**SIXTH EXPLANATION OF SIGNIFICANT DIFFERENCES**
**FOR THE**
**NEW BEDFORD HARBOR SUPERFUND SITE**
**UPPER AND LOWER HARBOR OPERABLE UNIT 1 (OU1) AND THE OUTER HARBOR OPERABLE UNIT 3 (OU3)**
**NEW BEDFORD, MASSACHUSETTS**
**EPA REGION 1**

**SEPTEMBER 2017**

## I. INTRODUCTION TO THE SITE AND STATEMENT OF PURPOSE

***Site name and Location:*** New Bedford Harbor Superfund Site (Site), Bristol County, Massachusetts

***Lead Agency:*** United States Environmental Protection Agency

***Support Agency:*** Massachusetts Department of Environmental Protection

***Statement of Purpose:***

Section 117(c) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. § 9617(c), and Section 300.435(c)(2)(i) of the National Contingency Plan (NCP), 40 CFR § 300.435(c)(2)(i), require that, if any remedial action is taken after adoption of a final remedial action plan, and such action differs in any significant respect from the final plan, the United States Environmental Protection Agency (EPA) shall publish an Explanation of Significant Difference (ESD). The ESD must describe the significant difference(s) between the selected remedial action and the modified remedial action, including an explanation of why such changes were made.

***Summary of Explanation of Significant Differences:***

EPA documented the selected remedy for the Upper and Lower Harbor Operable Unit of the Site (Operable Unit 1 or OU1) in a Record of Decision (OU1 ROD or the 1998 ROD) which was signed on September 25, 1998. Since that time, EPA has gathered additional site information and refined the cleanup approach for the Upper and Lower Harbor areas through five prior ESDs. The cleanup plan selected in the OU1 ROD called for dredging of sediment in the Upper Harbor and Lower Harbor contaminated with polychlorinated biphenyls (PCBs) above the selected cleanup levels.[1] The OU1 ROD also included the remediation of two localized areas of PCB-contaminated sediment that exceeded OU1 cleanup standards, located in the Outer Harbor just south of the Hurricane Barrier.[2] In the OU1 ROD, EPA noted that further investigation of the Outer Harbor area (Operable Unit 3 or OU3) would be undertaken to determine whether any future remediation would be appropriate.

[1] The New Bedford Harbor Superfund Site is divided into the Upper, Lower, and Outer Harbors. The boundary between the Upper/Lower Harbors and the Outer Harbor is the New Bedford Harbor hurricane barrier (Figure 1).
[2] These areas have been the subject of a pilot capping study and are subject to long-term monitoring.

EPA performed a Remedial Investigation (RI) of the Outer Harbor from 2009 to 2015. The investigation resulted in a 2017 RI Report including a risk assessment of potential risks to both human and ecological receptors.

Based on the RI, EPA determined that:

1. PCB concentrations in OU3 Outer Harbor sediment are generally low; approximately 80% of the OU3 sample results were below a concentration level of 1 ppm. Sediment concentrations have been decreasing over time;
2. PCBs from OU1 contribute a measureable amount of PCBs to OU3 by tidally driven surface water flux and;
3. There is an unacceptable risk to human health due to potential consumption of PCB contaminated seafood in OU3; however, the PCBs in the seafood are due to exposure to PCBs originating in surface water flowing from OU1. There is also an unacceptable risk to ecological receptors exposed to PCBs through the diet or direct contact with PCB-contaminated media.

The implementation of the OU1 Remedy is expected to continue to reduce the overall PCB sediment concentrations at the Site, which is expected to address the PCB flux that is the cause of the contamination in OU3. Based on modeling performed in 2017, EPA estimates that PCB flux in surface water from the Upper and Lower Harbors through the Hurricane Barrier and out to the Outer Harbor will be reduced significantly after the OU1 Remedy is complete (Hayter, 2017).

For these reasons, through this sixth ESD to the OU1 ROD, EPA is modifying the OU1 Remedy to expand the OU1 area to include the OU3 area and eliminate the designation of "OU3." This ESD is not changing any of the remedial components of the OU1 Remedy. EPA will continue to perform the OU1 Remedy, implement institutional controls on seafood consumption (seafood advisories, signage, and educational campaigns), and EPA will continue to perform long-term seafood monitoring already being conducted under the OU1 Remedy. EPA will continue to monitor the effect of the completion of the OU1 Remedy on the entire Site, including the Outer Harbor. The goal of these fish consumption institutional controls is to minimize ingestion of locally-caught PCB-contaminated seafood until PCBs in seafood reach safe levels. State fishing restrictions are also in effect.

***Availability of Records and Public Notice***

The documents supporting this ESD have been compiled into an administrative record which will become part of the Administrative Record (AR) for the New Bedford Harbor Superfund Site, as required by the NCP 300.825(a)(2). The Administrative Record for this ESD has been developed in accordance with Section 113 (k) of CERCLA and a copy of the files associated with the AR are available for public review at the following information repositories:

New Bedford Free Public Library
613 Pleasant Street, 2nd Floor Reference Department,
New Bedford, MA 02740
(508) 961-3067

EPA Region 1
OSRR Records and Information Center, 1st Floor
5 Post Office Square, Suite 100 (HSC),
Boston, MA 02109-3912
(617) 918-1440

EPA's website: https://www2.epa.gov/new-bedford-harbor

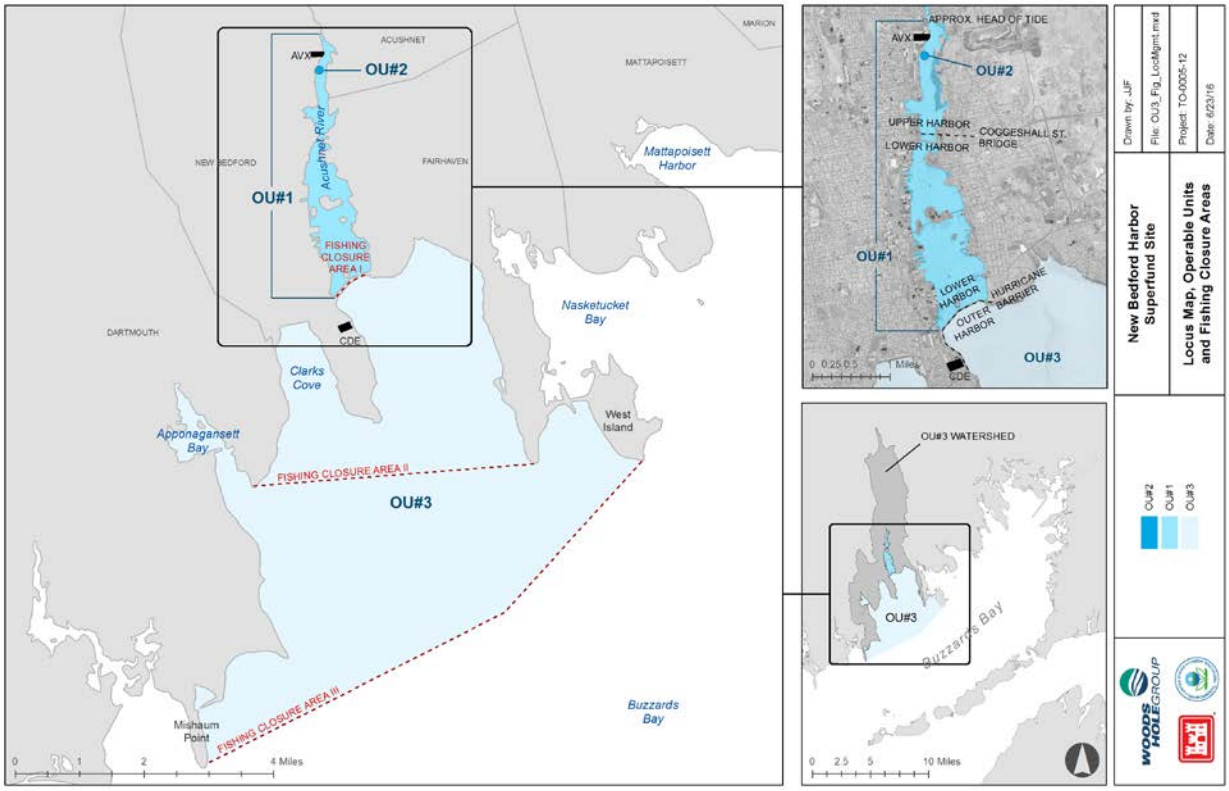
**Attachment A** to this document identifies the items contained in the Administrative Record for this ESD. Section 117(d) of CERCLA, 42 U.S.C. §9617(D), requires public notification of the ESD in a newspaper of general circulation. **Attachment B** includes a copy of the notice published in New Bedford Standard Times. The notice includes information about the formal public comment period for this ESD.

## II. SITE HISTORY, CONTAMINATION, AND SELECTED REMEDY

***Summary of Contamination Problems and Site History***

The New Bedford Harbor Superfund 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 acres of Buzzards Bay. 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 Massachusetts Department of Public Health (MassDPH) in 1979, extending approximately 6.8 miles north to south and encompassing approximately 18,000 acres in total. (See Figure 1 below, also Figure 2.1-2 of the 2017 RI.)

**Figure 1. Locus Map with Operable Units and Fishing Closure Areas**




Identification of PCB-contaminated sediment and seafood in and around New Bedford Harbor was first made in the mid-1970s as a result of EPA region-wide sampling programs. Elevated levels of heavy metals in sediment (notably cadmium, chromium, copper and lead) were also identified during this time frame. The manufacture and sale of PCBs was banned by the Toxic Substances Control Act (TSCA) in 1978. In 1979, the Massachusetts Department of Public Health promulgated regulations prohibiting fishing, shellfishing and lobstering within the Site due to elevated PCB levels in area seafood. Due to these concerns, the Site was proposed for the Superfund National Priorities List (the NPL) in 1982, and finalized on the NPL in September 1983. Pursuant to 40 CFR § 300.425(c)(2), the Commonwealth of Massachusetts (Commonwealth) nominated the Site as its priority site for listing on the NPL.

EPA's site-specific investigations began in 1983 and 1984. Site investigations continued throughout the rest of the 1980s and early 1990s, including a pilot dredging and disposal study in 1988 and 1989, a baseline public health risk assessment in 1989, and computer modeling of site cleanup options and an updated feasibility study for the Site completed in 1990. Thousands of additional environmental samples have been taken since then to support the implementation of the remedy.

Collectively, these investigations identified the former Aerovox facility on Belleville Avenue in New Bedford, an electrical manufacturing plant located on the western shore of New Bedford Harbor, as the primary source of PCBs to the Site. PCB wastes were discharged from the facility's operations directly to the Upper Harbor through drainage trenches and discharge pipes, or indirectly throughout the site via CSOs (combined sewer overflows) and the City's sewage treatment plant outfall. PCBs were also

released to the Harbor from the Cornell Dubilier Electronics, Inc. (CDE) facility just south of the hurricane barrier in New Bedford.

Based on the results of these investigations, state and federal enforcement actions were initiated against parties who owned and/or controlled both the Aerovox and CDE facilities, as well as the City of New Bedford (though the City is not a Potentially Responsible Party for this Site), pursuant to CERCLA, Massachusetts General Law c.21E, and other federal and state environmental statutes. For a summary of early enforcement actions and resulting settlements, please see Section II of the 1998 ROD (http://www.epa.gov/region1/superfund/sites/newbedford/38206.pdf). In September 2013, the U.S. District Court for the District of Massachusetts approved a landmark $366.25 million, plus interest, cash-out settlement with AVX Corp., whose corporate predecessor, Aerovox Corp., owned and operated the Aerovox facility (through "reopeners" of a 1992 settlement with AVX). With this settlement, the pace of the Harbor cleanup has been accelerated. For more information on the 2013 settlement, see EPA's website, including the 2015 Five Year Review, which includes references to the 2013 settlement with AVX: https://www.epa.gov/sites/production/files/2015-10/documents/583507.pdf.

In April 1990, EPA issued a ROD for the Hot Spot Operable Unit of the Site (OU2). The Hot Spot ROD called for dredging and on-site incineration of sediment above 4,000 ppm (parts per million) PCBs in the vicinity of the Aerovox facility. Dredging and temporary disposal of this sediment—about 14,000 cubic yards in volume and 5 acres in area—into a storage cell built at EPA's Sawyer Street facility (Cell #1) began in April 1994 and was completed in September 1995. Pursuant to an April 1999 amendment to the 1990 Hot Spot ROD, the contaminated sediment was removed from the storage cell, dewatered, and transported to an offsite landfill for permanent disposal. This final offsite disposal phase of the Hot Spot remedy was completed in May 2000.

