EPA Region I
Superfund Program
New Bedford Harbor Site
New Bedford, Massachusetts

New Bedford
4.9
46600

Proposed Plan

January 1992

EPA Proposes Cleanup Plan to Address Contamination in the Estuary and Lower Harbor/Bay at the New Bedford Harbor Site

The U.S. Environmental Protection Agency (EPA) is proposing a cleanup plan, referred to as a preferred alternative[1] (As explained below, there will be an Addendum Proposed Plan issued in the spring of 1992, addressing additional bay remediation), to address contamination in the estuary (EST) and lower harbor/bay (LHB) at the New Bedford Harbor Superfund Site in New Bedford, Massachusetts. This Proposed Plan recommends a method of addressing **sediment**[2] (Words that appear in **bold** print in this document are defined in the glossary beginning on page 29.) contamination from among the cleanup options that were evaluated during the **Feasibility Study (FS)** performed for the site. This Proposed Plan, together with the Hot Spot operable unit Record of Decision issued on April 6, 1990 and an Addendum Proposed Plan for additional bay remediation to be issued in the spring of 1992 will constitute a comprehensive remedial decision with respect to PCBs for all areas of the site. In accordance with Section 117(a) of the **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)**, EPA is publishing this Proposed Plan to provide an opportunity for public review and comment on the cleanup alternatives, known as remedial alternatives, under consideration for the site. The selection of a preferred alternative is not a final decision. EPA will consider public comments as part of the final decision-making process for selecting a cleanup remedy for the site.

EPA's preferred alternative is to dredge sediment in the estuary and lower harbor/bay contaminated with **polychlorinated biphenyls (PCB)** at concentrations exceeding 50 **parts per million (ppm)**. Dredging in these areas would leave a **residual PCB level** of less than 50 ppm. Sediments would be disposed of in shoreline **confined disposal facilities** (CDFs) that would be constructed as part of the site cleanup. A total of approximately 300,000 cubic yards (cy) of sediment would be removed from these portions of the site. EPA is currently conducting a Supplemental Feasibility Study on additional areas of concern in

[1] As explained below, there will be an Addendum Proposed Plan issued in the spring of 1992, addressing additional bay remediation.
[2] Note: words that appear in *italic* print in this document are defined in the glossary beginning on page 22.

the bay portion of the site. After this work is completed, EPA will issue an addendum to this proposed plan. The preferred alternative is described in greater detail on pages 13-18 of this document.

This Proposed Plan:

1. explains the opportunities for the public to comment on the remedial alternatives;
2. includes a brief history of the site and the principal findings of site investigations;
3. provides a brief description of the preferred alternative and other alternatives evaluated in the FS;
4. outlines the criteria used by EPA to propose an alternative for use at the site, and briefly analyzes whether the alternatives meet the criteria;
5. presents EPA's rationale for its preliminary selection of the preferred alternative; and
6. outlines the information currently being evaluated regarding the bay portion of the site.

To help the public participate in reviewing the cleanup options for the New Bedford Harbor site, this document also explains where interested citizens can find more detailed descriptions of the remedy selection process and the alternatives under consideration.

The Public's Role in Evaluating Remedial Alternatives

Public Information Meeting

EPA will hold a public information meeting on January 30, 1992 at 7:30 p.m. at the Days Inn on Hathaway Road in New Bedford, MA to describe the preferred alternative and other alternatives evaluated in the FS. The public is encouraged to attend the meeting to hear the presentations and to ask questions.

Public Comment Period

EPA is conducting a 120-day public comment period, from January 31, 1992 to May 31, 1992, to provide ample opportunity for public involvement in the final cleanup decision. EPA is extending the normal 30 days for comment to 120 days because EPA has already received a request for an extension, because of the complexities at this site, and because EPA wishes to provide sufficient time for public comment on all aspects of site remediation, including the Addendum Proposed Plan which EPA expects to issue by April 30, 1992. EPA anticipates a standard 30-day comment period for the Addendum Proposed Plan (May 1, 1992 through June 1, 1992).

EPA is specifically seeking comments on the proposed CDF locations and impacts of site cleanup to **wetlands** and floodplains. During the comment period, the public is invited to review this Proposed Plan, the proposal for additional remediation in Buzzard's Bay, and the FS report, and to offer comments to EPA. EPA urges the public to submit their comments on the information presented in this proposed plan and the issues arising from it as soon as possible. The public should submit their supplemental comments on the Addendum Proposed Plan and its interrelationship with this Proposed Plan during the overlap comment period (May 1 through June 1, 1992).

Informal Public Hearing

Following the public information meeting and after the public has had an opportunity to review this proposed plan, EPA will hold an informal public hearing on March 5, 1992 at 7:30 p.m. at the Days Inn to accept oral comments on the cleanup alternatives under consideration for the site. Comments made at the hearing will be transcribed, and a copy of the transcript will be added to the site Administrative Record available at the EPA Records Center at 90 Canal Street in Boston, MA and at the information repository locations listed on pages 3 and 4. A similar public review process will be followed for the addendum proposed plan for the bay portion of the site.

Written Comments

If, after reviewing the information on the site, you would like to comment in writing on EPA's preferred alternative, any of the other cleanup alternatives under consideration, or other issues relevant to the site cleanup, please deliver your comments to EPA at the Public Hearing or mail your written comments to:

Gayle Garman, Remedial Project Manager
U.S. Environmental Protection Agency
Waste Management Division (HRM-CAN3)
JFK Federal Building
Boston, MA 02203
(617) 223-5522

All written comments must be postmarked no later than June 1, 1992 in order to be considered by EPA in it's final choice of remedy.

EPA's Review of Public Comment

EPA will review comments received from the public on this proposed plan and on the addendum as part of the process of reaching a final decision on the most appropriate remedial alternative, or combination of alternatives, for addressing contamination at the New Bedford Harbor site. EPA's final choice of a remedy will be issued in a **Record of Decision (ROD)** for the site. A document called a Responsiveness Summary, which summarizes EPA's responses to comments received during the public comment period, will be issued with the ROD. Once the ROD is signed by the EPA Regional Administrator, it will become part of the **Administrative Record**, which contains documents used by EPA to choose a remedy for the site.

Additional Public Information

This Proposed Plan provides only a summary description of the investigation of the New Bedford Harbor site and the cleanup alternatives currently being considered by EPA. The public is encouraged to consult the Administrative Record, which includes the FS report, the report providing a more detailed explanation of the site and all of the remedial alternatives under consideration. Other documents which may be of interest to the public are contained in the Administrative Record as well.

The Administrative Record is available for review at the following locations:

New Bedford Free Public Library
613 Pleasant Street
New Bedford, Massachusetts 02740
(508) 991-6275
Hours: Monday, Wednesday: 9 a.m. to 9 p.m.
Tuesday, Thursday, Friday, Saturday: 9 a.m. – 5 p.m.

EPA Records Center
90 Canal Street, 1st Floor
Boston, Massachusetts 02114
(617) 573-5729
Hours: Monday - Friday: 8:30 a.m. to 1:00 p.m. and 2:00 p.m. to 5:00 p.m.

Copies of selected site investigation studies and the FS report only are available for review at:

The Millicent Library
45 Center Street
Fairhaven, Massachusetts 02179
(508) 992-5342
Hours: Monday, Wednesday: 9 a.m. – 8 p.m.
Tuesday, Thursday, Friday, Saturday: 9 a.m. – 6 p.m.

Site History

New Bedford Harbor is an urban tidal **estuary** located near Buzzards Bay in southeastern Massachusetts, approximately 55 miles south of Boston. The communities of New Bedford, Fairhaven, and Acushnet border the harbor, which is home port to one of the largest commercial fishing fleets in the United States. From the 1940's until the late 1970's, when use of PCBs was banned by EPA, factories along the Acushnet River discharged industrial process wastes containing PCBs into the harbor. In 1976, EPA conducted a New England-wide PCB survey which included New Bedford Harbor. EPA determined that the high levels of PCBs detected in New Bedford Harbor sediments warranted further investigation. During the next five years, field studies conducted by the EPA and the Commonwealth of Massachusetts identified PCBS and heavy metals in the sediments and marine life throughout a 1,000-acre area north of the Hurricane Barrier in New Bedford Harbor and in parts of Buzzards Bay. In 1977, when testing of edible fish tissue samples revealed PCB levels in excess of the U.S. Food and Drug Administration's 5 ppm guideline (subsequently reduced to 2 ppm), the Massachusetts Department of Public Health issued a warning and subsequently established fishing closure areas in New Bedford Harbor and Buzzards Bay.

The Commonwealth of Massachusetts has designated the New Bedford Harbor site as its priority Federal Superfund site. In 1982, EPA added the New Bedford Harbor site to the **National Priorities List**, thus making it eligible for Federal Superfund cleanup funds.

In an effort to encourage public involvement in the investigation and decision-making process regarding cleanup of the New Bedford Harbor site, EPA has been working closely with residents from the communities surrounding the harbor. These residents are members of an incorporated non-profit organization, the Greater New Bedford Environmental Community Work Group (CWG), which has been meeting in public sessions with EPA on a regular basis since mid-1987. In 1989, EPA awarded the CWG a $50,000 Technical Assistance Grant to provide the CWG with the opportunity to conduct an independent analysis of EPA's site investigation findings and evaluation of cleanup options.

