. EPA | HAZARDOUS WASTE PROGRAM AT EPA NEW ENGLAND

THE SUPERFUND PROGRAM *protects human health and the environment by investigating and cleaning up often-abandoned hazardous waste sites and engaging communities throughout the process. Many of these sites are complex and need long-term cleanup actions. Those responsible for contamination are held liable for cleanup costs. EPA strives to return previously contaminated land and groundwater to productive use.*

SITE DESCRIPTION:

The U.S. EPA has been committed to the New Bedford Harbor (NBH) cleanup since the 1980s, following discovery of polychlorinated biphenyls (PCBs) in sediment and fish and designation to the national priority list of Superfund sites in 1983. In 1998, EPA proposed a dredging remedy for the Upper and Lower harbors, and full scale dredging started in 2004. Remediation is ongoing, with dredging typically occurring in the summer. In 2009, EPA Administrator Lisa Jackson announced the availability of recovery act funds to help speed up the current cleanup timeframe for the harbor cleanup.

PARTNERING

As part of the NBH site monitoring, the Massachusetts Department of Environmental Protection has conducted annual fish and shellfish sampling to determine whether PCB concentrations in NBH fish and shellfish are declining as a result of cleanup activities. In general, PCB concentrations have indeed decreased from the 1980s to the present in most species, although concerns remain as discussed herein. Fish and shellfish sampling will continue throughout the cleanup efforts, and updates to this fact sheet will be issued as appropriate.

ASSESSMENT

The Massachusetts Department of Public Health (MDPH) has also had extensive involvement with NBH in order to address a variety of health concerns. In 1979, MDPH promulgated state regulations prohibiting the consumption of any fish/shellfish in Area 1 of NBH; of bottom feeding fish (eel, scup, flounder, and tautog) or lobster in Area 2; and lobster in Area 3 (see attached map). These early efforts were followed by human epidemiological studies of PCB exposure via fish consumption by MDPH and others. MDPH has additional advice for sensitive populations (pregnant women, nursing mothers, children under age 12, women who may become pregnant) that can be found at www.mass.gov/dph/fishadvisories. EPA supports this additional advice, and notes that its updated risk assessment (discussed below) recommends that sensitive populations avoid fish, shellfish and lobster from the three closure areas in NBH (see map on reverse) except that shellfish from Area 3 and Clark's cove may safely be consumed by these sensitive populations if limited to one meal per month.

RECOMMENDATIONS

As part of the Superfund process, EPA is required to conduct risk assessments that will result in cleanup levels that the selected remedy for a given site must meet. These risk assessments use conservative (health-protective) assumptions to ensure that even sensitive populations will not have health concerns following completion of remediation activities. In the case of NBH and the risk assessment conducted on fish/shellfish in the closed areas of the harbor, EPA's updated evaluation indicates that some species not currently covered by the 1979 state regulations may present health concerns for recreational fishermen and shell fishermen (and/or their families/friends who consume their take) if these species are consumed in larger quantities than current epidemiological data

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LEARN MORE AT:
www.epa.gov/ne/nbh