As described above, EPA issued the OU1 ROD for the cleanup of the Upper and Lower Harbor areas in September 1998. The Site cleanup is being managed by EPA, in partnership with the Massachusetts Department of Environmental Protection (MassDEP). The U.S. Army Corps of Engineers (USACE) is implementing the work under EPA's oversight.

***Contamination Problems***

The main Site concern is the widespread PCB contamination in New Bedford Harbor sediment. PCB levels in sediment generally decrease from north to south from the Upper Harbor to the Lower Harbor and out into the Outer Harbor. Because of this sediment contamination, PCBs are also found in elevated levels in the water column and in local seafood. In addition to the PCB contamination, Harbor sediment also contains high levels of other contaminants, including heavy metals (e.g., cadmium, chromium, copper and lead). High levels of solvents (*e.g.*, trichloroethylene) have also been identified in sediment adjacent to the Aerovox facility. However, because many of these other contaminants are co-located with PCBs, the OU1 ROD contains action levels only for PCBs.

As described more completely in Sections V and VI of the 1998 ROD, EPA found the PCB contamination to result in unacceptable risks to human health and the environment. The biggest human health risk was found to be from frequent (*e.g.*, weekly) ingestion of local seafood, although unacceptable risks were also found from frequent human contact with, or incidental ingestion of, PCB-contaminated shoreline sediment. Ecologically, EPA's investigations concluded that the Harbor's marine ecosystem is severely damaged from the widespread sediment PCB contamination. As a result, EPA issued fish

consumption guidelines which can be found at: https://www.epa.gov/new-bedford-harbor/fish-consumption-regulations-and-recommendations.

EPA performed a Remedial Investigation of the Outer Harbor from 2009 to 2015, resulting in a 2017 Remedial Investigation Report (2017 RI Report). The 2017 RI Report indicated that PCB concentrations in OU3 Outer Harbor sediment are generally low, ranging from 0.0003 ppm to a high of 19.5 ppm; approximately 80% of the OU3 sample results were below a concentration level of 1 ppm. The median and mean sediment concentrations found were 0.166 ppm and 1.33 ppm respectively. Sediment concentrations have been decreasing over time, based on Long Term Monitoring (LTM) sampling.

The unacceptable risk in the Outer Harbor is due to PCB flux from OU1 and the accumulation of PCBs in seafood tissue. The results of the 2017 RI Report and the contamination in the Outer Harbor are discussed in more detail below.

***Summary of Selected Remedy***

*OU1 Remedy - Dredging*

The OU1 ROD called for the dredging of approximately 450,000 cubic yards of *in situ* PCB-contaminated sediments in the Upper and Lower Harbors to meet cleanup levels as presented below.

For subtidal areas, the cleanup levels are:

- 10 ppm PCBs for subtidal and mudflat sediment in the Upper Harbor, which has most of the PCB contamination
- 50 ppm PCBs for subtidal and mudflat sediment in the Lower Harbor

For the shoreline intertidal areas other than mudflats, the cleanup levels, aimed at reducing risk from human contact with contaminated sediment, are:

- 1 ppm PCBs for areas bordering residential areas
- 25 ppm PCBs for shoreline areas bordering recreational areas
- 50 ppm PCBs for other shoreline areas with little or no public access, including saltmarshes

The OU1 ROD called for the construction of four shoreline confined disposal facilities (CDFs) (A, B, C, and D) to contain and isolate the dredged sediment, associated water treatment, capping of the CDFs, long-term monitoring and maintenance, and institutional controls. The CDFs were conceptually located in PCB-contaminated areas to avoid the need to dredge an additional approximately 126,000 cubic yards of *in situ* sediment, which instead would have been contained within the footprint of the CDFs. The ROD also required that institutional controls, such as the state-mandated fish closure areas and fish consumption guidelines, be in place until PCB levels in seafood reach acceptable levels for human consumption. The OU1 ROD also authorized the Commonwealth of Massachusetts to conduct additional navigational dredging and on-site disposal of sediments contaminated with PCBs below the OU1 ROD cleanup levels as part of an enhanced remedy under CERCLA, known as the “State Enhanced Remedy”.

Based on additional information and refinements of the cleanup approach for OU1, EPA has issued five ESDs modifying the OU1 ROD Remedy. These ESDs are summarized below:

- In September 2001, EPA issued ESD1, which set forth five changes to the OU1 Remedy, including: the use of mechanical dewatering of dredged sediment to reduce the volume of processed sediments needing disposal, incorporation of a rail spur, the revision of the dike design at CDF D, ongoing use of the pilot CDF at EPA's Sawyer Street facility, and identification of additional intertidal cleanup areas near residences.
- In 2002, EPA issued ESD2, which eliminated CDF D, the largest of the four CDFs, and instead sent the dredged sediment that would have gone to CDF D to an offsite landfill.
- In 2010, EPA issued ESD3, which documented the temporary storage of PCB- and VOC-contaminated sediments in the former Hot Spot sediment disposal cell ("Cell 1") at EPA's Sawyer Street facility.
- In 2011, EPA issued ESD4, which modified the remedy to include the construction and use of a confined aquatic disposal (CAD) cell in the Lower Harbor (the Lower Harbor CAD Cell or LHCC) for disposal of approximately 300,000 cy of dredged sediments with PCB concentrations above the OU1 ROD action levels.
- In 2015, EPA issued ESD5, which eliminated the three remaining originally planned CDFs (A, B, and modified C), and selected off-site disposal of sediment slated for disposal in those planned CDFs. Through this ESD, EPA also confirmed that the Sawyer Street pilot CDF is protective and made it a permanent TSCA disposal facility.

As of April 2017, EPA has dredged the following quantities of sediment from the Upper and Lower Harbor:

- 433,570 cubic yards of contaminated intertidal and subtidal sediment from the Upper Harbor followed by off-site disposal;
- approximately 40,000 cubic yards of contaminated sediment from the Upper Harbor followed by LHCC disposal;
- approximately 84,000 cubic yards from the Lower Harbor followed by disposal in the LHCC.

With the $366.25 million, plus interest, cash-out settlement with AVX Corporation approved by the U.S. District Court in September 2013, dredging currently continues at an accelerated pace. In addition to the EPA dredging, various navigation-related projects authorized under the State Enhanced Remedy component of the OU1 ROD have led to the dredging and CAD disposal in a State-designated Dredged Material Management Plan (DMMP) area of an additional approximately 550,000 cubic yards of less contaminated sediment from the Site.

*OU1 Remedy - Outer Harbor Cap*

OU3 was created in response to comments received regarding the OU1 Proposed Plan issued in January 1992. A supplemental investigation and feasibility study concluded that there were 3 locations within OU3 with relatively high PCB concentrations. Two areas were found to be adjacent to the Combined Sewer Overflow (CSO) by the Cornell Dubilier plant and a third area was found surrounding the City of New Bedford's treatment plant outfall.

The 1998 OU1 ROD included an interim remedy to address the two localized areas in the Outer Harbor near the CDE facility where PCB-contaminated sediment had concentrations above 50 ppm. The two areas near the CDE facility were capped as part of a pilot study in 2005. The cap material was generated from the construction of the first SER CAD Cell. The third area of heightened PCB concentrations in sediment in the Outer Harbor identified was the area of PCB contamination near the City's outfall pipe, which has since been addressed through wastewater treatment facility upgrades and the reduction of PCB disposal in the City's wastewater system. An area adjacent to the 2005 Pilot Cap and the shoreline which had sediment PCB concentration less than 50 ppm was also later capped in 2015 as part of a mitigation project required under the State Enhanced Remedy. See Figure 2 below, also Figure 2.3.1 of the 2017 RI. Finally, the 1998 ROD also called for further investigation to determine if any additional remedial action was required for the remainder of the Outer Harbor.

**Figure 2. 2005 and 2015 Cap Footprint Areas**

## III. BASIS FOR THE DOCUMENT

Through this ESD6, EPA is expanding the OU1 remedy to include the OU3 area based on the key findings of the 2017 Remedial Investigation of the Outer Harbor, including the long-term monitoring results.

Based on the 2017 Remedial Investigation, EPA has determined that:

1. PCB concentrations in OU 3 Outer Harbor sediment are generally low, ranging from 0.0003 ppm to a high of 19.5 ppm; approximately 80% of the OU3 sample results were below a concentration level of 1 ppm. The median and mean sediment concentrations found were 0.166 ppm and 1.33 ppm respectively. Sediment concentrations have been decreasing over time;
2. PCBs from OU1 contribute a measureable amount of PCBs to OU3 by tidally driven surface water flux and;
3. There is an unacceptable risk to human health due to potential consumption of PCB contaminated seafood in OU3; however, the PCBs in the seafood are due to exposure to PCBs originating in surface water flowing from OU1. There is also an unacceptable risk to ecological receptors to PCBs through the diet or direct contact with PCB-contaminated media.

EPA believes that the implementation of the OU1 Remedy will reduce the overall PCB concentrations at the Site, thereby reducing the PCB flux that is the ongoing primary source of the contamination in OU3. As described above, based on modeling performed in 2017, EPA estimates that PCB flux in surface water from the Upper and Lower Harbors to the Outer Harbor will be reduced significantly after the OU1 Remedy is complete (Hayter, 2017).

Based on the long-term monitoring data, the OU1 Remedy has been effective, and its continued performance has resulted in reductions in levels of PCBs in fish tissue causing unacceptable risks in the Outer Harbor (although risks still remain from consuming Outer Harbor seafood). For these reasons, through this sixth ESD to the OU1 ROD, EPA is modifying the OU1 Remedy to expand the OU1 area to include the OU3 area and eliminate the designation of "OU3". This ESD is not changing any of the remedial components of the OU1 Remedy. EPA will continue to perform the OU1 Remedy, which includes implementing institutional controls on seafood consumption (seafood advisories, signage, and educational campaigns) and the performance of long-term seafood monitoring. EPA will continue to monitor the effect of the completion of the OU1 Remedy on the entire Site, including the Outer Harbor.

A discussion of key findings from the 2017 Remedial Investigation for the Outer Harbor, including the long-term monitoring efforts, is provided below.

### *1. Sediment PCB Concentrations in the Outer Harbor are Low and Continue to Decrease*

As presented in the 2017 RI report, sediment PCB concentrations in OU3 were characterized with data from three sources: (i) EPA's Long Term Monitoring (LTM) sampling program, which included sampling for PCBs in surface sediments throughout the Site and was carried out in 1993, 1995, 1999, 2004, 2009 and 2014; (ii) the Pilot Cap area sampling conducted since 2005; and (iii) supplemental sampling completed in 2009 as part of the remedial investigation.

EPA LTM sampling included collecting data from 79 stations in the Upper Harbor, Lower Harbor, and Outer Harbor to assess spatial and temporal trends in the data and the effects and/or effectiveness of the remedial activities. Sediment grabs from the top 2 cm were collected for chemical and physical testing; benthic community analysis was conducted to assess sediment conditions as well.

Pilot Cap area sediment sampling data has been collected since 2005 and includes seven sampling events (over several years) to determine cap thickness using bathymetric surveys and to determine PCB levels in surface sediment from grab samples collected in the top 3 inches.

The 2009 RI sampling included sampling from four habitat types in OU3 (salt marshes, nearshore environments, cap and hurricane barrier stations, and offshore areas) and in corresponding habitats in the reference areas. The 2009 sampling included a total of 42 sediment samples for chemical analysis. Biological tissue samples for chemical analysis were also collected along with sediment samples for toxicity testing and benthic community analysis. Surface water samples were also collected for the RI; analytical results are presented in the following section.

In general, the conclusions presented in the 2017 RI report are:

- Sediment PCB concentrations are decreasing over time in OU3, based on LTM sampling.
- There are areas where PCB concentrations in sediment exceed the biological effect screening levels (NOAA Effects Range Low (ER-L, 23 ppb or 0.023 ppm) and the Effects Range Median (ER-M, 180 ppb or 0.18 ppm), but the extent of the Outer Harbor that is below the ER-L and ER-M is increasing with time.
- Sediment PCB concentrations in OU3 are elevated relative to the reference area[3], but lower than the Upper and Lower Harbor.
- In 2009, there were elevated concentrations of PCBs (but not exceeding 50 ppm) inshore of the 2005 Pilot Cap near the CDE facility, but those areas were capped in 2015 as part of a mitigation project required under the State Enhanced Remedy.