Assessment of Harbor Contamination

In 1982 EPA began a comprehensive assessment of the nature and extent of PCB contamination at the New Bedford Harbor site. EPA has conducted sampling and analysis of sediments, air, surface water, and **biota**. EPA has also

studied the New Bedford sewer system. A computerized data base developed by EPA includes sediment, water, and biota data for the site. In 1983, the results of EPA's site assessment were presented in a **Remedial Action Master Plan (RAMP)**. In the RAMP, EPA recommended further investigation and analysis of harbor contamination problems.

EPA's investigation of sediment, water, and biota contamination (EPA has investigated **groundwater** at the site. Groundwater flows into the harbor, and it is not a drinking water source. Therefore, groundwater contamination is not a problem which is related to the site.) is divided into three geographic areas: 1) the estuary (the Acushnet River north of the Coggeshall Street Bridge); 2) the Hot Spot (a 5-acre area in the northern portion of the estuary); 3) the lower harbor/upper bay (south of the Coggeshall Street Bridge out to Buzzards Bay); see Exhibit 1.

Contamination by PCBs is widespread throughout the estuary, with the highest concentrations of PCBs located in the Hot Spot portion. The Hot Spot, a 5-acre area within the estuary which contains 45% of the mass of PCBs, is addressed by the April 1990 Record of Decision calling for removal and treatment of these highly contaminated sediments. The lower harbor/bay portion of the site has lower levels of PCB contamination which tend to be more localized.

Estuary Feasibility Study

In October 1983, EPA began a feasibility study (FS) of the estuary because of the presence of extremely high levels of PCB and heavy metal contamination and the potential risk posed to human health and the environment by these contaminants. The draft FS, completed in August 1984, evaluated a series of remedial alternatives for addressing contamination in the estuary including dredging contaminated sediments, in-harbor disposal of contaminated sediments, and **in-situ** containment of contaminated sediments.

During a public comment period, EPA received extensive comments about the feasibility of the remedial alternatives evaluated. As a result, EPA initiated additional studies with the assistance of the U.S. Army Corps of Engineers (Corps) to further investigate the potential effectiveness of specific harbor cleanup options. At EPA's request, the Corps designed and conducted an Engineering Feasibility Study (EFS) and **Pilot Study** to evaluate dredging and disposal techniques for the New Bedford Harbor site.

Engineering Feasibility Study (EFS) and Pilot Study

In 1985, the Corps began an "Engineering Feasibility Study of Dredging and Dredged Material Disposal Alternatives for the Acushnet River Estuary" (EFS) to evaluate site-specific remedial alternatives for addressing harbor contamination. In 1988, the EFS was expanded to include a Pilot Study at the site, allowing the Corps to demonstrate the use of dredging equipment and to construct and test disposal facilities in the estuary, while continuing to carry out site sampling and analysis. During the EFS and Pilot Study, three hydraulic dredges were tested, two sediment disposal facilities were constructed, and extensive environmental monitoring was conducted to determine whether removal and construction activities could occur without spreading contaminants.

The Pilot Study took place in a cove in the upper estuary (see Exhibit 2) and involved the removal and disposal of approximately 10,000 cy of sediments, including approximately 3,000 cy of PCB-contaminated sediments in the 200 ppm range and 7,000 cy of clean sediments. PCB levels in the top 6 inches of sediment ranged from 150 to 585 ppm. A shoreline disposal facility, called a confined disposal facility (CDF), was constructed on city-owned property at the

Exhibit 1

Site Map

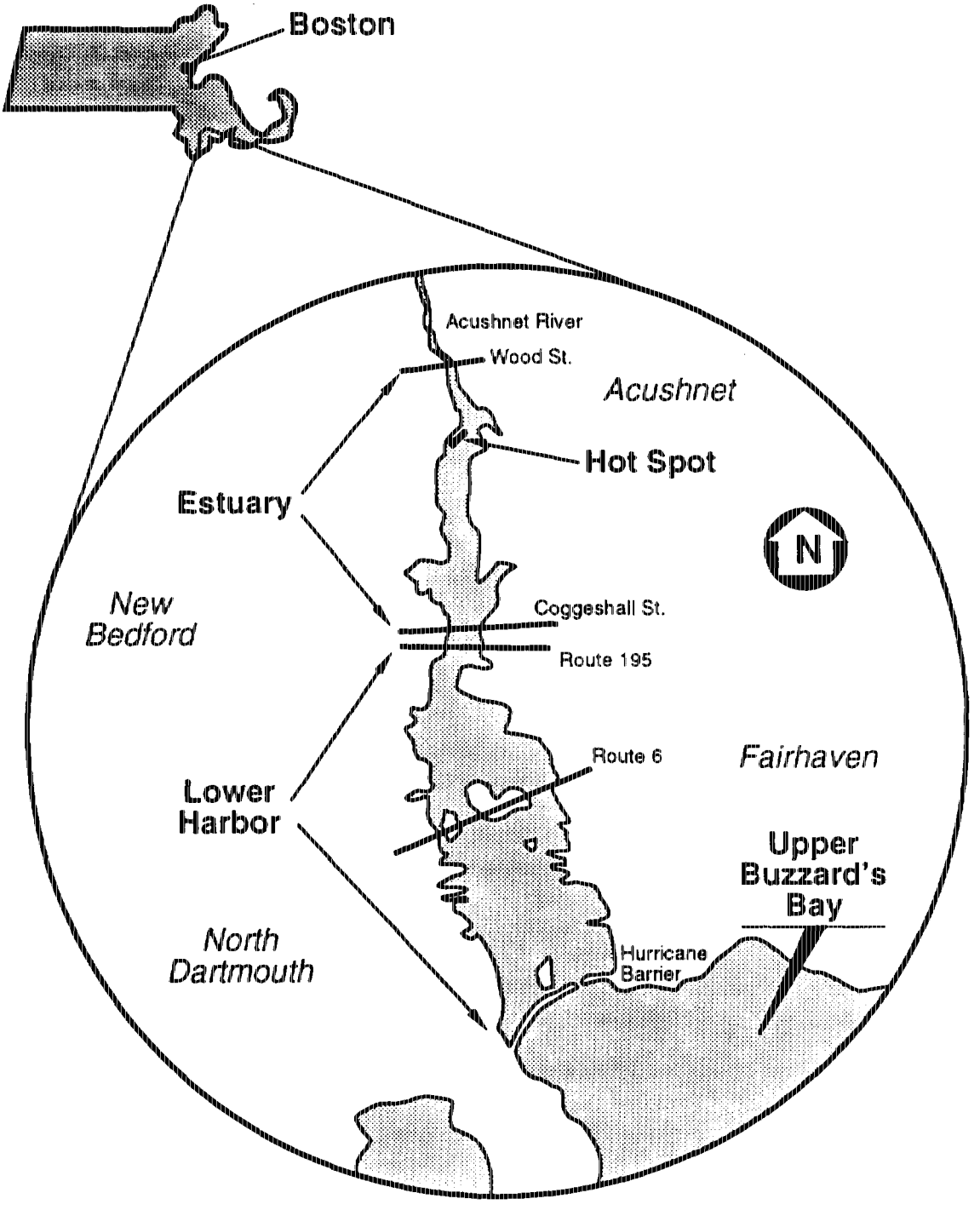
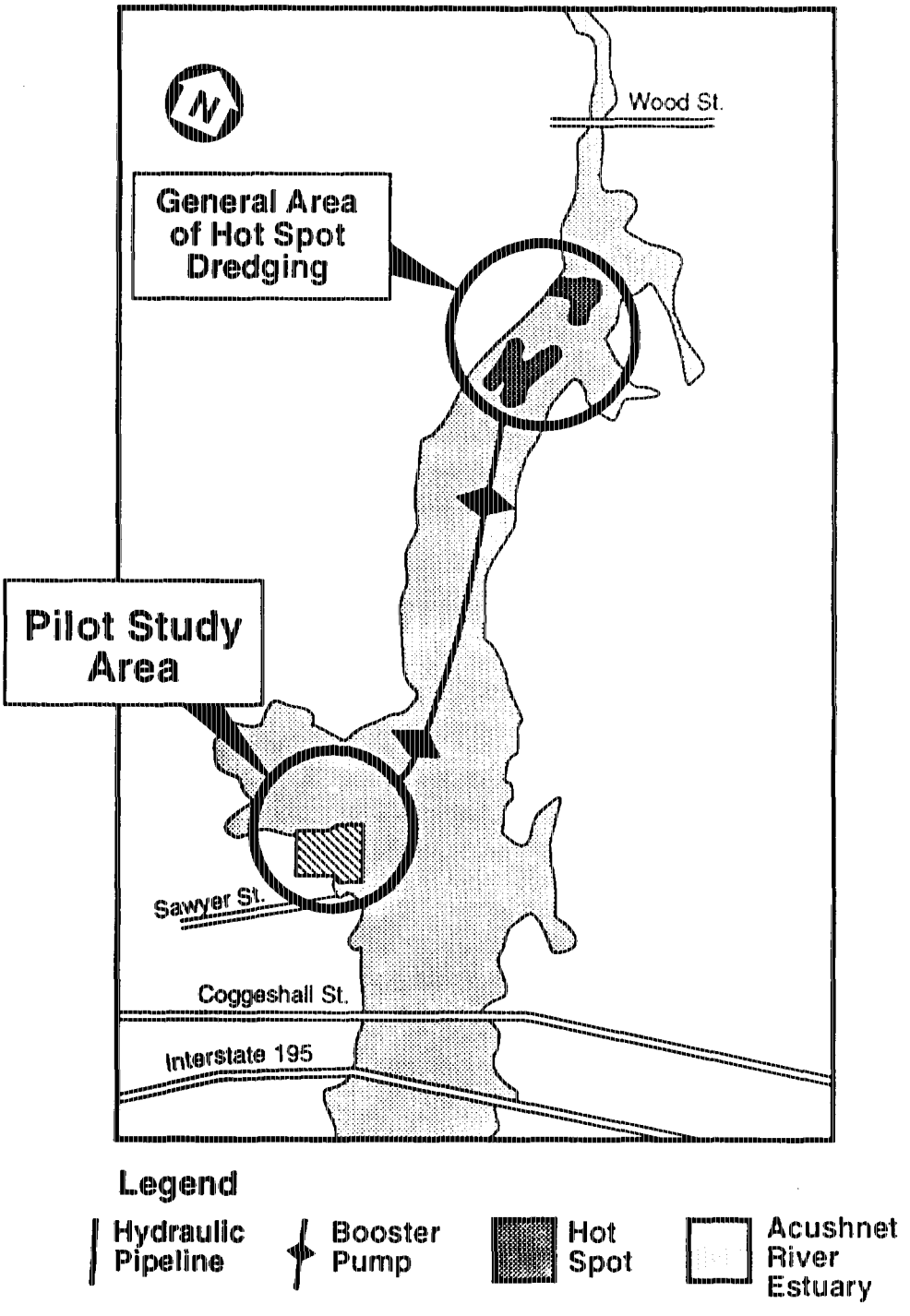