EPA United States Environmental Protection Agency

September 2010

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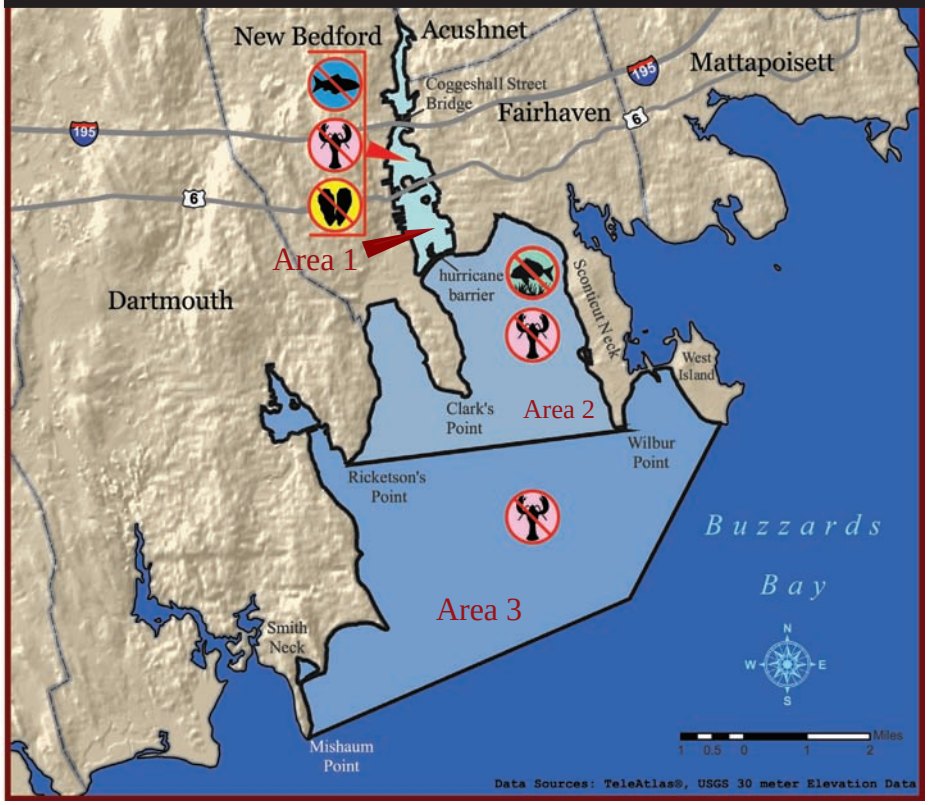
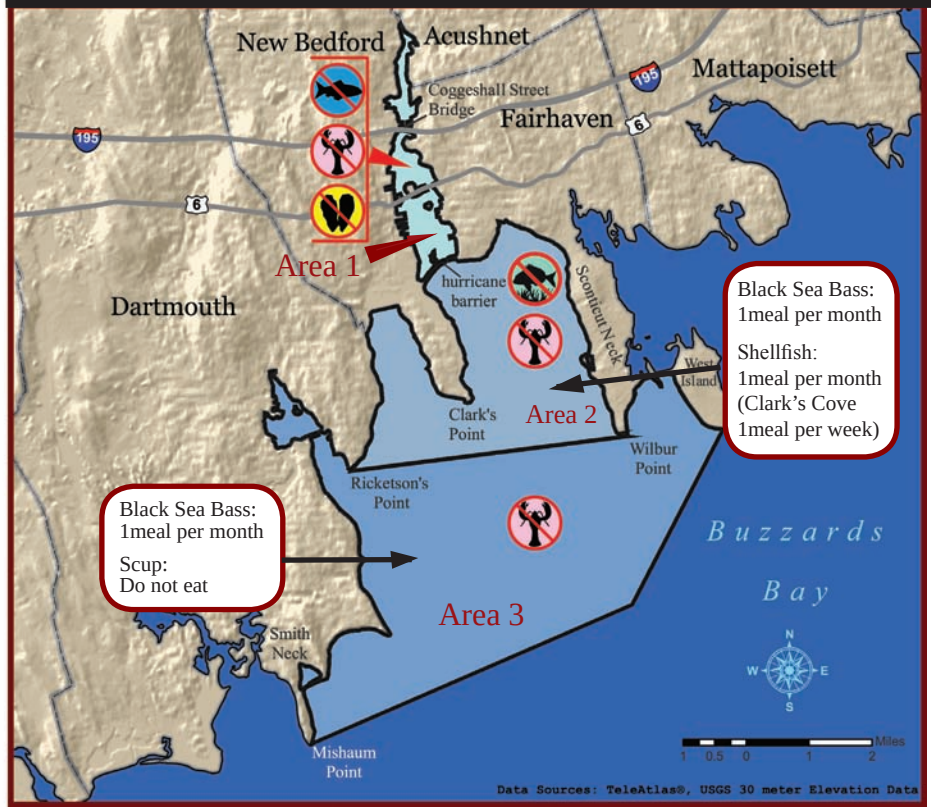
Original Fishing Ban (in effect 1979-present) per Massachusetts Department of Public Health



Updated 2010 EPA Recommendations for Recreational Fishermen/Shellfishermen per Superfund Risk Assessment with additional species highlighted*

*sensitive populations-see reverse for more information



Do NOT eat shellfish
No coma mariscos
Não coma mariscos

Do NOT eat fish
No coma pescado
Não coma peixe

Do NOT eat lobster
No coma langosta
Não coma lagosta

Do NOT eat bottom feeding fish:
No coma pescado de fondo:
Não coma peixe de fundo:

- flounder
- lenguado
- solha
- scup
- sargo
- sargo
- tautog
- tautoga
- bodião da ostra
- eel
- anguila
- anguila

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continued from front >> suggest. EPA believes it is important that recreational fishermen and shell-fishermen be aware that the risk assessment suggests that: consumption of black sea bass be limited to one meal per month if they are obtained in Areas 2 and 3; that scup not be consumed from Areas 2 or 3; and that general guidelines for shellfish include limiting consumption to one meal a month in Area 2 and one meal a week in Area 3. See map above for a summary of EPA's recommendations.

It is important to recognize the substantial benefits of fish consumption for everyone. Fish is one of the best sources of fatty acids which are helpful in reducing the risk of heart disease. In order to avoid exposure to a harmful level of contaminants, people should choose a variety of fish and shellfish from a variety of sources.

EPA

September 2010