More specifically, EPA's LTM program indicates that sediment concentrations in OU3 have decreased since 1993. A comparison of LTM data from the two most recent sampling events (2009 and 2014) shows the mean sediment PCB concentration in OU3 surficial sediments dropped from 0.24 to 0.17 mg/kg (ppm) over this period, and samples from 20 of the 23 stations showed a decrease in concentration (EPA, 2015).

Although the 2009 RI sampling data shows elevated PCB concentrations in sediment in certain areas of OU3 when compared to the ER-L and ER-M, EPA's LTM data shows that the areas where concentrations are below the ER-L and ER-M have expanded since 1993 (Figure 5.1-1 of the 2017 RI). Despite the fact that PCB sediment concentrations in OU3 continue to exceed levels in reference areas, benthic community analysis shows that the benthic community in OU3 is relatively healthy. Nevertheless, tissue concentrations of PCBs in all biota measured in OU3 are generally an order of magnitude, or more, higher than those in biota from the reference area.

[3] Reference area is where habitats of interest, similar to the Site, may be found and are used for comparisons to ascertain conditions at the site relative to the general region. The reference area for the RI was Sippican Harbor located in Marion, MA.

Overall, the sediment PCB concentrations in OU3 are lower than concentrations in OU1. The sediment PCB concentrations in Upper and Lower Harbor sediments range from 10-1000 mg/kg, while surface sediment PCB concentrations in OU3 (not capped with clean material) are generally less than 1 mg/kg at most locations. OU3 Outer Harbor PCB concentrations in sediment range from 0.0003 ppm to a high of 19.5 ppm; approximately 80% of the OU3 sample results were below a concentration level of 1 ppm. The median and mean sediment concentrations found were 0.166 ppm and 1.33 ppm respectively.

A 2014 study, conducted as part of the RI, concluded that there has been a general decrease in the total mass of PCBs in surface sediments (top 2 centimeters) within OU3. Samples collected in 2016, which included samples taken both within and outside of the capped areas in the Outer Harbor, range from 0.0347 to 1.19 mg/kg with an average of 0.4 mg/kg. The most recent Pilot Cap monitoring report, (Jacobs, 2017) indicates that the surface of the capped areas found near CDE contains PCB concentration levels below 4 mg/kg.

2. *PCBs from OU1 Contribute PCBs to OU3 by Surface Water Flux*

Surface water sampling was done in 2010 as part of a flux study at the hurricane barrier to characterize the net flow of PCBs to OU3 from the Upper and Lower Harbor areas. The flux study also used data from the 2009 RI Investigation collected near two combined sewer outfalls in OU3. Finally, in 2015 surface water PCBs were measured using Passive Samplers in key areas: just outside the hurricane barrier, in the marsh areas throughout OU3 that were previously sampled for biological tissue and sediment, and at the reference area.

In summary, the conclusions from the 2017 RI report indicate:

- Surface water PCBs are elevated in OU3 relative to the reference area, both in the freely dissolved fraction and whole water (particulate plus dissolved) fractions;
- Surface water PCB concentrations are elevated at the hurricane barrier, relative to both the reference area, and the other stations within OU3;
- Waterborne concentrations of PCBs at the hurricane barrier exceed the National Recommended Water Quality Criteria (NRWQC) criterion for protection of aquatic life;
- A measurable PCB flux from inside the hurricane barrier to OU3 constitutes a continuing source of PCBs from the Upper and Lower Harbor areas to the Outer Harbor.

More specifically, the 2010 PCB flux study data showed PCB concentrations at the hurricane barrier ranging from 0.88 to 11.9 ng/l in the dissolved phase, and 8 to 42 ng/l in the whole water (dissolved plus particulate) portion (Appendix F of the 2017 RI). Flood tide values, which represent the PCB concentration in the water mass moving into the harbor from OU3 and Buzzard's Bay, were always lower than ebb tide values which reflect the water mass moving from the harbor to OU3. Flood tide PCB concentrations were generally about half the values of ebb tides. In addition, 5 of the 6 measured ebb tide PCB concentrations for dissolved plus particulate PCBs exceeded the National Recommended Water Quality Criterion, CCC (Criterion Chronic Concentration) for total PCBs in marine water of 30 ng/l, while the average flood tide values never did. All PCB concentrations in these samples exceeded the National Recommended Water Quality Criterion for protection of humans (0.064 ng/L based on a carcinogenic risk of 10E-6 or 6.4 ng/L based on a carcinogenic risk of 10E-4). EPA notes that consistent with the findings in the OU1 ROD, swimming has not been found to result in a significant human health risk at the Site.

The flux study measured the mass of PCBs flowing into the harbor, and out to OU3 on each measured tide, and provided an estimate of annual net flux of PCBs from the harbor to OU3. Mass flux was calculated from the measured PCB concentration in flow-proportioned composite samples, and the measured flow volume for the particular tide. The net PCB mass flux to OU3 from the Lower Harbor ranged from 24.7 g (0.05 lb) per tidal cycle (neap tide on April 21, 2010) to 82.8 g (0.18 lb) per tidal cycle (weather event on April 28, 2010 coinciding with spring tide). The mean net PCB mass flux from the Lower Harbor to OU3 for the six sampling events was 61 g (0.13 lb) per tidal cycle, which, if scaled to daily and yearly flux is approximately 118 g (0.26 lb) per day and 43 kg (95 lb) per year.

Sampling results from the 2015 passive sampling study show that freely dissolved PCBs ranged from 1.5 to 60 ng/L in surface water, and 2 to 23 ng/l in pore water. The freely dissolved PCB concentration in water represents the bioavailable fraction, and is of interest in determining biological exposure to PCBs. Concentrations were higher near the hurricane barrier (average 48.6 ng/L in surface water and 20.8 ng/L in pore water) than in the other stations throughout OU3 (average 3.7 ng/L in surface water, 4.1 ng/L in pore water). In the reference area sample, the surface water concentration was less than 1 ng/L (0.36 ng/L). The measurement of PCBs in surface water supports the importance of surface water as the exposure medium in the food chains for the Site, relative to sediment.

The surface water PCBs concentrations from OU1 contribute PCBs to receptors in the Outer Harbor through surface water, food web, and sediment exposures, and represents an uncontrolled source of PCBs to OU3. However, full scale remediation of the OU1 area is intended to reduce the flux of waterborne PCBs from the Upper and Lower Harbor areas, along with removing (or containing) contaminated sediment from the Harbor. As remediation of sediment within OU1 moves towards completion, surface water PCB concentrations are expected to decrease. As described in the OU1 ROD at page 34: "A key measurement of the ecological protectiveness of the remedy, in addition to the long term ecological monitoring program, will be achievement of the 0.03 ug/l PCB water quality standard for the protection of marine organisms."[4] Monitoring will continue to measure progress towards this goal as the OU1 Remedy is performed.

In addition to the previous lines of evidence cited, modeling was performed to estimate PCB flux in surface water from the Upper and Lower Harbors to the Outer Harbor. Based on this modeling, EPA estimates that the PCB flux will be reduced significantly after the OU1 Remedy is complete (Hayter, 2017). Although the model was based on limited data sets, collection of additional data going forward can be used to lower the uncertainty of the forecast results. The average annual flux of PCBs from the OU1 area to OU3 measured in the 2010 flux study was approximately 43 kg/year, while the model predicted pre-remediation flux rates with a median and average value of about 30 kg/year. According to the model, once the remedial dredging is completed at OU1, the post-remediation flux rate is forecast to decrease by about an order of magnitude (to about 4.5 kg/year) from the pre-remedial range, followed by a slow decrease of another order of magnitude over a 30-year period down to approximately 0.4 kg/year. Therefore, according to the model, 30 years after the OU1 Remedy is completed the average annual flux of PCBs through the hurricane barrier is estimated to be approximately two orders of magnitude less than before remediation.

4. OU1 ROD at 34.

3. *Remaining Risk in OU3 is Due to Consumption of Seafood Exposed to PCBs in Surface Water*

Human health risks associated with consumption of edible seafood from OU3, and risks to ecological receptors exposed to PCBs through the diet or direct ingestion of contaminated media constitute unacceptable CERCLA risks that remain in the Outer Harbor. Therefore, the OU1 remedy must continue to be performed to reduce PCBs in surface water at the Site. Below is a brief summary of the general findings of the Ecological and Human Health Risk assessment documented in the 2017 RI report for OU3:

- The Ecological Risk Assessment evaluated the potential ecological risks of PCBs in the near shore marine environment for various exposure routes including direct exposure to PCBs in water and sediment, or consumption of contaminated prey (killifish, scup, quahog, mussel, oyster, lobster and soft-bodied worms). For example, the risks of measured tissue PCB concentrations were evaluated by comparing the tissue concentration in OU3 organisms with the tissue concentrations known from the scientific literature studies to be toxic or non-toxic (i.e. residue effects levels). If the tissue concentrations in OU3 organisms were less than the no-effect residue effect level, then it was concluded that there was no significant risk. The risks to wildlife species (heron, cormorant, tern, osprey, mink) due to ingestion of PCB-contaminated prey was evaluated using modeled ingestion rates along with PCB concentrations in prey (e.g. eel, killifish, scup, lobster). The risk was characterized by comparing the modeled ingested dose by the no-effect dose obtained from literature studies. The risk was expressed as a hazard quotient (HQ), calculated by dividing the modeled dose in OU3 wildlife by the no-effect dose. In general, all wildlife receptors considered had an HQ greater than one, which indicates a potentially adverse ecological effect from PCBs (Table 6.3-13 of the 2017 RI). The highest HQ of 40 was calculated for Osprey feeding on scup and eel throughout the Site.

- The Baseline Human Health Risk Assessment (BHHRA) evaluated human health risks for a potential recreational angler and family members (child, older child, and adult) who consume seafood contaminated with PCBs (lobster meat, lobster meat and tomalley, quahogs, scup, and black sea bass) caught from OU3. The exposures and risks for seafood consumption were evaluated separately for Closure Area II (in OU3) [5], Closure Area III (in OU3) and the Reference Area at Sippican Harbor (see Figure 2). The BHHRA concluded that the seafood consumption risks are higher than CERCLA limits (i.e. cancer risk greater than 1E-04, or HQ greater than 1) in Closure Area II and III, as well as in the Reference Area. Closure Area II risks are higher than those associated with Closure Area III, and risks for both closure areas are at least double the risks for the Reference Area. Additional details of the BHHRA are provided in Chapter 7 of the 2017 RI report.

As described above, the evaluation of exposure pathways suggests that surface water, rather than sediment, is the more important source of PCBs to ecological and human receptors in the Outer Harbor. In Chapter 8 of the 2017 RI, the analysis of modeled food chain exposures in fish and shellfish for ecological and human receptors shows an unacceptable ecological risk and human health risk from seafood consumption and that risk originates largely through exposure of the consumed organisms to total PCBs or dioxin-like PCB congeners in the surface water, rather than the sediment. Table 8.3-2 and

[5] The closure areas were established in 1979 by MassDEP and MassDPH when PCB contamination was initially identified in edible seafood (MassDPH, 1979).

Table 8.3-3 from the 2017 RI provide a summary of the exposure pathways for ecological and human receptors that have an unacceptable risk, respectively.

Surface water is a significant exposure medium in the food chains for the Site because (1) PCB congeners occur in OU3 surface water in concentrations that often exceed NRWQC for protection of marine organisms and humans; (2) the concentrations of the freely dissolved PCB congeners in surface water, which are generally accepted as the bioavailable fraction, are elevated above reference area concentrations; and (3) the areas of elevated concentrations of freely dissolved PCB congeners correspond to areas where elevated concentrations of PCBs were measured in biological tissue.

## IV. DESCRIPTION OF SIGNIFICANT DIFFERENCES

Although levels of PCBs in contaminated sediment in OU3 are generally below 1 ppm at most locations, the consumption of PCB-contaminated seafood caught in OU3 continues to present a human health risk above the acceptable CERCLA risk range. In addition, consumption of PCB-contaminated prey by several wildlife species currently presents an unacceptable ecological risk. An evaluation of exposure pathways suggests surface water, rather than sediment, is the primary source of PCBs to receptors in OU3. PCB flux in surface water from OU1 therefore represents an uncontrolled source of PCB contamination in OU3.