Exhibit 2

Selected Alternative for Hot Spot Sediments



foot of Sawyer Street, and was used to contain 2,200 cy of contaminated sediment dredged from the cove. An underwater disposal facility, known as a **confined aquatic disposal (CAD)** cell, was constructed using the hole created when sediments were dredged for placement in the CDF. The CAD was partially filled with 700 cy of contaminated sediments dredged from the cove and then capped with a clean layer of sediment excavated from below the level of contamination.

The EFS and Pilot Study allowed EPA to:

- Evaluate the effectiveness of dredging techniques and equipment under various conditions, including analysis of the **resuspension** and migration of contaminated sediments during dredging operations;
- Determine the feasibility of using CAD;
- Determine the cost and effectiveness of various water treatment technologies that could be used in the CDF;
- Assess and monitor changes in air and water quality resulting from dredging and disposal facility construction and use; and
- Evaluate **effluent** and **leachate** quality during CDF operation.

Results of the EFS and Pilot Study

The EFS and Pilot Study were completed in 1989. As a result of these studies, the Corps has recommended the **cutterhead dredge** for use in removing contaminated sediments based on its ability to minimize resuspension as well as several operational advantages over other dredges tested. The Corps' studies further demonstrated that PCB levels remaining (i.e., PCB residual levels) in the sediment after dredging were generally 10 ppm or less. EPA found that this dredge could effectively remove contaminated sediments while minimizing impacts outside the immediate area of the dredging and disposal operations. EPA and the Massachusetts Department of Environmental Protection (DEP) established and implemented monitoring procedures and engineering controls to ensure protection of human health and the environment during the dredging operations.

Harbor Feasibility Study

In 1986, EPA began a second set of studies, including an FS and a **Risk Assessment**, for the entire New Bedford Harbor site using information from the FS completed in 1984. The scope of the harbor FS which began in 1986 and was completed in 1990 (the "1990 FS"), included investigation of the three areas of contamination within the harbor. It also included the development of computer models to assess the distribution, transport and fate of PCBs in the estuary and lower harbor, both through movement of water and in marine organisms.

Results of the Risk Assessments

EPA conducted public health and environmental risk assessments (RA) for the New Bedford Harbor site. These documents are titled "Draft Final Baseline Public Health Risk Assessment; New Bedford Harbor Feasibility Study; August 1989" and "Draft Final Ecological Risk Assessment New Bedford Harbor Site Feasibility Study; April 1990." Based on information gathered in site investigations, the RAs describe the potential risks to human health and the environment posed by contamination in each of the three geographic areas within the site. EPA used these documents as a basis for setting response objectives and subse-

quently, PCB action levels for the site.

The major potential human health risks in the estuary and lower harbor/bay involve direct contact with contaminated sediments and ingestion of contaminated fish and shellfish. There is an increased carcinogenic risk posed to human health from eating PCB-contaminated fish from the harbor and estuary on a daily or weekly basis. There is also an increased non-carcinogenic risk to human health from the ingestion of lead-contaminated biota.

With respect to environmental risks, the risk to biota is greatest for bottom dwelling organisms that have direct contact with PCB-contaminated sediments. Exposure to these contaminants likely results in increased mortality and decreased reproduction rates among marine organisms. It is reasonable to conclude that PCB contamination is causing a decrease in available food resources for marine life.

For a complete explanation of the human health and environmental risks posed by estuary and lower harbor/bay contamination, please refer to the Public Health and Ecological Risk Assessments and the FS, all of which are available at the information repositories at the Fairhaven and New Bedford Public Libraries and at the EPA Records Center. See pages 3 and 4 for the addresses and operating hours of these locations.

Hot Spot Operable Unit

EPA uses operable units when the remedial process at a site is complex and can be conducted more efficiently by individually addressing discrete areas or types of contamination. In 1989, EPA divided the harbor cleanup into two operable units: the Hot Spot area is addressed in one operable unit, and the remaining estuary area and lower harbor/bay is addressed in a second operable unit.

The Hot Spot area contains approximately 10,000 cy of contaminated sediment with PCB concentrations ranging from 4,000 ppm to over 200,000 ppm and heavy metal concentrations ranging from below detection to approximately 4,000 ppm. EPA site investigations have estimated that approximately 45 percent of total site PCB contamination is contained in the Hot Spot area. In addition, these studies have identified the Hot Spot as a continuing source of PCB contamination to the remainder of the site. Remediation of the Hot Spot is an important first step in overall site remediation, since it will remove the large mass of PCB contamination that serves as a continuing source of contamination throughout the remainder of the site.

In July 1989, EPA completed an FS and a Proposed Plan focused on the Hot Spot, and held a public comment period to provide an opportunity to comment on the proposed cleanup plan. After considering public comment, EPA signed a Record of Decision in April 1990 setting forth the cleanup plan: Hot Spot sediments will be removed using a cutterhead dredge and the PCBs will then be destroyed in an incinerator that will be located adjacent to the harbor to treat the sediments. The ash will then be disposed of in the existing Pilot Study CDF. EPA and the Corps of Engineers are currently designing the Hot Spot cleanup, and construction is scheduled to begin later this year.

Proposed Cleanup Objectives

Using the information gathered during the FS and Risk Assessments, EPA identified remedial response objectives for overall site cleanup:

- Reduce human exposure to PCB contaminated sediment.
- Reduce ecological exposure to PCB contaminated sediment.

- Reduce PCB **water column** concentrations by reducing PCB sediment concentrations.
- Reduce PCB concentrations in biota by reducing PCB sediment concentrations.

As part of these objectives, EPA examined site-specific PCB action levels. A PCB action level is a sediment concentration level, the effects of which are evaluated in terms of its human health and environmental impacts. A residual PCB level (i.e., the level that remains) in the harbor will be lower than a PCB action level. For example, dredging an area with a 50 ppm action level will leave less than 50 ppm PCBs in that area. The PCB action levels in this case were based upon an analysis of the risk associated with human and ecological exposure to a given level of a contaminant.

EPA evaluated PCB action levels of 1 ppm, 10 ppm, and 50 ppm in the process of determining an appropriate level for the site.

First, EPA examined various methodologies to evaluate the effects of contaminant exposure on ecological systems. These methodologies indicate that a PCB action level of 1 ppm or less would be protective for aquatic organisms living in the estuary, harbor and bay. Yet the widespread distribution of PCBs makes achieving a residual sediment PCB concentration of 1 ppm technically impracticable at this site. The area within the estuary and lower harbor containing sediments with greater than 1 ppm PCB is over 1,100 acres. Capping sediments containing 1 ppm PCBs or more would necessitate the import of millions of cubic yards of clean capping material, the creation of hundreds of acres of **intertidal** zones, and require the installation and permanent enforcement of **institutional controls** on essentially the entire harbor.

Sediment sampling in the upper estuary shows that PCB concentrations between 1 and 10 ppm extend to a depth of 24 to 36 inches. Removal of all contaminated sediments at 1 ppm PCBs or greater in the estuary and lower harbor alone would involve at least 2.1 million cy of sediment. This volume does not include the potentially large quantity of sediment in the 1 to 10 ppm range in the 17,000 acre bay portion of the site south of the Hurricane Barrier.

Management of 2.1 million cy of sediment presents enormous implementation difficulties, including the need for a substantial amount of land for siting sediment disposal facilities and for siting water treatment facilities. In the 1990 FS, EPA has identified a maximum number of potential sediment disposal sites both along the shoreline and within the harbor itself. These identified facilities can accommodate approximately 1.89 million cubic yards of sediment.

Identification of a potential CDF location and capacity does not, however, speak directly to the ability and the cost to construct it. Particular sediment characteristics, for example, may create implementation problems and may dictate that an identified CDF be abandoned. Aside from potential construction problems, some of the identified disposal sites in the lower harbor may be highly undesirable due to competing interests in the community for the limited available shoreline property. Therefore, it may not be possible or appropriate to use all of the identified sites, a possibility which would result in a loss of sediment disposal capacity.

EPA's analysis of the adverse environmental consequences associated with dredging or capping all sediments contaminated in excess of 1 ppm showed that the harm that would be caused to the environment and to aquatic organisms would outweigh any potential benefit of remediation to a 1 ppm level. Dredging of all sediments with a PCB level of 1 ppm or greater would necessarily involve destruction of at least 47 acres of wetland areas and salt marsh

located primarily along the eastern shoreline of the estuary. Among other functions, these wetlands provide refuge areas for egg hatching and juvenile fish. They trap sediments thereby providing a buffer to the harbor for storm-related effects.

EPA also considered the cost involved in remediating at a 1 ppm action level. The cost would exceed many hundreds of millions of dollars for the estuary and lower harbor alone. Such an expenditure considered with the other difficulties of a 1 ppm action level is not justified.

In light of these facts, EPA examined other PCB action levels to determine their feasibility and the extent to which such levels would provide an acceptable level of protection to human health and the environment. Specifically, EPA evaluated alternatives that would achieve a PCB action level of 10 ppm, which would be protective of human health in terms of the risk posed by direct contact with sediments. This 10 ppm level would likely result in attainment of **Ambient Water Quality Criteria** (AWQC) for PCBs, thereby being environmentally protective.

Using the 10 ppm PCB action level, EPA evaluated six remedial alternatives, each of which would use a single cleanup technology on a site-wide basis. These alternatives included non-removal technologies (leaving sediments in place) and removal technologies (dredging of contaminated sediments combined with a treatment and/or disposal technology).

Although to a lesser extent than a 1 ppm PCB action level, a 10 ppm PCB action level requires remediation of a significant volume of sediment: approximately 920,000 cy over a 400-acre area in the estuary and lower harbor. Many of the implementation problems identified for the 1 ppm action level also would be present with the 10 ppm action level. For example, if an alternative employing capping of contaminated sediments were selected, extensive volumes of clean capping material would be needed and institutional controls of the capped areas would have to be maintained, particularly in shoreline and shallow water areas. If an alternative employing removal with no treatment of the sediments was chosen, a combination of extensive parcels of shoreline property and 2 large island CDFs would be required to site sediment disposal facilities. Should island CDFs be needed in the lower harbor, there would be the potential for interference with small craft navigation, shoreline development, and current patterns. Additionally, island CDFs would require more maintenance than shoreline CDFs.

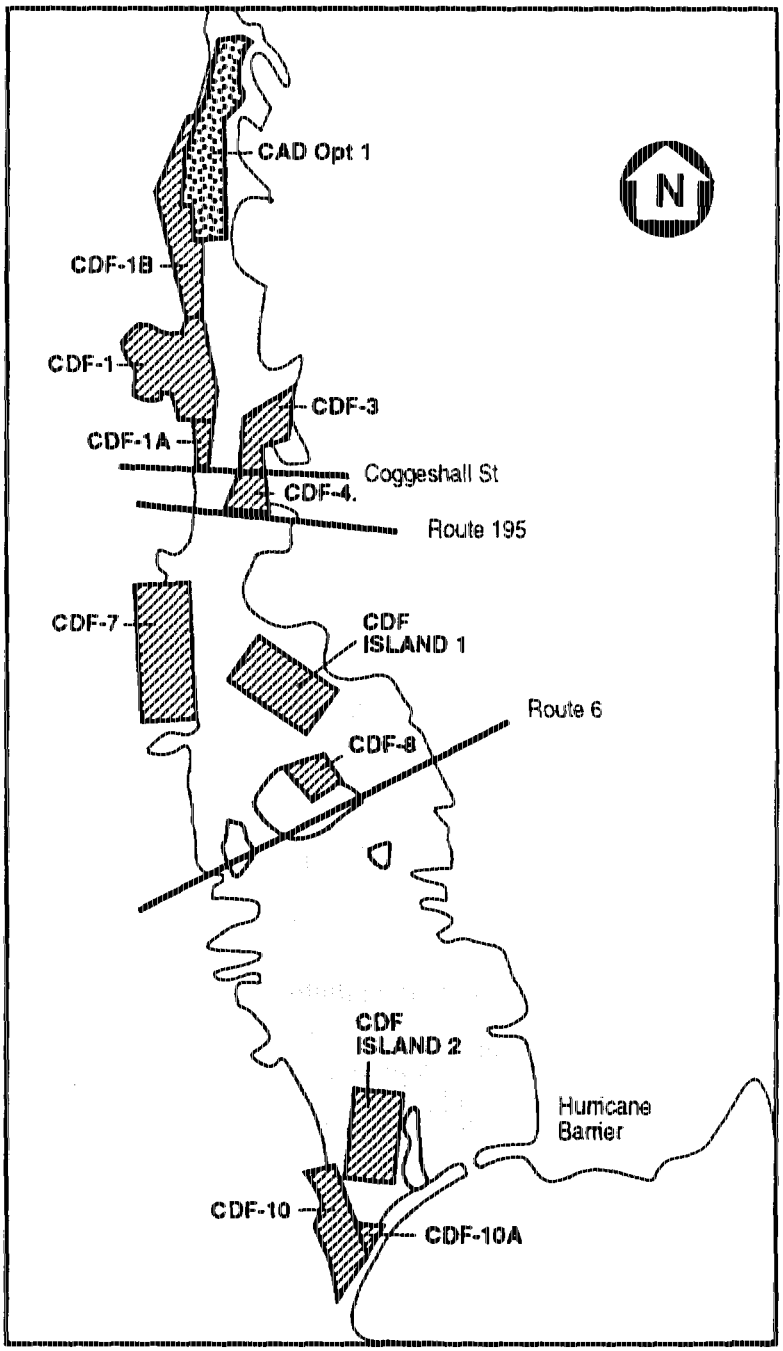
As stated previously, EPA believes that construction of all of the potential disposal sites in the lower harbor would be difficult due to competing interests for this limited available shoreline property. Because of its awareness of the public's interest in these areas, EPA is specifically requesting comment on all of the potential locations of the sediment disposal facilities, as shown in Exhibit 3.

EPA believes that construction of the disposal facilities in the estuary portion of the site only, where there is less traffic and greater protection, would be more easily implemented. CDFs identified in the estuary could accommodate approximately 544,000 cy of sediment. However, this is still insufficient capacity to accommodate the volume of sediment generated by a 10 ppm PCB action level.

Finally, EPA evaluated a PCB action level of 50 ppm and found that such a level would result in a significant decrease in the volume of sediment requiring remediation and would result in a PCB residual concentration of less than 50 ppm, thereby still being protective of human health in terms of the risk posed by direct contact. This 50 ppm would likely result in attainment of AWQC for PCBs. However, it is not possible to state with scientific certainty how long this

Exhibit 3

Potential Disposal Sites for 10 ppm PCB Action Level



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Potential Shoreline Disposal Sites

process will take. EPA's rough estimate is that the AWQC for PCBs will be attained in approximately ten years. EPA believes that the AWQC standard provides an adequate level of environmental protectiveness at the site.

EPA developed and evaluated three additional remedial alternatives that utilize a 50 ppm PCB action level and combine the removal and non-removal remedial technologies of the first six alternatives.

To assist in its evaluation of all nine remedial alternatives, EPA has used a **hydrodynamic and food chain model** developed for the site. Specifically, EPA has used this model to estimate and quantitatively assess the consequences of implementation of various remedial alternatives. The principal results of the hydrodynamic portion of the model are summarized in the overview of the model report which presents the model predictions for water column PCB concentrations prior to and following completion of various remedial alternatives involving no action or sediment cleanup to various PCB action levels.

EPA recognizes the limitations of the model and cautions that the model estimates should not be viewed as absolute predictions. Rather, the model estimates should be used to provide a framework for assessing the relative performance of various remedial actions on a qualitative basis.

In summary, the model results show that any of the action alternatives yield a greater reduction of PCBs over time in the water column and bed sediment than the no action option. The model results for various remedial alternatives under consideration can be placed in three groups. The 1 ppm scenario would yield the greatest reduction in PCB concentrations. The upper estuary (at 10 ppm), lower harbor (at 10 ppm) and 50 ppm scenarios used in the model form a second tier of alternatives. Finally, a 500 ppm and Hot Spot scenario form a third tier.

The overall model projections suggest that remediation of areas north of the Hurricane Barrier will significantly lower sediment and water column PCB levels within this area. This reduction is anticipated to be reflected in PCB levels in biota from this region. Model projections also indicate that these remedial actions will reduce the flux of PCBs to the area south of the Hurricane Barrier. However, model projections suggest that this reduction in PCB flux may have a minimal impact on sediment, water column and biota PCB concentrations in the bay portion of the site.

Based upon its consideration of the technical issues and benefits associated with each alternative which was evaluated, EPA believes that the preferred alternative provides the most appropriate overall approach to remediation of the Harbor.

EPA's Preferred Alternative

EPA's selection of the preferred cleanup alternative for the estuary and lower harbor/bay portion of the New Bedford Harbor site, as described in this Proposed Plan, is the result of a comprehensive evaluation and screening process. The 1990 FS for the site was conducted to identify and analyze the alternatives for addressing contamination associated with the site. The 1990 FS report for the New Bedford Harbor site describes the alternatives considered, as well as the process and criteria EPA used to screen or narrow the list of potential remedial alternatives to address contamination. For details on EPA's screening methodology, see Sections 5 and 6 of the 1990 FS. This section describes EPA's preferred alternative. Other alternatives retained by EPA for detailed analysis are described in subsequent sections.