The implementation of the OU1 Remedy is expected to continue to reduce the overall PCB sediment concentrations at the Site, which is expected to address the PCB flux that is the cause of the contamination in OU3. Through this sixth ESD to the OU1 ROD, EPA is modifying the OU1 area to include the OU3 area and eliminate the designation of "OU3". This ESD is not changing any of the remedial components of the OU1 Remedy. EPA will continue to monitor the effectiveness and protectiveness of the OU1 Remedy, including the Outer Harbor as part of Five Year Review process. The need for any additional remedial measures in the Outer Harbor area (of the enlarged OU1) will be addressed in a future decision document, after the OU1 dredging within the Upper and Lower Harbors has been completed and its impact on the Outer Harbor is evaluated.

EPA will continue to perform the OU1 Remedy, implement institutional controls on seafood consumption (seafood advisories, signage, and educational campaigns), and EPA will continue to perform long-term seafood monitoring already being conducted under the OU1 Remedy. The goal of these fish consumption institutional controls is to minimize ingestion of locally-caught PCB-contaminated seafood until PCBs in seafood reach safe levels. State fishing restrictions are also in effect. As described above, the 1998 OU1 Remedy included an interim action addressing areas in the Outer Harbor where sediment contaminated with PCB concentrations were over 50 ppm. This area was capped in 2005 by the Pilot Cap; evaluation of this Pilot Cap is ongoing. As part of a mitigation project under the SER, an additional area of elevated sediment contamination adjacent to the Pilot Cap was also capped in 2015. The combination of capping these two areas reduced the availability of PCBs to the marine food chain and significantly reduced the source of PCBs to surface water in the Outer Harbor.

In addition, as part of the OU1 Remedy, institutional controls have been put in place to prevent any damage to the Pilot Cap in the Outer Harbor. In July 2011, the U.S. Coast Guard designated the Pilot Cap area as a Regulated Navigation Area (RNA) at EPA's request after a formal rulemaking process. This RNA is an institutional control that restricts persons and vessels from disturbing the seabed, which includes

but is not limited to anchoring, dragging, trawling and spudding within this area. EPA will continue to monitor the physical, chemical and biological quality of the cap to ensure that it is functioning as intended.

EPA will continue the seafood monitoring program (being carried out by MassDEP) within the Site, including the Outer Harbor, to evaluate whether the cleanup work is having an impact on PCB concentration levels in locally caught fish and shellfish. This monitoring continues under the OU1 Remedy. EPA will also continue to perform long term monitoring of sediment and biota, and will continue to conduct Five-Year Reviews for the Site, including the expanded area of OU1 that encompasses the Outer Harbor. EPA will continue to monitor the effect of the completion of the OU1 Remedy on the entire Site, including the Outer Harbor.

## V. SUPPORTING AGENCY COMMENTS

MassDEP has reviewed the draft ESD and concurs with the issuance of the final ESD. A copy of the State's concurrence letter is included as **Attachment C.**

## VI. STATUTORY DETERMINATIONS

The modification of the OU1 area to include the OU3 area and eliminate the designation of "OU3" does not require the addition and/or modification of Applicable or Relevant and Appropriate Requirements (ARARs) that have been identified in the 1998 ROD and the subsequent five ESDs that have modified it.

The remedy as modified herein remains protective of human health and the environment, complies with all federal and state requirements that are applicable or relevant and appropriate to the remedy, and is cost-effective. In addition, the remedy as modified utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this Site.

## VII. PUBLIC PARTICIPATION COMPLIANCE

EPA maintains significant public outreach regarding the Site, including an extensive website, emailed community updates, and the holding of public meetings with site stakeholders to keep them up to date on the Site's cleanup status. EPA held a public meeting on June 26, 2017 to present the proposed ESD. During the meeting, EPA announced the opening of the 30-day comment period. A notice of the 30-day comment period, which lasted from June 27 to July 28, 2017, was published in the New Bedford Standard Times newspaper. **Attachment D** includes EPA's responses to comments received on the ESD.

## VIIII. DECLARATION

For the foregoing reasons, by my signature below, I approve the issuance of this sixth Explanation of Significant Differences for the New Bedford Harbor Superfund Site located in New Bedford, Acushnet, Fairhaven and Dartmouth, Massachusetts and the changes and conclusions stated therein.

9/20/17

Bryan Olson, Director
Office of Site Remediation and Restoration
EPA Region 1

Date

**ATTACHMENT A**

**LIST OF FILES IN ADMINISTRATIVE RECORD**

**Sixth Explanation of Significant Differences for the**
**New Bedford Harbor Superfund Site, New Bedford, Massachusetts**

New Bedford Harbor Superfund Site
Administrative Record

Upper and Lower Harbor Operable Unit 1
and the Outer Harbor Operable Unit

Sixth Explanation of Significant Differences
(ESD) 6

# INDEX

ESD6 Released: September 20, 2017

Prepared by
EPA New England
Office of Site Remediation and Restoration

## Introduction to the Collection

This is the Administrative Record for the New Bedford Harbor Superfund Site, New Bedford, MA, Upper and Lower Harbor Operable Unit 1 and Outer Harbor Operable Unit, Sixth Explanation of Significant Differences (ESD) 6, issued on September 20, 2017. This Administrative Record contains site-specific documents and guidance used by EPA staff that form the basis for OU1 Sixth Explanation of Significant Differences.

This Administrative Record incorporates, by reference, the Administrative Records for the Third Modification to EPA's Final Determination for the South Terminal Project – Channel Widening and Additional Blasting, issued by EPA on September 30, 2014 (Third Modification – South Terminal Project); the Administrative Record for EPA's Second Modification for South Terminal Project –Additional Dredging and Blasting for Rock Removal, New Bedford Harbor Superfund Site, Operable Unit 1, State Enhanced Remedy, issued by EPA on September 30, 2013 (Second Modification – South Terminal Project); the Administrative Record for EPA's Final Determination for the South Terminal Project, New Bedford Harbor Superfund Site, Operable Unit 1, State Enhanced Remedy, issued by EPA on November 19, 2012 (Final Determination– South Terminal Project); the Administrative Records for the Unilateral Administrative Order for Remedial Design, Remedial Action, and Operation and Maintenance (OU1 UAO) issued by EPA on April 18, 2012; the Record of Decision for the Upper and Lower Harbor Operable Unit (OU1) issued by EPA on September 25, 1998 (OU1 ROD, *a.k.a.* 1998 Upper and Lower Harbor ROD), the Explanation of Significant Differences issued by EPA on September 27, 2001 (OU1 ESD1, *a.k.a.* 2001 Upper and Lower Harbor ESD), the Explanation of Significant Differences issued by EPA on August 15, 2002 (OU1 ESD2, *a.k.a.* 2002 Upper and Lower Harbor ESD), the Explanation of Significant Differences issued by EPA on March 4, 2010 (OU1 ESD3, *a.k.a.* 2010 Upper and Lower Harbor ESD), the Explanation of Significant Differences issued on March 14, 2011 (OU1 ESD4, *a.k.a.* 2011 Upper and Lower Harbor ESD), and the Explanation of Significant Differences issued by EPA on July 16, 2015 (OU1 ESD5, *a.k.a*. 2015 Upper and Lower Harbor ESD). This Administrative Record also incorporates, by reference, the Administrative Records for the Record of Decision for the Hot Spot Operable Unit (OU2) issued by EPA on April 6, 1990 (OU2 ROD, *a.k.a.* 1990 Hot Spot ROD), the Explanation of Significant Differences issued by EPA on April 27, 1992 (OU2 ESD1, *a.k.a.* 1992 Hot Spot ESD), the Explanation of Significant Differences issued by EPA on October 30, 1995 (OU2 ESD2, *a.k.a.* 1995 Hot Spot ESD), and the Amended Record of Decision for the Hot Spot Operable Unit issued by EPA on April 27, 1999 (OU2 Amended ROD, *a.k.a.* 1998 Upper and Lower Harbor ROD). This Administrative Record also incorporates, by reference, the Administrative Record for the Administrative Order for Property Access for OU2, dated September 10, 1993, and the Administrative Record for the Administrative Order for Property Access for OU1, dated January 9, 2001.

This Administrative Record replaces the Administrative Record file for the Draft Sixth Explanation of Significant Difference (ESD) - Upper and Lower Harbor Operable Unit (OU) 1 and Outer Harbor Operable Unit (OU) 3 released on June 27, 2017 for public comment.

This Administrative Record is available for review at:

https://semspub.epa.gov/src/collection/01/AR65253

For general information of the site:

https://www.epa.gov/superfund/newbedford

EPA New England
OSRR Records & Information Center
5 Post Office Square, Suite 100 (OSRR 02-3)
Boston, MA 02109-3912
(by appointment)
(617) 918-1440 (phone)
(617) 918- 0440 (fax)

New Bedford Free Public Library
613 Pleasant Street
New Bedford, MA 02740
(508) 991-6280 (phone)
(508) 991-6268 (fax)
www.newbedford-ma.gov/library/

This Administrative Record is the administrative record required by Section 113(j)(1) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. § 9613(j)(1), which would be reviewed in any judicial action concerning the adequacy of any response action ordered by EPA, in particular OU1 ESD6.

Questions about the Administrative Record should be directed to the EPA New England Remedial Project Manager at EPA New England.

# NEW BEDFORD

## AR Collection: 65253

## Sixth Explanation of Significant Differences (ESD), 09-15-2017

## AR Collection Index Report

## ***For External Use***

**File Break:** **03.06 - REMEDIAL INVESTIGATION REPORTS**

**599078** **REMEDIAL INVESTIGATION (RI) REPORT**

**# of Pages:** 4924
**Doc Date:** 06/01/2017
**Resource Type:** Report
**Access Control:** Uncontrolled

**Author:** , WOODS HOLE GROUP INC
**Addressee:** , US ARMY CORPS OF ENGINEERS - NEW ENGLAND DISTRICT

**File Break:** **04.06 - FEASIBILITY STUDY REPORTS**

**63864** **DRAFT FINAL SUPPLEMENTAL FEASIBILITY STUDY (FS) EVALUATION FOR UPPER BUZZARDS BAY**

**# of Pages:** 179
**Doc Date:** 05/01/1992
**Resource Type:** Report
**Access Control:** Uncontrolled

**Author:** ALAN S FOWLER, EBASCO SERVICES INC
**Addressee:**

**File Break:** **05.01 - CORRESPONDENCE (ROD)**

**605891** **PUBLIC COMMENT ON SIXTH EXPLANATION OF SIGNIFICANT DIFFERENCES (ESD)**

**# of Pages:** 2
**Doc Date:** 07/27/2017
**Resource Type:** Letter
**Access Control:** Uncontrolled

**Author:** KORRIN N PETERSEN, COALITION FOR BUZZARDS BAY
**Addressee:** DAVE LEDERER, US EPA REGION 1

**AR Collection: 65253**

**Sixth Explanation of Significant Differences (ESD), 09-15-2017**

**AR Collection Index Report**

*****For External Use*****

**File Break: 05.01 - CORRESPONDENCE (ROD)**

**605894** **STATE CONCURRENCE LETTER FOR SIXTH EXPLANATION OF SIGNIFICANT DIFFERENCES (ESD) - UPPER AND LOWER HARBOR OPERABLE UNIT (OU 1) AND OUTER HARBOR OPERABLE UNIT (OU3)**

**# of Pages:** 3
**Doc Date:** 09/10/2017
**Resource Type:** Letter
**Access Control:** Uncontrolled

**Author:** PAUL LOCKE, MA DEPT OF ENVIRONMENTAL PROTECTION
**Addressee:** BRYAN OLSON, US EPA REGION 1

**File Break: 05.04 - RECORD OF DECISION (ROD)**

**599376** **PROPOSED SIXTH EXPLANATION OF SIGNIFICANT DIFFERENCES (ESD) - UPPER AND LOWER HARBOR OPERABLE UNIT 1 (OU1) AND THE OUTER HARBOR OPERABLE UNIT 3 (OU3)**