In EPA's preferred alternative, sediments contaminated with PCBs in excess

of 50 ppm in the estuary and lower harbor/bay would be dredged and disposed of in CDFs that would be constructed along the shoreline at locations 1, 1a and 3 (see Exhibits 4 and 5). Removing sediment at a 50 ppm level for PCBs simultaneously reduces elevated levels of metals in this area.

Approximately 118 acres of the estuary contain sediment with PCBs greater than 50 ppm. Since CDF 1 is located within the 50 ppm PCB sediment boundary, EPA believes that dredging under this CDF is not necessary, thereby eliminating the need to dredge 52,000 cy of sediment. Thus, approximately 232,000 cy of sediment would be dredged from the estuary. Approximately 47 acres in the lower harbor/bay would be dredged to remove 76,000 cy of sediment.

The CDFs called for in the preferred alternative would be located as follows: CDF 1 would be approximately 2,000 feet north of the Coggeshall Street Bridge, in the cove along the western shore. CDF 1a would be located between CDF 1 and the bridge. CDF 3 would be constructed in a small cove immediately north of the Coggeshall Street Bridge along the eastern shore. Sediments would not be treated prior to disposal in the CDFs. Dredged sediment discharged to the CDF would be allowed to gravity settle. The effluent from the CDF will be treated to reduce PCBs and heavy metals using best available control technology prior to release to the harbor. The CDFs will have a final cover which will be designed and constructed to prevent migration of liquids, have minimal maintenance requirements, promote drainage, minimize erosion, and accommodate settling.

EPA's preferred alternative significantly reduces the potential for PCB migration and isolates the contaminants from both the public and the environment. Although the threat from direct contact with contaminated sediments would be considerably diminished, the threat from ingestion of contaminated biota would remain. Therefore, the fishing ban would be maintained until such time that PCB levels in the biota were reduced to acceptable levels.

A quarterly monitoring program would be implemented to assess long term trends in sediment and water column PCB concentrations and associated responses in biota. The monitoring program would include collecting sediment, water, and biota samples throughout the site and analyzing these samples for PCBs and metals. CERCLA mandates that, because contaminated sediment will be left on-site, data collected as part of the monitoring program be evaluated as part of a 5-year review.

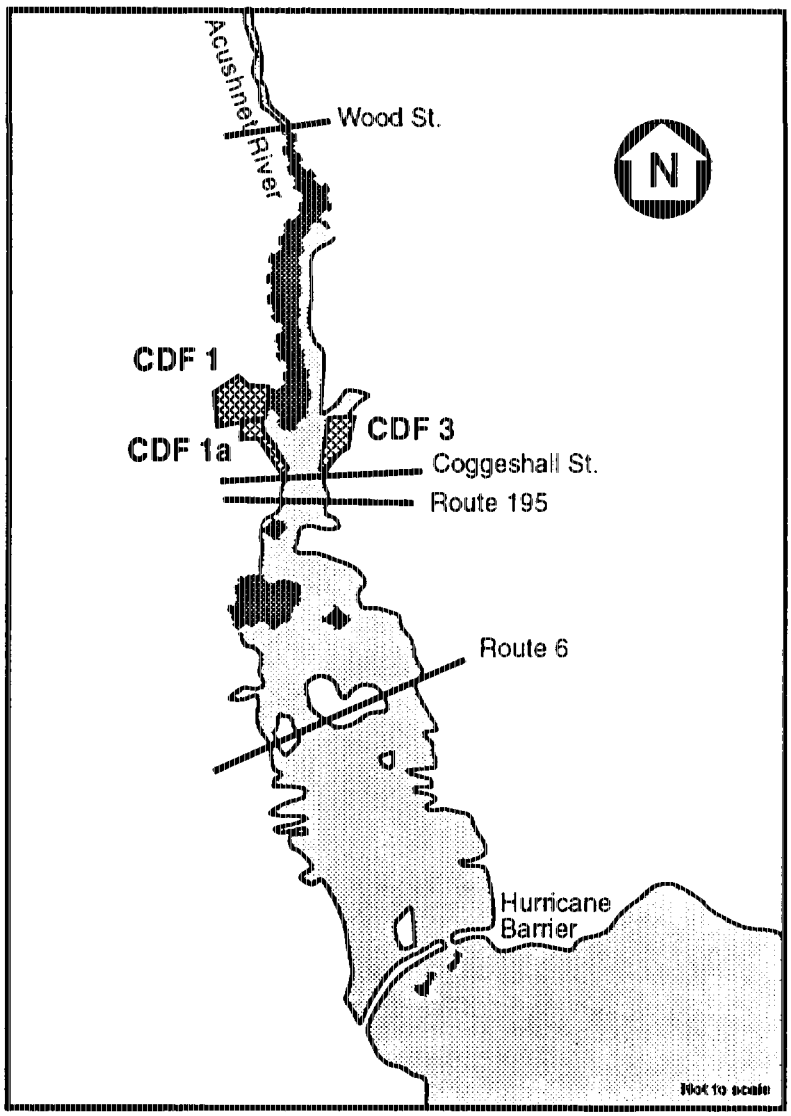
Under CERCLA, there is a preference for choosing remedies which employ treatment which permanently and significantly reduces the volume, toxicity, or mobility of hazardous substances. The preferred alternative does not contain a sediment treatment component. EPA guidance suggests that PCB concentrations in excess of 500 ppm should generally be treated since they typically represent a principal threat.

EPA believes that the statutory preference for treatment at this site is satisfied by the remedy set forth in the Hot Spot Record of Decision. Based on its evaluation of the site as a whole, EPA also believes that the Hot Spot constitutes the principal threat at the site. The Hot Spot is the area with the highest concentrations of PCBs, it acts as a source of contamination throughout the site, and it contains 45% of the total site PCB contamination. Implementation of the Hot Spot remedy will eliminate the principal threat at the site and will permanently and significantly reduce the toxicity and mobility of the hazardous substances at the site.

Additional treatment beyond that specified in the Hot Spot remedy would have minimal impact on reducing the risk to human health and the environ-

Exhibit 4

Preferred Alternative for Estuary and Lower Harbor/Bay



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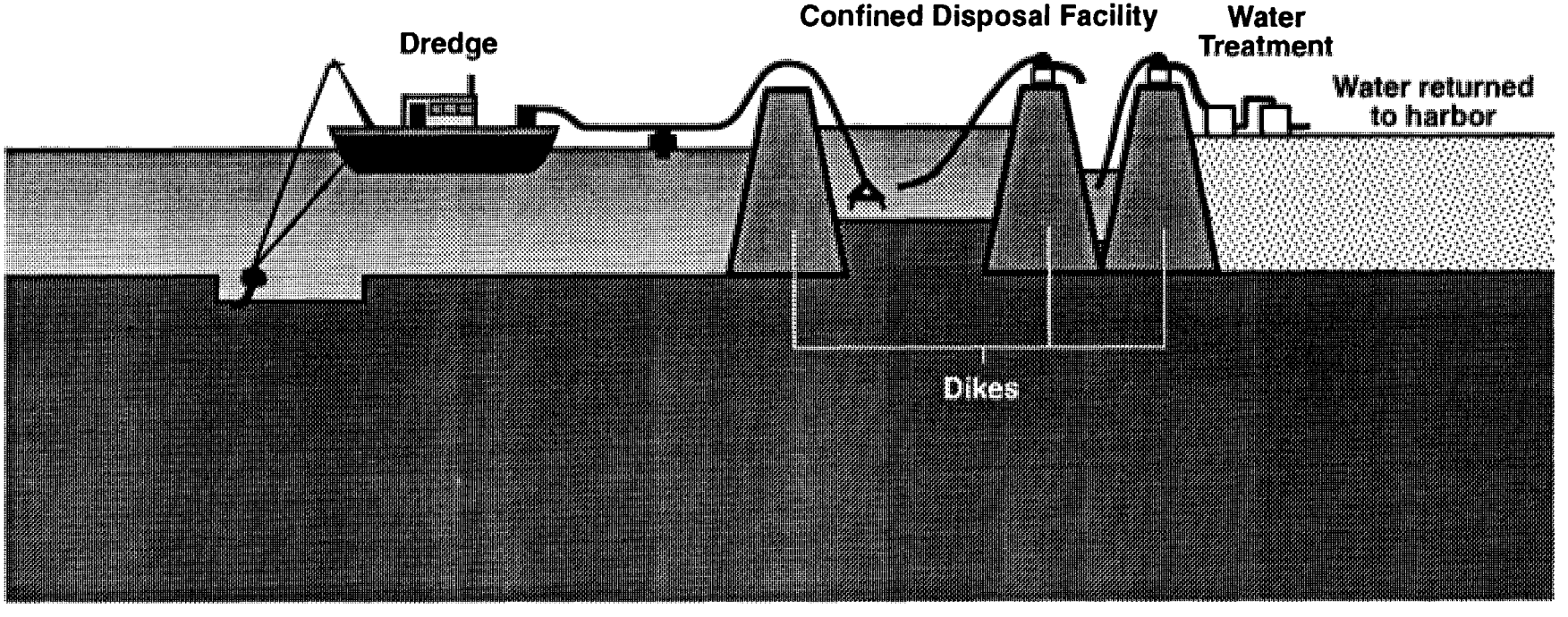
CDF - Confined Disposal Facility

Areas to be dredged in estuary and lower harbor (>50 ppm PCBs)

Exhibit 5

Dredge and CDF Disposal



ment. Under the preferred alternative, PCB contaminated sediment will be adequately contained in CDFs. Only a very small fraction of the PCBs will eventually be released as leachate moving through the bottom and sides of the facility due to the low permeability of the sediments. Data collected during laboratory and pilot tests and groundwater monitoring at the existing CDF by the Corps of Engineers indicate the PCB loss to be very small. Moreover, further treatment would extend over a period of several years, thereby increasing remediation time of the remedy, because of the large volume of sediments requiring treatment. In contrast, incineration of the Hot Spot is expected to last approximately 4 to 6 months because only 10,000 cy of material will be treated.