**# of Pages:** 17
**Doc Date:** 06/01/2017
**Resource Type:** Report
**Access Control:** Uncontrolled

**Author:** , US EPA REGION 1
**Addressee:**

**605896** **ATTACHMENT D - RESPONSE TO COMMENTS ON SIXTH EXPLANATION OF SIGNIFICANT DIFFERENCES (ESD) - UPPER AND LOWER HARBOR OPERABLE UNIT 1 (OU1) AND OUTER HARBOR OPERABLE UNIT 3 (OU3)**

**# of Pages:** 11
**Doc Date:**
**Resource Type:** Letter
**Access Control:** Uncontrolled

**Author:** , US EPA REGION 1
**Addressee:**

**File Break:** **05.04 - RECORD OF DECISION (ROD)**

**605897** **SIXTH EXPLANATION OF SIGNIFICANT DIFFERENCES (ESD) - UPPER AND LOWER HARBOR OPERABLE UNIT 1 (OU1) AND OUTER HARBOR OPERABLE UNIT 3 (OU3)**

**# of Pages:** 43
**Doc Date:**
**Resource Type:** Report
**Access Control:** Uncontrolled

**Author:** , US EPA REGION 1
**Addressee:**

**File Break:** **07.05 - REMEDIAL ACTION DOCUMENTS**

**583616** **LONG TERM MONITORING (LTM) PROGRAM: COMPARATIVE ANALYSIS OF THE 2014 LTM COLLECTION**

**# of Pages:** 21
**Doc Date:** 09/23/2015
**Resource Type:** Report
**Access Control:** Uncontrolled

**Author:** BARBARA J BERGEN, NATIONAL HEALTH AND ENVIRONMENTAL EFFECTS RESEARCH LABORATORY (NHEERL)
**Addressee:**

**583617** **LONG TERM MONITORING (LTM) SURVEY 6: FINAL SUMMARY REPORT**

**# of Pages:** 1978
**Doc Date:** 09/01/2015
**Resource Type:** Report
**Access Control:** Uncontrolled

**Author:** , BATTELLE
**Addressee:** , US ARMY CORP ENGINEERS

**File Break:** **07.05 - REMEDIAL ACTION DOCUMENTS**

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**599080** **FINAL 2017 PILOT UNDERWATER CAP BATHYMETRIC SURVEY REPORT**

**# of Pages:** 236
**Doc Date:** 06/01/2017
**Resource Type:** Report
**Access Control:** Uncontrolled

**Author:** , JACOBS

**Addressee:** , US ARMY CORPS OF ENGINEERS - NEW ENGLAND DISTRICT

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**599091** **PCB TRANSPORT AND FATE MODELING AT NEW BEDFORD HARBOR**

**# of Pages:** 189
**Doc Date:** 06/01/2017
**Resource Type:** Report
**Access Control:** Uncontrolled

**Author:** LAWRENCE BURKHARD, US EPA

JOSEPH Z GAILANI, US ARMY ENGINEER RESEARCH AND DEVELOPMENT CENTER

KARL GUSTAVSON, US EPA

EARL HAYTER, US ARMY CORPS OF ENGINEERS

DAVE LEDERER, US EPA REGION 1

ELLEN LORIO, US ARMY CORPS OF ENGINEERS - NEW ENGLAND DISTRICT

JARRELL SMITH, US ARMY CORPS OF ENGINEERS

ELAINE STANLEY, US EPA REGION 1

**Addressee:** , US EPA REGION 1

**AR Collection: 65253**

**Sixth Explanation of Significant Differences (ESD), 09-15-2017**

**AR Collection Index Report**

*****For External Use*****

**File Break:** **13.03 - NEWS CLIPPINGS/PRESS RELEASES**

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**605895** **ATTACHMENT B - PUBLIC MEETING NOTICE REGARDING PROPOSED SIXTH EXPLANATION OF SIGNIFFICANT DIFFERENCES (ESD) - UPPER AND LOWER HARBOR OPERABLE UNIT 1 (OU1) AND OUTER HARBOR OPERABLE UNIT 3 (OU3)**

**# of Pages:** 1

**Doc Date:** 06/23/2017

**Resource Type:**
Publication

**Access Control:**
Uncontrolled

**Author:** , THE STANDARD TIMES

**Addressee:**

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**Number of Documents in Administrative Record:** **12**

# Selected Key Guidance Documents

EPA Guidance Documents may be reviewed at the OSRR Records and Information Center in Boston, MA

| DOCNUMBER | DOCDATE | TITLE | OSWEREPAID |
|---|---|---|---|
| 2002 | 10/1/1988 | INTERIM FINAL GUIDANCE FOR CONDUCTING REMEDIAL INVESTIGATIONS AND FEASIBILITY STUDIES UNDER CERCLA. | OSWER #9355.3-01 |
| C525 | 7/1/1999 | GUIDE TO PREPARING SUPERFUND PROPOSED PLANS RECORDS OF DECISION AND OTHER REMEDY SELECTION DECISION DOCUMENTS. | OSWER # 9200.1-23P |

**ATTACHMENT B**

**PUBLIC NOTIFICATION OF THE ESD**

**Sixth Explanation of Significant Differences for the**
**New Bedford Harbor Superfund Site, New Bedford, Massachusetts**

## Legals

**Public Meeting Notice:**
**New Bedford Harbor**
**Site Update**
**Tuesday, June 27, 2017**
**6 pm - 8 pm**
**National Parks Building,**
**33 Williams Street**
**New Bedford, MA**

US EPA will hold a public meeting to update the public on the status of the New Bedford Harbor Superfund Site and announce a proposed sixth **Explanation of Significant Differences (ESD)** for the New Bedford Harbor Superfund Site in New Bedford, MA.

EPA is proposing through ESD6 to expand the Operable Unit (OU) 1 remedy, which primarily addresses the clean-up of the inner harbor to include the OU3 area which includes about 17,000 acres located outside the New Bedford Hurricane Barrier. ESD6 is based on the key findings of the 2017 Remedial Investigation of the Outer Harbor, including the long-term monitoring results. The draft ESD will be presented at the public meeting and opened for public comment the following day, on June 28th.

***Public Comment Period:***

A formal public comment period on this draft ESD will run from June 28, 2017 through July 27, 2017. Beginning June 28, 2017, EPA will accept written and e-mailed comments on this ESD which will be included in the administrative record. Submit your comments by mail, hand delivery/courier, or email to:

Kimberly White,
Remedial Project Manager
New Bedford Harbor
Superfund Site
EPA Region 1,
Office of Site Remediation
and Restoration
MC: OSRR-07-1
5 Post Office Sq., Suite 100,
Boston, MA 02119
NewBedfordHarbor@
epa.gov

A copy of EPA's proposed ESD for the New Bedford Harbor Superfund Site and its Administrative Record File as well as the original Record of Decision, previous ESDs, previous Administrative Records for the Site, and other technical documents related to the site are available for review on EPA's web page http://www2.epa.gov/new-bedford-harbor and at the following locations:

The site information repository at the New Bedford Free Public Library, 613 Pleasant Street, 2nd Floor Reference Department, New Bedford, MA 02740.

The U.S. Environmental Protection Agency Records Center located at 5 Post Office Square, Suite 100, Boston, Massachusetts. The Records Center is open Monday through Friday, 9:00 am until 5:00 pm; for an appointment to view the records at EPA's office please call at 617-918-1440.

For more information on EPA's proposed Explanation of Significant Differences or cleanup of the New Bedford Harbor Superfund Site, contact:

Kelsey Dumville,
EPA Community
Involvement Coordinator
Dumville.kelsey@epa.gov
Office: 617-918-1003

June 23

**ATTACHMENT C**

**DEPARTMENT OF ENVIRONMENTAL PROTECTION (MASSDEP)**
**CONCURRENCE WITH THE ESD**

**Sixth Explanation of Significant Differences for the**
**New Bedford Harbor Superfund Site, New Bedford, Massachusetts**

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection
One Winter Street Boston, MA 02108 • 617-292-5500

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Matthew A. Beaton
Secretary

Martin Suuberg
Commissioner

September 10, 2017

Mr. Bryan Olson, Director
Office of Site Remediation and Restoration
U.S. EPA Region I
Suite 100
5 Post Office Square
Boston, MA 02109

Subject: ESD #6 MassDEP Concurrence Letter
Upper and Lower Harbor Operable Unit (OU1)
Outer Harbor Operable Unit (OU3)
New Bedford Harbor Superfund Site

Dear Mr. Olson:

The Department of Environmental Protection (MassDEP) has reviewed the U.S. Environmental Protection Agency's (EPA's) proposed Explanation of Significant Differences #6 (ESD #6). ESD #6 would modify the selected remedy for Operable Unit #1 (OU1) of the New Bedford Harbor Superfund Site (the Site). For the reasons and subject to the considerations stated below, MassDEP concurs with the modifications to the OU1 selected remedy proposed in ESD #6.

Site Background. EPA selected a remedy for OU1, also referred to as the Upper and Lower Harbor Operable Unit, in a Record of Decision (ROD) dated September 25, 1998.[1] The OU1 ROD explains how EPA has divided the Site for purposes of investigation and remediation. "The [Site] has been divided into three operable units, or phases of site cleanup: The hot spot operable unit,[2] the upper and lower harbor operable unit (which this ROD encompasses) and the Buzzards Bay or outer harbor operable unit."[3] The lower harbor is bounded to the south by the New Bedford hurricane barrier and connects to the outer harbor through a 150 wide opening in the hurricane barrier.

[1] From 2001 through 2015, EPA modified the OU1 selected remedy through a series of five explanations of significant differences (ESDs #1 through #5).
[2] In 1990, EPA issued a Record of Decision for the Hot Spot Area (referred to as Operable Unit 2 or OU2) of the Site, The selected remedy for OU2 was also subsequently modified through ESDs.
[3] Section IV. Scope and Role of Operable Unit, OU1 ROD p. 10.

OU3 Remedial Investigation. In 2009, EPA initiated a remedial investigation (RI) of the outer harbor operable unit, designated OU3. In June, 2017, EPA completed the OU3 RI. The OU3 RI report concludes that PCB contamination in the outer harbor currently poses human health risks because of consumption of PCB contaminated seafood and ecological risks to various receptors because of diet or direct contact with PCB contaminated media (sediments and water column). The RI report also concludes that the PCB concentrations in OU3 sediments are generally low (80% being below 1 ppm PCBs) and are overall decreasing over time; despite the fact that PCBs from OU1 (inside the hurricane barrier) are currently contributing a measureable amount of PCBs to OU3 by tidally driven surface water flux. Finally, the report states that PCB concentrations in the water from inside the hurricane barrier are expected to continue to decrease with time due to the OU1 remedial action removing and disposing of contaminated sediments from within the upper and lower harbor.

ESD #6 Summary. EPA is proposing to modify the OU1 Remedy to expand the OU1 area to include the OU3 area and eliminate the designation of "OU3". This ESD is not changing any of the remedial components of the OU1 Remedy. EPA will continue to perform the OU1 Remedy, which includes implementing institutional controls on seafood consumption (seafood advisories, signage, and educational campaigns) and the performance of long-term seafood monitoring. EPA will continue to monitor the effect of the completion of the OU1 Remedy on the entire Site, including the Outer Harbor. The OU1 selected remedy involves dredging of PCB contaminated sediments in the Upper and Lower Harbor that are above the selected cleanup levels, followed by either off-site disposal or on-site disposal into a Confined Aquatic Disposal (CAD) cell. This ongoing lower and upper harbor dredging is expected to reduce the level of PCB contamination entering the outer harbor driven by flux through the hurricane barrier. The ongoing benthic and seafood monitoring within the outer harbor is expected to continue and will aid in confirming the reductions in PCB levels in fish. In addition, ongoing 5-Year Reviews, which evaluate the effectiveness of all the selected remedies, are expected to continue for the total site area. Finally, ESD #6 states that EPA will address any additional remedial measures that may be needed through a future decision document.

Considerations of MassDEP Concurrence. MassDEP concurs with the further modifications to the selected remedy described in ESD #6, subject to the following considerations regarding future cleanup activities:

1. Confirm Accuracy of Flux Model. The flux model estimates that the concentration of PCBs in water flowing from the lower harbor through the opening in the hurricane barrier into the outer harbor will be significantly reduced since the start of the remedial dredging by the time the remedial action is completed.[4] Once the dredging component of the OU1 remedial action has been completed, the flux model's accuracy needs to be confirmed with a follow up study.

2. Address the Need for Specific Sediment Cleanup Levels for the Outer Harbor. Although the current OU1 selected remedy identifies cleanup levels for subtidal sediment in the upper harbor (achieve a level of PCB contamination of less than 10 ppm) and in the lower harbor (achieve a level of PCB contamination of less than 50 ppm), it does not do so for the outer

[4] *PCB Transport and Fate Modelling at New Bedford Harbor, MA by Hayter et al.*, US Army Corps of Engineers, ERDC Letter Report, June 2017.

harbor.[5] Nor does the OU3 RI, which identifies human health and ecological risks in the outer harbor due to PCB contamination, yet does not identify cleanup levels specifically for outer harbor subtidal and mudflats sediment areas or for outer harbor intertidal shoreline areas.

As EPA noted in ESD #6, "An evaluation of exposure pathways suggests surface water, rather than sediment, is the primary source of PCBs to receptors in OU3." Accordingly, the need for and the identification of cleanup levels for the outer harbor sediment remains to be determined.

3. Future Remedial Decision Document. ESD #6 states in part: "The need for any additional remediation measures in the Outer Harbor area (of the enlarged OU1) will be addressed in a future decision document, after the OU1 dredging within the Upper and Lower Harbors has been completed and its impact on the Outer Harbor is evaluated." In the event that the evaluation concludes that levels of sediment contamination in the Outer Harbor present an unacceptable risk to human health and the environment, EPA should evaluate the need for establishing appropriate cleanup levels for the Outer Harbor, including evaluating potential sediment cleanup levels, in accordance with CERCLA and the NCP. Such a future decision document would be needed to evaluate the remedial options against the required CERCLA and NCP criteria, and to establish a means of determining when the cleanup levels for the Outer Harbor have been achieved. Time estimates for the achievement of any new cleanup goals would be calculated and should be included in the future decision document.

4. Seafood Risk Level. The OU3 RI indicates the off-site seafood PCB concentrations are in excess of 0.02 ppm PCBs (*i.e.*, higher than a $10^{-5}$ risk). EPA should establish on-site seafood PCB concentrations goals for the outer harbor portion of the Site, taking into consideration the off-site levels of seafood PCB contamination.

If you have any questions or comments on this letter, please contact, me or Paul Craffey at (617) 292-5591.

Very truly yours,

Paul W. Locke,
Assistant Commissioner

e-file: 20170910 ESD 6 Concurrence Letter

[5] Although the OU1 ROD did not establish cleanup levels for the outer harbor in its entirety, it did establish a cleanup level for one area within the outer harbor, known as the Cornell Outfall (achieve a level of PCB contamination of less than 50 ppm).

**ATTACHMENT D - RESPONSE TO COMMENTS**

**Sixth Explanation of Significant Differences for the**
**New Bedford Harbor Superfund Site, New Bedford, Massachusetts**

## PREFACE

In accordance with 40 C.F.R. § 300.825, EPA is providing this Responsiveness Summary to document EPA's responses to questions, comments, and concerns raised during the public comment period on the draft Sixth Explanation of Significant Differences prepared by the EPA for the New Bedford Harbor Superfund Site.

EPA held a public meeting on June 26, 2017 to present the proposed ESD. During the meeting, representatives from EPA answered questions about the ESD and discussed upcoming site activities for the Site in general. EPA also used the meeting to announce the opening of the 30-day comment period. A notice of the 30-day comment period, which lasted from June 27 to July 28, 2017, was published in the New Bedford Standard Times newspaper.

During the comment period, EPA received a single set of comments from the Buzzards Bay Coalition, and no other parties submitted comments. EPA considered all of the comments provided during the comment period and summarized them in this document before finalizing this ESD. None of the comments received by EPA were in opposition to any of the changes brought forth in the ESD.

EPA's responses to the comments received during the comment period are included in this Responsiveness Summary. The original letter and comments submitted to EPA are included in the Administrative Record.

## COMMENTS RECEIVED AND EPA RESPONSE

The comments provided are presented below and the EPA response follows.

***Comments from Buzzards Bay Coalition (BBC)***
BBC submitted two comments requesting clarification on information presented in the ESD. Each comment is addressed separately below:

BBC Comment 1:
*The ESD is unclear on how it reached the conclusion that PCB concentrations in the Outer Harbor range from .0003 to 19.5 ppm. Several data sources are mentioned but none of the data is presented. Please provide the number of samples taken in the Outer Harbor and over what time period and the PCB concentrations of those samples.*

EPA Response to Comment 1:
ESD is based on several data sources which are provided in the Administrative Record. The datasets used to characterize sediment PCB concentrations in OU3 are listed below along with a reference to tables where the data is presented in the associate report (with administrative record document identification [DOC ID]):

- 2009 RI Sampling Data (Remedial Investigation (RI) Report, WHG, June 2017 [DOC ID: 599078]),
- EPA's Long Term Monitoring Data (Long Term Monitoring (LTM) Program: Comparative analysis of the 2014 LTM collection, NHEERL, September 2015 [DOC ID: 583616]), and
- OU3 Cap Area Sampling Data (Final 2017 Pilot Underwater Cap Bathymetric Survey Report, Jacobs, June 2017 [DOC ID: 599080]).

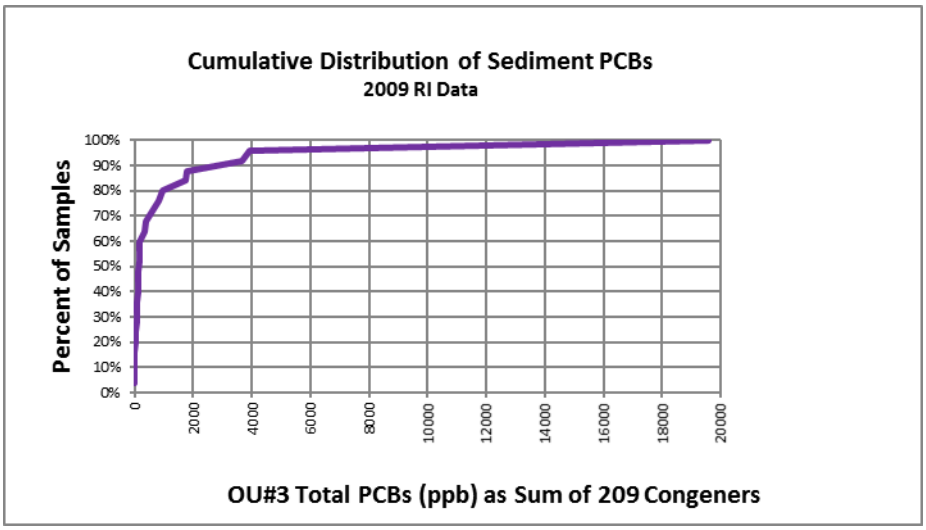
In addition, Tables 1, 2, 3 at the end of this Attachment D provides the PCB concentration data for the RI, LTM and Cap Monitoring programs, respectively. A summary of the three datasets including the number of samples collected, the time period of the sampling and the PCB analysis are presented below.

| Sampling Program | Purpose | Number of Samples | Sampling Dates | Sample Depth | PCB Analysis |
|---|---|---|---|---|---|
| **Long Term Monitoring** | Characterize surface sediment PCBs throughout the entire New Bedford Harbor Site, and changes over time | 23 in OU3 | 1993, 1995, 1999, 2004, 2009, 2014 | Top 2cm | 18 Congeners |
| **OU3 RI Sampling** | Characterize conditions within OU3, particularly in areas not previously sampled, and where ecological receptors (or their prey) may become exposed to PCBs | 29 Within OU3 | 2009 | Top 6 in | 209 Congeners |
| **Cap Area Monitoring** | Characterize sediment PCB concentrations in the area offshore of CDE where capping occurred in 2005 and 2015 | Varies by Year<br><br>Generally 13 to 17 | Pre-cap sediment core samples, 1999 and 2001<br><br>Post-cap surface sediment monitoring 2005, 2006, 2007, 2008, 2010, 2012, 2017 | Pre-cap sediment cores: Approx. top 1 ft, 1-2 ft, & 2-3 ft<br><br>Post-cap monitoring samples: Top 3in | 18 Congeners |

The 2009 RI sampling data was the only dataset used to develop the summary statistics referenced in the BBC comment 1. The rationale for using only this dataset for the summary was based on the type of PCB analysis that was used, which included 209 Congeners, and the distribution of the samples. The 2009 RI sampling effort included collection of 29 surface sediment samples from OU3, which are shown in the 2009 RI Report as Figure 5.1-2 Total PCBs in Surface Sediment, 2009 RI Data. The sediment concentration data from this sampling program are shown Table 6.3-11 of the 2009 RI Report and also summarized in Table 1 at the end of this Attachment D, with comments and summary statistics.

Summary statistics were calculated in order to derive the range of values, 0.0003 to 19.5 ppm, as well as a mean and median concentration. A cumulative distribution calculation was done to evaluate the percent of samples below 1ppm. Data used in the computations included 27 of the 29 samples, because

two of the samples collected in 2009 were located in an area that was capped in 2015 with clean material. Therefore, those 2 samples no longer represent surface sediment PCB concentrations. Table 1 shows PCB concentration data for all 29 samples, with the 2 from the cap area shown in light gray text. The cumulative distribution of the data is shown in the figure below. It can be seen that approximately 80% of the samples have PCB concentrations below 1ppm (1000 ppb).




BBC Comment 2:

*The ESD indicates that sediment grab samples were taken in the Outer Harbor at 2cm deep. Please provide the sedimentation rate for the Outer Harbor. Do higher concentrations of PCBs exist below the 2cm? Furthermore, please provide an explanation of sediment transport in the Outer Harbor and whether a storm event could uncover higher concentrations of sediment.*

EPA Response to Comment 2:

*In response to the sedimentation rate for the Outer Harbor:* Sediment deposition rates for OU#3 were not investigated as part of the site RI, and no detailed analyses have been identified in the open literature. Buzzards Bay overall has been characterized as a net depositional area with a progression of silts and clays being transported from the outer continental shelf into the Bay (Howes and Goehringer, 1996). However, scour events occur at certain places and times. Long-term monitoring program will identify if there are any issue with scour going forward.

*In response to the question of whether there are higher PCB concentrations in sediments below 2cm:* Sediment PCB concentrations below 2cm depth were analyzed in the 2009 RI samples (where depth of sample was 6 inches) and in pre-cap sediment cores in the area just offshore of Cornell-Dubilier Electronics Facility (where sediment cores as deep as 3 feet were collected). Data from these sampling efforts, prior to 2005, are provided in Tables 1 and 3 below. Tables 1 and 3 show that elevated PCB concentrations in sediment were located in the vicinity of the cap; however, these areas are now covered with capping material.

*In response to the request to provide an explanation of sediment transport in the Outer Harbor and whether a storm event could uncover higher concentrations of sediment:*
The only areas where the available data showed higher PCB concentrations in deep sediment are in places now covered by the 2005 and 2015 caps. These areas were capped with approximately 3 feet of clean sediment. The pilot underwater capped area has been monitored for changes in spatial extent, thickness of cap through bathymetric surveys, PCB levels and total organic carbon ("TOC") of the cap. Monitoring of the cap has been performed in 2006, 2007, 2009, 2010, 2011, 2012 and 2016. Recent monitoring shows surface sediment PCB concentrations remain low, suggesting the more contaminated sediments under the cap are not being exposed during storm events (see Table 3). Monitoring data continue to support that the pilot capping operation was successful and has consistently shown that the cap is effective at isolating underlying PCBs despite being located in the open water of Buzzards Bay.