Additional treatment would not significantly reduce the volume of material to be contained. Consequently, the same number of CDFs would be required for sediment disposal. Finally, the more than 200% increase in the cost of a remedy that employs a treatment component does not justify the marginal benefit that may be gained.

Treatment of the sediment in order to comply with the land disposal restrictions in the Resource Conservation and Recovery Act (RCRA) is not necessary. There are two reasons why EPA believes that the land disposal restrictions do not apply to the preferred alternative. First, EPA does not have any evidence that the sediment will be hazardous based on leachable metals. The Toxicity Characteristic Leaching Procedure (TCLP) data which EPA has shows that the sediment is not hazardous based on the leachable metals. Second, under the preferred alternative, there would be no "placement in" within the meaning of RCRA.

In this case, EPA believes that it is appropriate to treat the site as a single area of contamination because the contamination is contiguous. The preferred alternative would be implemented entirely on-site, and the alternative calls for consolidation or movement of the waste entirely within a single area of contamination. EPA interprets the phrase "placement in" a land disposal unit to mean placement of hazardous wastes into a unit, not the movement of waste within a unit.

EPA will include a long-term monitoring program as an integral part of its remediation and post-remediation efforts at this site.

- *Wetlands*: EPA recognizes that both floodplains and wetlands will be impacted by this proposed alternative in two ways. The first is by remediation of the sediments, and the second is by construction of CDFs for sediment disposal. Since it is the sediments themselves that are contaminated, some impact to the wetlands during remediation is unavoidable. All practicable measures to minimize potential harm and compensate for unavoidable impacts to wetlands will be examined.

EPA finds that shoreline disposal facilities, on balance, are the best disposal option. The proposed shoreline CDF areas were selected because of their lowered ecological values due to existing contaminant levels, and because of their ability to provide large disposal capacities without interfering with maritime uses. EPA evaluated alternative upland disposal sites in the report "Description of Alternative Disposal Sites for the New Bedford Harbor Feasibility Study; 1987" which found upland sites to be either less environmentally acceptable or not practicable.

- *Saltmarsh*: EPA evaluated the potential environmental impacts associated with removing contaminated sediments located along the eastern shoreline of the estuary and found that greater damage would be done to the saltmarsh, with greater overall environmental consequences, from remediation at a 50 ppm action level than would occur by allowing the contaminants to remain in

place. Accordingly, EPA is proposing to dredge only the most contaminated saltmarsh areas (contamination in excess of 500 ppm PCBs) and to conduct long-term monitoring of the saltmarsh to determine the effectiveness of the remedial alternative. Saltmarsh sediments would be disposed of in the CDFs that would be constructed as part of the estuary and lower harbor/bay cleanup.

EPA will take all practicable measures to minimize potential harm to the saltmarsh during remediation. EPA will either restore the lost area or compensate for any unavoidable impacts to the saltmarsh.

♦ *Costs*: The estimated cost, including capital, monitoring, and operation and maintenance (O&M) costs are presented below. The total costs are presented as **net present worth (NPW)** costs for a 30-year period. The costs for all remedial alternatives presented in this Proposed Plan have been developed in accordance with standard Superfund cost estimating practice using 1989 figures. Accordingly, the estimates are within the -30 to +50% range. The cost for land acquisition to support alternatives requiring space for CDFs and treatment facilities has not been included. Although these costs could be significant, they have not been included since EPA is unable to estimate these costs with any reasonable degree of certainty.

Estimated Time for Construction: 6 years following necessary land acquisitions or access rights
Estimated Capital Cost: $26,723,000
Estimated Monitoring Program Cost: $5,817,000
Estimated CDF Operation and Maintenance Cost: $734,000
Estimated Total Cost (NPW):$33,274,000

Additional Bay Remediation

EPA, in coordination with the **Federal and State Natural Resource Trustees** (Trustees), is currently evaluating localized, discrete areas in Buzzard's Bay with greater than 10 ppm PCBs which may contribute disproportionately to the presence of PCBs in the bay portion of the site. These areas currently include an expanded area immediately south of the Hurricane Barrier adjacent to the Cornell-Dubilier facility and an area in the vicinity of the City of New Bedford's sewage outfall located approximately one half mile south of Clark's Point. The Supplemental Feasibility Study may identify other areas of concern. The remedial alternatives being considered include a treatment alternative, alternatives involving combinations of dredging and capping, as well as a no-action alternative. EPA will present its evaluation of remedial alternatives for upper Buzzards Bay in an Addendum to this proposed plan, expected in April, 1992.

South of the hurricane barrier, in the bay portion of the site, the Harbor is less industrialized and is a valuable economic and recreational resource. Based on their analysis of information in the record, the Trustees have presented EPA with a proposal which they believe indicates that remediation of areas located south of the hurricane barrier where sediment is contaminated at levels in excess of 10 ppm PCBs, may foster significant environmental recovery from PCB contamination in upper Buzzards Bay. The Trustees have presented information that they believe indicates that a reduction of PCB concentrations in the two identified areas to a residual level of approximately 1 to 3 ppm may provide a significant reduction in environmental risks over the existing conditions. The Trustees believe that remediation in these areas would eliminate the primary sources of PCB contamination in upper Buzzards Bay, and that PCB concentrations in harvestable biota in this area could reach acceptable health

risk levels over a significantly shorter time period than with no-action, and biota would be expected to reach or go below the FDA limit of 2 ppm.

As noted previously, there will be an overlapping public comment period, including a public meeting and hearing, which will provide the opportunity to comment on the comprehensive proposed plan. However, EPA presently solicits public input on additional Buzzards Bay remediation.

Other Alternatives Evaluated in the FS

The public is invited to comment not only on the preferred cleanup alternative, but also on the other alternatives that EPA evaluated in detail. Each of these alternatives is described briefly below. A more detailed description of each alternative can be found in the 1990 FS report, and a summary of the alternatives is provided in Exhibit 6. Any alternative with a containment component assumes a 30-year monitoring and maintenance period. EPA did not examine a true "no action" alternative in detail for this site because institutional controls, similar to those currently in place at the site, are a minimum requirement for the site. A true no action alternative without institutional controls would not be protective.

For the 10 ppm removal alternatives, EPA did not reduce the volume of sediment by the amount underlying a CDF, or the **footprint**. This footprint refers to the area of contaminated sediment greater than a given action level and upon which a CDF would be constructed. Only the 50 ppm alternatives adjusted for the sediment volume underlying CDF 1. This footprint concept is presented in greater detail in the Administrative Record.

Non-Removal Alternatives – 10 ppm

Alternative EST/LHB-1: Minimal No Action

In this alternative, no dredging or treatment of contaminated harbor sediments would take place. However, the Minimal No-Action alternative for the estuary and lower harbor/bay would include **institutional controls** to limit potential exposure to site contaminants. Institutional controls would consist of: posting of warning signs; installation of fencing to restrict access to certain shoreline areas; limits on shoreline/marine uses including continuing the ban on shellfish and finfish consumption and overseeing possible future dredging activities; environmental monitoring and site reviews; and continuing public information programs. This alternative was evaluated in detail in the 1990 FS to serve as a comparison to other remedial alternatives under consideration.

Estimated time for Operation: Assumes 30 years
Estimated Total Capital Costs: $491,000
Estimated Monitoring Program Costs: $6,752,000
Estimated Operation and Maintenance Costs: $235,000
Estimated Total Cost (NPW): $7,478,000

Alternative EST/LHB-2: Capping

Alternative EST/LHB-2 would contain contaminated sediments in place by capping them with clean materials. Due to differing water depths and the composition of the harbor bottom, different capping techniques would be used in the estuary versus the lower harbor/bay. Each of these methods is described below.

♦ *Estuary Capping:* In this alternative, a temporary dam would be constructed at the Coggeshall Street Bridge to control tidal flow in the estuary,

Exhibit 6

Summary of Alternatives

Alternatives	Description	Approx. Cost
EST/LHB-1	Minimal No-Action	$7.5 Million
10 ppm PCB Action Level Alternatives		
EST/LHB-2	Capping	$106 Million
EST/LHB-3	Dredge, Dispose	$103 Million
EST/LHB-3d	Dredge, Dewater, Dispose	$164 Million
EST/LHB-4	Dredge, Solidify, Dispose	$308 Million
EST/LHB-5	Dredge, Solvent Extraction, Dispose	$530 Million
EST/LHB-6	Dredge, Incinerate, Dispose	$627 Million
50 ppm PCB Action Level Alternatives		
SW-7	Dredge, Cap	$36 Million
SW-8	Dredge, Dispose	$33 Million
SW-9	Dredge, Treat>500 ppm, Dispose	$80 - 93 Million

facilitate placement of capping materials, and reduce the possible release of contaminated sediments that could be stirred by cap placement. Following construction of the dam, a geotextile material would be placed on the contaminated sediments to prevent clean capping materials from mixing with contaminated sediments. The geotextile would also serve to minimize resuspension of sediments during the capping operation. Finally, approximately three feet of sand would be placed on top of the geotextile material. A barge mounted hydraulic pump would be used to place the sand. In areas of fast water movement, additional stabilization of the cap would be accomplished by covering the cap with a synthetic webbing material and rip-rap. Approximately 187 acres would be capped, and 818,000 cubic yards (cy) of sand would be required. Institutional controls would be required to prevent cap disturbance, particularly in shallow water and in shoreline areas where anchoring is required.