**Table 1. 2009 OU3 RI Sediment Sample PCB Concentration Data** (Total PCBs as sum of 209 congeners, non-detects set to 0)

| STATION_ID | PCB Concentration (Sum of 209 Congeners) | Units | Comment |
|---|---|---|---|
| S01 | 102.48 | ug/Kg | Surface Grab to 6" depth |
| S02 | 0.33 | ug/Kg | Surface Grab to 6" depth |
| S03 | 73.22 | ug/Kg | Surface Grab to 6" depth |
| S04 | 105.41 | ug/Kg | Surface Grab to 6" depth |
| S05 | 13.14 | ug/Kg | Surface Grab to 6" depth |
| S06 | 16.38 | ug/Kg | Surface Grab to 6" depth |
| S07 | 2.94 | ug/Kg | Surface Grab to 6" depth |
| S08 | 3644.33 | ug/Kg | Surface Grab to 6" depth |
| S09 | 92.83 | ug/Kg | Surface Grab to 6" depth |
| S10 | 373.93 | ug/Kg | Surface Grab to 6" depth |
| S11 | 19583.51 | ug/Kg | Surface Grab to 6" depth |
| ~~S12~~ | ~~3587.51~~ | ug/Kg | Area is now under the 2015 cap. Therefore sample does not represent current surface sediment concentration |
| ~~S13~~ | ~~22139.58~~ | ug/Kg | |
| S14 | 577.18 | ug/Kg | Surface Grab to 6" depth |
| S15 | 228.01 | ug/Kg | Surface Grab to 6" depth |
| S16 | 1766.35 | ug/Kg | Surface Grab to 6" depth |
| S17 | 1.21 | ug/Kg | Surface Grab to 6" depth |
| S18 | 58.65 | ug/Kg | Surface Grab to 6" depth |
| S19 | 3926.57 | ug/Kg | Surface Grab to 6" depth |
| S20 | 166.35 | ug/Kg | Surface Grab to 6" depth |
| S21 | 1752.88 | ug/Kg | Surface Grab to 6" depth |
| S22 | 330.87 | ug/Kg | Surface Grab to 6" depth |
| S23a | 0.73 | ug/Kg | Surface Grab to 6" depth |
| S24 | 816.05 | ug/Kg | Surface Grab to 6" depth |
| S25 | 598.39 | ug/Kg | Surface Grab to 6" depth |
| S26 | 937.22 | ug/Kg | Surface Grab to 6" depth |
| S27 | 105.78 | ug/Kg | Surface Grab to 6" depth |
| S28 | 162.90 | ug/Kg | Surface Grab to 6" depth |
| S29 | 187.40 | ug/Kg | Surface Grab to 6" depth |
| **Minimum** | 0.33 | Minimum of values used in calculating surface sediment summary statistics (excludes samples now under the cap) | |
| **Maximum** | 19583.51 | Maximum of values used in calculating surface sediment summary statistics (excludes samples now under the cap) | |
| **Average** | 162.90 | Average of values used in calculating surface sediment summary statistics (excludes samples now under the cap) | |
| **Median** | 1392.79 | Median of values used in calculating surface sediment summary statistics (excludes samples now under the cap) | |

**Table 2. Long Term Monitoring Program Sediment PCB Concentration Data** (Total PCBs as Sum of 18 Congeners, non-detects set to 0)

| Sediment Samples from LTM Sampling (PCBs as Sum of 18 Congeners) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **LTM Station** | **1993** | **1995** | **1999** | **2004** | **2009** | **2014** | **Units** |
| 304 | 739.6 | 1478.3 | 500.0 | 730.0 | 1100.0 | 770.0 | ug/Kg |
| 306 | 113.7 | 2.4 | 16.0 | 3.4 | 2.8 | 1.7 | ug/Kg |
| 309 | 699.4 | 965.0 | 830.0 | 230.0 | 330.0 | 380.0 | ug/Kg |
| 310 | 1611.6 | 1243.6 | 1400.0 | 640.0 | 580.0 | 440.0 | ug/Kg |
| 311 | 7720.3 | 116.3 | 38.0 | 13.0 | 41.0 | 15.0 | ug/Kg |
| 317 | 1841.5 | 2346.4 | 2000.0 | 710.0 | 740.0 | 640.0 | ug/Kg |
| 318 | 38.3 | 36.6 | 16.5 | 8.8 | 9.5 | 11.0 | ug/Kg |
| 323 | 577.2 | 360.7 | 460.0 | 260.0 | 0.0 | 190.0 | ug/Kg |
| 324 | 1274.9 | 1268.7 | 1000.0 | 650.0 | 1000.0 | 460.0 | ug/Kg |
| 325 | 551.5 | 629.5 | 660.0 | 360.0 | 380.0 | 270.0 | ug/Kg |
| 331 | 534.9 | 400.6 | 540.0 | 170.0 | 200.0 | 120.0 | ug/Kg |
| 332 | 83.3 | 72.0 | 65.0 | 11.0 | 61.0 | 21.0 | ug/Kg |
| 333 | 53.3 | 50.0 | 29.0 | 14.0 | 110.0 | 19.0 | ug/Kg |
| 334 | 287.8 | 226.3 | 210.0 | 55.0 | 150.0 | 96.0 | ug/Kg |
| 335 | 0.0 | 4.1 | 47.0 | 53.0 | 120.0 | 120.0 | ug/Kg |
| 338 | 206.6 | 200.9 | 160.0 | 36.0 | 140.0 | 71.0 | ug/Kg |
| 339 | 1733.7 | 104.6 | 110.0 | 24.0 | 84.0 | 55.0 | ug/Kg |
| 340 | 189.0 | 147.7 | 120.0 | 22.0 | 110.0 | 19.0 | ug/Kg |
| 341 | 67.5 | 49.6 | 67.0 | 14.0 | 20.0 | 24.0 | ug/Kg |
| 345 | 318.8 | 116.5 | 110.0 | 15.0 | 90.0 | 51.0 | ug/Kg |
| 346 | 21.3 | 16.6 | 15.0 | 3.9 | 10.0 | 3.0 | ug/Kg |
| 349 | 52.9 | 30.8 | 51.0 | 5.7 | 6.6 | 9.4 | ug/Kg |
| 352 | 4.4 | na | 12.0 | 4.4 | 20.0 | 18.0 | ug/Kg |
| **Minimum** | 0.0 | 2.4 | 12.0 | 3.4 | 0.0 | 1.7 | ug/Kg |
| **Maximum** | 7720.3 | 2346.4 | 2000.0 | 730.0 | 1100.0 | 770.0 | ug/Kg |
| **Average** | 814.0 | 448.5 | 367.7 | 175.4 | 230.6 | 165.4 | ug/Kg |
| **Median** | 287.8 | 132.1 | 110.0 | 24.0 | 110.0 | 55.0 | ug/Kg |
| Shaded values are average of 2 duplicate samples. | | | | | | | |

**Table 3. Cap Area Sediment PCB Conservation Data. PCBs as Sum of 18 Congeners.** Note sediment depth varies by study, and sampling began in 1999.

| Cap Area Sediment Samples<br>Pre-Cap Cores (1999 -2001) and Post-Cap Grab Samples (2005 -2017)<br>PCBs as Sum of 18 Congeners | | | | | |
|---|---|---|---|---|---|
| STUDY_ID | STATION_ID | Sampling Year | Sediment Depth | PCB Concentration Sum of 18 Congeners | Units |
| PHASEI | S-210 | 1999 | Top 12 in | 14300 | ug/Kg |
| PHASEI | S-210 | 1999 | 12-24 in | 436 | ug/Kg |
| PHASEI | S-210 | 1999 | 12-24 in | 354 | ug/Kg |
| PHASEI | S-210 | 1999 | 24-36 in | 114 | ug/Kg |
| PHASEI | S-211 | 1999 | Top 12 in | 26500 | ug/Kg |
| PHASEI | S-211 | 1999 | 12-24 in | 10600 | ug/Kg |
| PHASEI | S-211 | 1999 | 24-36 in | 19.9 | ug/Kg |
| PHASEI | S-212 | 1999 | Top 12 in | 10700 | ug/Kg |
| PHASEI | S-212 | 1999 | 12-24 in | 245 | ug/Kg |
| PHASEI | S-212 | 1999 | 24-36 in | 57.5 | ug/Kg |
| PHASEI | S-213 | 1999 | Top 12 in | 12900 | ug/Kg |
| PHASEI | S-213 | 1999 | 12-24 in | 175 | ug/Kg |
| PHASEI | S-213 | 1999 | 24-36 in | 151 | ug/Kg |
| PHASEI | S-213 | 1999 | 24-36 in | 161 | ug/Kg |
| PHASEI | S-214 | 1999 | Top 12 in | 3800 | ug/Kg |
| PHASEI | S-214 | 1999 | 12-24 in | 233 | ug/Kg |
| PHASEI | S-214 | 1999 | 24-36 in | U | ug/Kg |
| PHASEI | S-215 | 1999 | Top 12 in | 3080 | ug/Kg |
| PHASEI | S-215 | 1999 | 12-24 in | U | ug/Kg |
| PHASEI | S-215 | 1999 | 24-36 in | U | ug/Kg |
| PHASE3A | S-3181 | 2001 | Top 12 in | 16800 | ug/Kg |
| PHASE3A | S-3181 | 2001 | 18-24 in | 255 | ug/Kg |
| PHASE3A | S-3182 | 2001 | Top 14 in | 22100 | ug/Kg |
| PHASE3A | S-3182 | 2001 | 14-26 in | 2040 | ug/Kg |
| PHASE3A | S-3183 | 2001 | Top 16 in | 7640 | ug/Kg |
| PHASE3A | S-3183 | 2001 | 14-26 in | 157 | ug/Kg |
| PHASE3A | S-3184 | 2001 | Top 12 in | 14700 | ug/Kg |
| PHASE3A | S-3184 | 2001 | Top 24 in | 193 | ug/Kg |
| PHASE3A | S-3185 | 2001 | 10-17 in | 229 | ug/Kg |
| PHASE3A | S-3185 | 2001 | Top 10 in | 23400 | ug/Kg |
| PHASE3A | S-3185 | 2001 | 1.4-2 ft | U | ug/Kg |
| PHASE3A | S-3186 | 2001 | Top 12 in | 20500 | ug/Kg |
| PHASE3A | S-3186 | 2001 | 1.0-1.9 ft | 583 | ug/Kg |

| Cap Area Sediment Samples<br>Pre-Cap Cores (1999 -2001) and Post-Cap Grab Samples (2005 -2017)<br>PCBs as Sum of 18 Congeners | | | | | |
|---|---|---|---|---|---|
| STUDY_ID | STATION_ID | Sampling Year | Sediment Depth | PCB Concentration<br>Sum of 18 Congeners | Units |
| PHASE3A | S-3187 | 2001 | Top 12 in | 14700 | ug/Kg |
| PHASE3A | S-3187 | 2001 | 12-24 in | 19000 | ug/Kg |
| PHASE3A | S-3188 | 2001 | Top 12 in | 276 | ug/Kg |
| PHASE3A | S-3188 | 2001 | 12-24 in | U | ug/Kg |
| PHASE3A | S-3188 | 2001 | 12-24 in | U | ug/Kg |
| PHASE3A | S-3189 | 2001 | Top 12 in | 15300 | ug/Kg |
| PHASE3A | S-3189 | 2001 | 12-24 in | 15700 | ug/Kg |
| PHASE3A | S-3190 | 2001 | Top 12 in | 3670 | ug/Kg |
| PHASE3A | S-3190 | 2001 | 12-24 in | U | ug/Kg |
| PHASE3A | S-3191 | 2001 | Top 12 in | 4620 | ug/Kg |
| PHASE3A | S-3191 | 2001 | 12-24 in | 18000 | ug/Kg |
| PHASE3A | S-3192 | 2001 | 12-24 in | 25 | ug/Kg |
| PHASE3A | S-3192 | 2001 | Top 12 in | 18600 | ug/Kg |
| PHASE3A | S-3193 | 2001 | Top 12 in | 37600 | ug/Kg |
| PHASE3A | S-3193 | 2001 | 12-24 in | 50000 | ug/Kg |
| NBHMON2005 | OU-10 | 2005 | Top 3 in | 613 | ug/Kg |
| NBHMON2005 | OU-11 | 2005 | Top 3 in | 138 | ug/Kg |
| NBHMON2005 | OU-12 | 2005 | Top 3 in | 2620 | ug/Kg |
| NBHMON2005 | OU-13 | 2005 | Top 3 in | 3390 | ug/Kg |
| NBHMON2005 | OU-14 | 2005 | Top 3 in | 3740 | ug/Kg |
| NBHMON2005 | OU-15 | 2005 | Top 3 in | 1340 | ug/Kg |
| NBHMON2005 | OU-16 | 2005 | Top 3 in | 1230 | ug/Kg |
| NBHMON2005 | OU-17 | 2005 | Top 3 in | 171 | ug/Kg |
| NBHMON2005 | OU-2 | 2005 | Top 3 in | 406 | ug/Kg |
| NBHMON2005 | OU-3 | 2005 | Top 3 in | 584 | ug/Kg |
| NBHMON2005 | OU-4 | 2005 | Top 3 in | 208 | ug/Kg |
| NBHMON2005 | OU-5 | 2005 | Top 3 in | 718 | ug/Kg |
| NBHMON2005 | OU-6 | 2005 | Top 3 in | 1240 | ug/Kg |
| NBHMON2005 | OU-7 | 2005 | Top 3 in | 1470 | ug/Kg |
| NBHMON2005 | OU-8 | 2005 | Top 3 in | 1280 | ug/Kg |
| NBHMON2005 | OU-8 | 2005 | Top 3 in | 1760 | ug/Kg |
| NBHMON2005 | OU-9 | 2005 | Top 3 in | 822 | ug/Kg |
| TASK 2C | OU10 | 2006 | Top 3 in | 623 | ug/Kg |
| TASK 2C | OU11 | 2006 | Top 3 in | 1540 | ug/Kg |
| TASK 2C | OU12 | 2006 | Top 3 in | 1770 | ug/Kg |