- *Lower Harbor/Bay Capping:* Capping in the lower harbor/bay would be conducted only in areas that would not affect harbor traffic. Capping of the lower harbor/bay would be carried out in a manner similar to the estuary and would cover approximately 170 acres. The use of geotextile may not be necessary in the lower harbor due to coarser sediments and deeper water depths. An additional one to two feet of capping material would replace the geotextile and would be placed to insure an adequate cap thickness, even if some intermixing with contaminated sediments were to occur, especially during cap placement.

Estimated Time for Construction: 8 years following necessary land acquisition or access rights
Estimated Total Capital Costs: $ 89,327,000
Estimated Monitoring Program Costs: $6,752,000
Estimated CDF and Cap Operation and Maintenance Costs: $9,834,000
Estimated Total Cost (NPW): $105,913,000

Removal Alternatives - 10 ppm

Alternative EST/LHB-3 and EST/LHB-3d: Removal, Dewater and On-Site Disposal

These alternatives would entail dredging sediments contaminated with greater than 10 ppm PCBs from the estuary and lower harbor/bay. The dredged sediments would be placed in either CDFs that would be constructed adjacent to or in the harbor or in CADs that would be constructed beneath the harbor. EPA estimates that 926,000 cy of sediment would be removed. To reduce the number and volume of CDFs required, the dredged sediments could be dewatered prior to placement, which requires additional water treatment. (This additional dewatering step is the characteristic which distinguishes alternative EST/LHB-3 from EST/LHB-3d.) This water would be treated to reduce contamination levels prior to being released to the harbor.

Estimated Time for Construction: 8 years following necessary land acquisition or access rights
Estimated Total Capital Costs (Costs for alternative EST/LHB-3 are listed first.) $93,950,000/$155,451,000
Estimated Monitoring Program Costs: $6,752,000/$6,752,000
Estimated CDF Operation and Maintenance Costs: $2,696,000/ $1,848,000
Estimated Total Cost (NPW): $103,400,000/$164,050,000

Alternative EST/LHB-4: Removal, Solidification, and On-Site Disposal

This alternative is similar to Alternative EST/LHB-3 (dredging, dewatering of sediments, treatment of wastewater, and on-site disposal), but Alternative EST/LHB-4 would include immobilization (e.g., solidification/stabilization) of the dewatered sediments prior to disposal. Immobilization, achieved by adding cement-like materials to the sediments, would chemically bind the PCBs and heavy metals in the sediments. Because immobilization increases the volume of the dredged sediments, Alternative EST/LHB-4 would require 1,195,000 cubic yards of on-site disposal facilities to implement, approximately 270,000 cy more than would be required for EST/LHB-3.

Estimated Time for Construction: 8 years following necessary land acquisition or access rights
Estimated Total Capital Costs: $298,645,000
Estimated Monitoring Program Costs: $6,752,000
Estimated CDF Operation and Maintenance Costs: $2,435,000
Estimated Total Cost (NPW): $307,832,000

Alternative EST/LHB-5: Removal, Solvent Extraction, and On-Site Disposal

This alternative would consist of dredging and dewatering of contaminated sediments, treating the wastewater produced during dewatering, and treating the sediments by **solvent extraction** to remove PCBs. The concentrated liquid PCBs would be collected and destroyed in an on-site incinerator, and the treated sediments would be disposed of in on-site CDFs. If determined to be necessary, the sediments would be solidified prior to disposal to immobilize residual metals.

Estimated Time for Construction: 8 years following necessary land acquisition or access rights
Estimated Total Capital Costs: $521,972,000
Estimated Monitoring Program Costs: $6,752,000
Estimated CDF Operation and Maintenance Costs: $860,000
Estimated Total Cost (NPW): $529,584,000

Alternative EST/LHB-6: Removal, Incineration and On-Site Disposal

This alternative would consist of dredging and dewatering the contaminated sediments, treating the wastewater produced during dewatering, and incinerating the sediments in an on-site incinerator to destroy the PCBs. Incinerator ash would be disposed of in on-site CDFs. The ash would be solidified prior to disposal if testing determined that it would be required to immobilize residual metals.

Estimated Time for Construction: 8 years following necessary land acquisition or access rights
Estimated Total Capital Costs: $619,324,000
Estimated Monitoring Program Costs: $6,752,000
Estimated CDF Operation and Maintenance Costs: $860,000
Estimated Total Cost (NPW): $626,936,000

Site-Wide (SW) Alternatives - 50 ppm

Alternative SW-7

In alternative SW-7, sediments in the estuary with PCB concentrations greater than 500 ppm (approximately 112,000 cy in 46 acres) would be dredged

and disposed of in a CDF that would be constructed adjacent to the harbor. The CDF would be constructed at location 1. Wastewater produced during sludge dewatering associated with use of the CDF would be treated prior to being released to the estuary. Areas of the estuary with contamination of 50 - 500 ppm (approximately 77 acres) would be capped to prevent physical contact with the sediments. In the lower harbor/bay, sediments would be left in place untouched, and institutional restrictions and long-term monitoring would be implemented. Public education programs would be implemented to advise residents of the potential health risks associated with lower harbor/bay sediments.

Estimated Time for Construction: 6 years following necessary acquisition of land or access rights
Estimated Total Capital Costs: $28,909,000
Estimated Monitoring Program Costs: $5,817,000
Estimated CDF and Cap Operation and Maintenance Costs: $1,438,000
Estimated Total Cost (NPW): $36,164,000

Alternative SW-8

EPA has made a preliminary selection of this alternative as the preferred alternative; it is discussed under the section entitled "EPA's preferred alternative" on pages 13-18.

Alternative SW-9

In alternative SW-9, sediments in the estuary and lower harbor/bay contaminated with greater than 50 ppm but less than 500 ppm PCBs would be dredged and placed in CDFs. Estuary sediments with contaminant levels of greater than 500 ppm would be dredged and treated either by incineration or solvent extraction. The treated sediment or incinerator ash would be tested to determine if solidification would be necessary to immobilize residual metals. The treated (>500 ppm) and untreated (50 - 500 ppm) sediments would be placed in CDFs that would be constructed at locations 1 and 1b. Location 1b would be in the northern end of the estuary along the western shoreline. Wastewater produced during sludge dewatering associated with use of the CDF would be treated prior to being released to the harbor. Approximately 46 acres (112,000 cy) of sediments in the estuary contain greater than 500 ppm PCBs. To remove sediments containing between 50 and 500 ppm, an additional 120,000 cy would be dredged. In the lower harbor/bay, approximately 47 acres (76,000 cy) would be dredged.

Estimated Time for Construction: 6 years following necessary acquisition of land or access rights
Estimated Total Capital Costs: $86,644,000 (incineration)
$74,279,000 (solvent extraction)
Estimated Monitoring Program Costs: $5,817,000
Estimated CDF Operation and Maintenance Costs: $538,000
Estimated Total Cost (NPW):$92,999,000 (incineration)
$80,634,000 (solvent extraction)

Summary of the Comparative Analysis of Alternatives

EPA uses nine criteria to evaluate each remedial alternative retained for detailed analysis in the FS. The nine criteria are used to select a remedy that meets the national Superfund program goals of protecting human health and the environment, maintaining protection over time, and minimizing untreated waste. Of the nine criteria, protection of human health and compliance with all Applicable or Relevant and Appropriate Requirements (ARARs) are threshold requirements that a remedy must meet in order to be selected as a final remedy. In selecting a remedy EPA then balances the tradeoffs among alternatives. Long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost are criteria which EPA uses to determine the proper balance of tradeoffs among the alternatives under evaluation. State and community concerns are modifying criteria factored into a final balancing of all criteria to select a remedy.

Definitions of the nine criteria and a summary of EPA's evaluation of the alternatives using the nine criteria are provided below.

1. Overall Protection of Human Health and the Environment.

Under this criterion EPA considers how an alternative as a whole will protect human health and the environment. This consideration includes an assessment of how human health and environmental risks are properly eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

EPA's preferred alternative would provide overall protection of human health and the environment by removing and isolating contaminated sediments, effectively reducing the potential for direct contact exposure. This alternative would limit the source of PCB contamination in surface water and biota. In contrast, under Alternative EST/LHB-1, Minimal No-Action, environmental risks would not be affected. Reduced risks to human health as a result of restricted site access would be expected, but to a lesser extent than EPA's preferred alternative.

Alternative EST/LHB-2, capping, would reduce risks to human health and environment by limiting physical contact with site contaminants to a degree similar to EPA's preferred alternative. The environmental impact of capping is similar to that of dredging, i.e., they both have adverse consequences for bottom dwelling organisms. However, capping would also disturb the adjacent shoreline, which would be needed to anchor the cap, and there is a marginal increase in the reliability of alternatives which employ CDFs, such as EPA's preferred alternative and EST/LHB-3 or EST/LHB-3d because CDF failure is less likely than cap failure.

Each of the remaining removal alternatives in the FS would provide some additional level of reliability in preventing exposure to hazardous substances. There would be an increase in the level of reliability of Alternative EST/LHB-4 over the alternatives that do not have a treatment component, because it calls for the immobilization of contaminated sediments. There is a further increase in the level of reliability of Alternatives EST/LHB-5, EST/LHB-6, AND SW-9 because these alternatives have components calling for the permanent destruction of PCBs through treatment.