| Cap Area Sediment Samples<br>Pre-Cap Cores (1999 -2001) and Post-Cap Grab Samples (2005 -2017)<br>PCBs as Sum of 18 Congeners | | | | | |
|---|---|---|---|---|---|
| STUDY_ID | STATION_ID | Sampling Year | Sediment Depth | PCB Concentration<br>Sum of 18 Congeners | Units |
| TASK 2C | OU13 | 2006 | Top 3 in | 6380 | ug/Kg |
| TASK 2C | OU14 | 2006 | Top 3 in | 1660 | ug/Kg |
| TASK 2C | OU15 | 2006 | Top 3 in | 1730 | ug/Kg |
| TASK 2C | OU16 | 2006 | Top 3 in | 866 | ug/Kg |
| TASK 2C | OU17 | 2006 | Top 3 in | 17 | ug/Kg |
| TASK 2C | OU2 | 2006 | Top 3 in | 177 | ug/Kg |
| TASK 2C | OU3 | 2006 | Top 3 in | 160 | ug/Kg |
| TASK 2C | OU4 | 2006 | Top 3 in | 602 | ug/Kg |
| TASK 2C | OU5 | 2006 | Top 3 in | 610 | ug/Kg |
| TASK 2C | OU6 | 2006 | Top 3 in | 384 | ug/Kg |
| TASK 2C | OU6 | 2006 | Top 3 in | 377 | ug/Kg |
| TASK 2C | OU7 | 2006 | Top 3 in | 880 | ug/Kg |
| TASK 2C | OU8 | 2006 | Top 3 in | 309 | ug/Kg |
| TASK 2C | OU9 | 2006 | Top 3 in | 506 | ug/Kg |
| TASK 2C | OU02 | 2007 | Top 3 in | 262 | ug/Kg |
| TASK 2C | OU03 | 2007 | Top 3 in | 217 | ug/Kg |
| TASK 2C | OU04 | 2007 | Top 3 in | 862 | ug/Kg |
| TASK 2C | OU05 | 2007 | Top 3 in | 296 | ug/Kg |
| TASK 2C | OU06 | 2007 | Top 3 in | 510 | ug/Kg |
| TASK 2C | OU07 | 2007 | Top 3 in | 656 | ug/Kg |
| TASK 2C | OU08 | 2007 | Top 3 in | 422 | ug/Kg |
| TASK 2C | OU09 | 2007 | Top 3 in | 685 | ug/Kg |
| TASK 2C | OU10_07 | 2007 | Top 3 in | 1200 | ug/Kg |
| TASK 2C | OU11_07 | 2007 | Top 3 in | 120 | ug/Kg |
| TASK 2C | OU12_07 | 2007 | Top 3 in | 1070 | ug/Kg |
| TASK 2C | OU13_07 | 2007 | Top 3 in | 898 | ug/Kg |
| TASK 2C | OU13_07 | 2007 | Top 3 in | 503 | ug/Kg |
| TASK 2C | OU14_07 | 2007 | Top 3 in | 705 | ug/Kg |
| TASK 2C | OU15_07 | 2007 | Top 3 in | 1190 | ug/Kg |
| TASK 2C | OU16_07 | 2007 | Top 3 in | 1550 | ug/Kg |
| TASK 2C | OU17_07 | 2007 | Top 3 in | 92.4 | ug/Kg |
| TASK 1C | OU02_08 | 2008 | Top 3 in | 1330 | ug/Kg |
| TASK 1C | OU03_08 | 2008 | Top 3 in | 88.3 | ug/Kg |
| TASK 1C | OU04_08 | 2008 | Top 3 in | 618 | ug/Kg |
| TASK 1C | OU05_08 | 2008 | Top 3 in | 108 | ug/Kg |

| Cap Area Sediment Samples<br>Pre-Cap Cores (1999 -2001) and Post-Cap Grab Samples (2005 -2017)<br>PCBs as Sum of 18 Congeners | | | | | |
|---|---|---|---|---|---|
| STUDY_ID | STATION_ID | Sampling Year | Sediment Depth | PCB Concentration Sum of 18 Congeners | Units |
| TASK 1C | OU06_08 | 2008 | Top 3 in | 498 | ug/Kg |
| TASK 1C | OU07_08 | 2008 | Top 3 in | 380 | ug/Kg |
| TASK 1C | OU08_08 | 2008 | Top 3 in | 193 | ug/Kg |
| TASK 1C | OU09_08 | 2008 | Top 3 in | 322 | ug/Kg |
| TASK 1C | OU10_08 | 2008 | Top 3 in | 209 | ug/Kg |
| TASK 1C | OU11_08 | 2008 | Top 3 in | 99.5 | ug/Kg |
| TASK 1C | OU12_08 | 2008 | Top 3 in | 282 | ug/Kg |
| TASK 1C | OU13_08 | 2008 | Top 3 in | 2310 | ug/Kg |
| TASK 1C | OU14_08 | 2008 | Top 3 in | 347 | ug/Kg |
| TASK 1C | OU15_08 | 2008 | Top 3 in | 841 | ug/Kg |
| TASK 1C | OU16_08 | 2008 | Top 3 in | 829 | ug/Kg |
| TASK 1C | OU16_08 | 2008 | Top 3 in | 709 | ug/Kg |
| TASK 1C | OU17_08 | 2008 | Top 3 in | 220 | ug/Kg |
| NBH OU3 2009 | NB09-S11 | 2009 | Top 6 in | 7490 | ug/Kg |
| NBH OU3 2009 | NB09-S12 | 2009 | Top 6 in | 1370 | ug/Kg |
| NBH OU3 2009 | NB09-S13 | 2009 | Top 6 in | 8680 | ug/Kg |
| NBH OU3 2009 | NB09-S14 | 2009 | Top 6 in | 218 | ug/Kg |
| NBH OU3 2009 | NB09-S15 | 2009 | Top 6 in | 89.1 | ug/Kg |
| NBHMON2010 | OU10_10 | 2010 | Top 3 in | 271 | ug/Kg |
| NBHMON2010 | OU11_10 | 2010 | Top 3 in | 99.4 | ug/Kg |
| NBHMON2010 | OU12_10 | 2010 | Top 3 in | 171 | ug/Kg |
| NBHMON2010 | OU13_10 | 2010 | Top 3 in | 361 | ug/Kg |
| NBHMON2010 | OU14_10 | 2010 | Top 3 in | 286 | ug/Kg |
| NBHMON2010 | OU15_10 | 2010 | Top 3 in | 546 | ug/Kg |
| NBHMON2010 | OU16_10 | 2010 | Top 3 in | 580 | ug/Kg |
| NBHMON2010 | OU17_10 | 2010 | Top 3 in | 91.8 | ug/Kg |
| NBHMON2010 | OU2_10 | 2010 | Top 3 in | 838 | ug/Kg |
| NBHMON2010 | OU3_10 | 2010 | Top 3 in | 578 | ug/Kg |
| NBHMON2010 | OU4_10 | 2010 | Top 3 in | 531 | ug/Kg |
| NBHMON2010 | OU5_10 | 2010 | Top 3 in | 154 | ug/Kg |
| NBHMON2010 | OU6_10 | 2010 | Top 3 in | 588 | ug/Kg |
| NBHMON2010 | OU7_10 | 2010 | Top 3 in | 225 | ug/Kg |
| NBHMON2010 | OU8_10 | 2010 | Top 3 in | 281 | ug/Kg |
| NBHMON2010 | OU9_10 | 2010 | Top 3 in | 323 | ug/Kg |
| NBH OU3 2012 | OU02-12 | 2012 | Top 1.2 in | 132 | ug/Kg |

| Cap Area Sediment Samples<br>Pre-Cap Cores (1999 -2001) and Post-Cap Grab Samples (2005 -2017)<br>PCBs as Sum of 18 Congeners | | | | | |
|---|---|---|---|---|---|
| STUDY_ID | STATION_ID | Sampling Year | Sediment Depth | PCB Concentration Sum of 18 Congeners | Units |
| NBH OU3 2012 | OU03-12 | 2012 | Top 1.2 in | 44.8 | ug/Kg |
| NBH OU3 2012 | OU04-12 | 2012 | Top 1.2 in | 504 | ug/Kg |
| NBH OU3 2012 | OU06-12 | 2012 | Top 1.2 in | 119 | ug/Kg |
| NBH OU3 2012 | OU07-12 | 2012 | Top 1.2 in | 87.1 | ug/Kg |
| NBH OU3 2012 | OU07-12-REP | 2012 | Top 1.2 in | 167 | ug/Kg |
| NBH OU3 2012 | OU08-12 | 2012 | Top 1.2 in | 67.8 | ug/Kg |
| NBH OU3 2012 | OU09-12 | 2012 | Top 1.2 in | 103 | ug/Kg |
| NBH OU3 2012 | OU12-12 | 2012 | Top 1.2 in | 200 | ug/Kg |
| NBH OU3 2012 | OU13-12 | 2012 | Top 1.2 in | 1020 | ug/Kg |
| NBH OU3 2012 | OU16-12 | 2012 | Top 1.2 in | 3110 | ug/Kg |
| NBH OU3 2012 | OU18-12 | 2012 | Top 1.2 in | 2020 | ug/Kg |
| NBH OU3 2012 | OU19-12 | 2012 | Top 1.2 in | 815 | ug/Kg |
| NBH OU3 2012 | OU21-12 | 2012 | Top 1.2 in | 2190 | ug/Kg |
| NBH OU3 2012 | OU22-12 | 2012 | Top 1.2 in | 630 | ug/Kg |
| NBH OU3 2012 | OU23-12 | 2012 | Top 1.2 in | 1490 | ug/Kg |
| NBH OU3 2012 | OU24-12 | 2012 | Top 1.2 in | 1310 | ug/Kg |
| NBH OU3 2012 | OU25-12 | 2012 | Top 1.2 in | 65.4 | ug/Kg |
| OU3CAP2017 | OU02 | 2017 | Top 3 in | 247 | ug/Kg |
| OU3CAP2017 | OU03 | 2017 | Top 3 in | 88.7 | ug/Kg |
| OU3CAP2017 | OU04 | 2017 | Top 3 in | 445 | ug/Kg |
| OU3CAP2017 | OU06 | 2017 | Top 3 in | 322 | ug/Kg |
| OU3CAP2017 | OU07 | 2017 | Top 3 in | 101 | ug/Kg |
| OU3CAP2017 | OU08 | 2017 | Top 3 in | 206 | ug/Kg |
| OU3CAP2017 | OU09 | 2017 | Top 3 in | 547 | ug/Kg |
| OU3CAP2017 | OU12 | 2017 | Top 3 in | 726 | ug/Kg |
| OU3CAP2017 | OU13 | 2017 | Top 3 in | 787 | ug/Kg |
| OU3CAP2017 | OU16 | 2017 | Top 3 in | 763 | ug/Kg |
| OU3CAP2017 | OU19 | 2017 | Top 3 in | 1190 | ug/Kg |
| OU3CAP2017 | OU20 | 2017 | Top 3 in | 34.7 | ug/Kg |
| OU3CAP2017 | OU22 | 2017 | Top 3 in | 171 | ug/Kg |
| OU3CAP2017 | OU23 | 2017 | Top 3 in | 219 | ug/Kg |
| OU3CAP2017 | OU23 | 2017 | Top 3 in | 310 | ug/Kg |
| OU3CAP2017 | OU25 | 2017 | Top 3 in | 125 | ug/Kg |