2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs).

Under this criterion, EPA considers whether a remedy complies with applicable or relevant and appropriate requirements under federal environmental laws and state environmental or facility siting laws. If ARARs are not attained, EPA considers whether grounds for a waiver exist.

The goal of this remedial action is to restore harbor water to its beneficial use, which includes attainment of Ambient Water Quality Criteria (AWQC). AWQC are established by EPA and are set at levels considered protective of aquatic receptors and/or their uses. For PCBs, the chronic (long-term) AWQC is 0.030 ug/L (parts per billion). Based on information obtained during site studies and the fact that reduction in the underlying sediment PCB concentration will result in a reduced overlying water column concentration, EPA believes that there will be a significant reduction in the levels of PCBs in the water column. EPA believes that the water concentrations will approach the AWQC. Due to the difficulty in predicting the exact response of the system into the future, long-term monitoring would be conducted to confirm the water column concentration levels that are achieved as a result of remedial activities.

EPA believes that EPA's preferred alternative would meet all other ARARs, with the exceptions of the Food and Drug Administration (FDA) PCB tolerance limit throughout the site. EPA is proposing waiving this ARAR, and requests comment on the proposed waiver.

To achieve the FDA tolerance limit for PCB concentrations in biota in all portions of the site, remediation to 1 ppm PCB level in all areas of the site would likely be required. EPA has determined that the 1 ppm PCB level is technically impracticable to achieve at this site. EPA also proposes waiving this ARAR for portions of the site (e.g., the estuary) on the grounds that compliance with the requirement would result in greater risk to human health and the environment than other alternatives, and that an alternative that attains this ARAR would not provide a balance between the need for protection of human health and the environment at the site and the availability of Superfund monies to respond to other sites that may present a threat to human health and the environment. When an alternative under consideration costs $57.6 million or above, EPA must determine whether to invoke the fund balancing waiver. The cost of remediating to 1 ppm, the only level which will result in the achievement of the FDA tolerance limit in all areas of the harbor exceeds $500 million. In light of this extraordinary cost and the limited funds available for other Superfund sites, EPA proposes invoking the fund balancing waiver. Notwithstanding the fact that the FDA tolerance limit may not be achieved for biota in all portions of the site with this remedy, water quality would improve and a corresponding reduction in the PCB biota levels is expected.

Sediment disposal will be in accordance with the Massachusetts hazardous waste regulations at 310 CMR 30.501(3)(a). This section waives certain Massachusetts requirements for the treatment, storage, and disposal of hazardous wastes containing greater than 50 ppm PCBs if the requirements of 40 CFR Part 761 are complied with. In this case, the preferred alternative will comply with the TSCA requirements found at 761.60(a)(5)(iii) governing disposal of dredged materials. EPA believes that at this site, disposal in a chemical waste landfill is not reasonable and appropriate, and that disposal in CDFs will provide adequate protection of human health and the environment. Because the requirements of TSCA will be met at this site, the Massachusetts hazardous waste requirements at 30 CMR 501(3)(a) will also be attained.

Under Alternative EST/LHB-1 AWQC for PCBs would not be met. Alterna-

tives EST/LHB-2 through EST/LHB-6 and Alternatives SW-7 and SW-9 would achieve a similar level of water quality improvement as EPA's preferred alternative. Standards for residual levels of PCBs in biota may not be achieved by any of the alternatives in all portions of the site.

The preferred alternative will comply with Executive Order 11988 - Protection of Floodplains and Executive Order 11990 -Protection of Wetlands. EPA finds that there is no practicable alternative to impacting the sediments since it is the sediments themselves that are contaminated from the historical disposal and discharges. Implementation of the remedy would utilize measures to minimize potential harm to the surrounding areas. Where adverse impacts cannot be avoided, mitigation will be provided.

3. Long-term Effectiveness and Permanence.

Under this criterion EPA compares the ability of remedial alternatives to maintain adequate and reliable protection of human health and the environment over time.

The preferred alternative would effectively reduce the movement of PCBs into the overlying water column and would prevent direct contact exposure to contaminated sediment. However, the sediment disposed of in the CDFs would present some residual risk since the contaminants are not destroyed. Yet, CDFs are a reliable and proven technology, and the likelihood of CDF failure is minimal with proper operation and maintenance. The risk of exposure resulting from CDF failure is, therefore, not considered significant. Under the preferred alternative annual monitoring and maintenance is required. Alternatives EST/LHB-3, EST/LHB-3d, and EST/LHB-4 would also utilize CDFs to contain contaminants.

The Minimal No-Action alternative (EST/LHB-1) compares unfavorably to the other alternatives under the long-term effectiveness criterion. The potential for human and environmental direct contact with contaminants would remain and the institutional controls that would be implemented or remain in place would be subject to violation. All of the containment alternatives provide for a greater reduction in risk than the minimal no-action alternative. With respect to the containment alternatives, CDFs are considered to be somewhat more reliable than capping in terms of long-term effectiveness and permanence. The treatment alternatives provide the greatest degree of long term effectiveness and permanence since contaminants are either immobilized or destroyed.

4. Reduction of Toxicity, Mobility, or Volume Through Treatment.

Under this criterion, EPA compares the degrees to which remedial alternatives permanently and significantly reduce the mobility, toxicity, or volume of contaminants as a direct result of treatment.

EPA's preferred alternative would not significantly reduce the toxicity, mobility or volume through treatment. This alternative would, however, reduce the potential for migration of contaminants by containing the sediments in CDFs. As discussed previously, the Hot Spot operable unit Record of Decision requires treatment of 45% of the PCB mass at the site. Thus, the overall site remedy includes a major treatment component.

Four of the nine alternatives contained in the FS have treatment components which would result in the reduction of toxicity, mobility, or volume of contaminants through treatment (EST/LHB-4, EST/LHB-5, EST/LHB-6, and SW-9). The greatest reduction in toxicity would occur with Alternatives EST/LHB-5 and EST/LHB-6, followed by Alternative SW-9 which would treat a smaller volume of sediments. Alternative EST/LHB-4 would reduce mobility of the contaminants through treatment.

5. Short-term Effectiveness.

EPA evaluates the likelihood of adverse impacts on human health or the environment that may be posed during the construction and implementation of an alternative until cleanup objectives are achieved under this criterion.

The preferred alternative would have limited short-term impacts, although some resuspension of sediments is expected during dredging operations, and the harbor bottom would be damaged by the removal of sediment. Engineering controls would be required to minimize risks to site workers, the community, and the environment during dredging activities. There would be an opportunity for worker exposure to contaminated sediment during dredging operations. Alternatives EST/LHB-3 and EST/LHB-3d would have the same type of short-term impacts as the preferred alternative since similar technology would be employed. However, because this alternative would require more time to implement, the opportunity for worker exposure would be slightly increased.

Alternative EST/LHB-1, Minimal No-Action, would present the least short-term risk to the environment, the community, or site workers during implementation because contaminated sediments are not handled. Alternative EST/LHB-2, capping, and SW-7 would also pose limited short term risks to human health, although there would be an opportunity for worker exposure to contaminated sediment during capping operations. Implementation of the capping alternatives would destroy habitats and eradicate significant populations of bottom dwelling organisms. Some resuspension of contaminated sediments would also be expected during cap placement, although measures could be taken to minimize sediment migration. All of the treatment alternatives pose greater short term risks than the other alternatives because of the additional movement, handling, and treatment of contaminated sediment. Compared to each other, all of the treatment alternatives (EST/LHB-4 through -6 and SW-9) pose a similar degree of worker risk and environmental impact caused by the removal of the contaminated sediment for treatment.

6. Implementability.

This criterion requires EPA to evaluate the technical and administrative feasibility of an alternative, including the availability of materials and services needed to implement the alternative.

The preferred alternative can be implemented with less difficulty than the other alternatives with the exception of the Minimal No-Action alternative. CDFs, which would be utilized under this alternative, were successfully demonstrated during the Pilot Study. The Pilot Study also demonstrated that dredging can be effectively implemented for removing New Bedford Harbor sediments with minimum sediment resuspension and impacts to the surrounding areas.

The implementation of Alternatives EST/LHB-2 through -6 are much more difficult than EST/LHB-1, SW-7, SW-8, and SW-9 because of the large volume of sediment requiring remediation. Although the technology to implement Alternative EST/LHB-2 (capping) and Alternatives EST/LHB-3 through -6 is available, installation of a cap would be more difficult administratively to implement because of the extensive permanent access agreements and institutional controls required. There is also a significant administrative component to securing access and controls for the large number of CDFs required for Alternatives EST/LHB-3 through -6. The mechanical dewatering component of Alternative EST/LHB-3d would reduce the number of CDFs required compared to the number required under EST/LHB-3. The treatment alternatives require more complex technology and equipment than capping.

7. Cost.

When evaluating the cost of an alternative, EPA considers the capital (up-front) cost of implementing an alternative, as well as the cost of operating and maintaining the alternative over the long term, and net present worth of both capital and operation and maintenance costs.

The preferred alternative would cost $33,274,000. Alternative EST/LHB-1 (Minimal No-Action) would be the least expensive at $7,478,000. Alternative EST/LHB-2 would cost $105,913,000. EST/LHB-3 would cost $103,400,000 and EST/LHB-3d would cost $164,050,000. EST/LHB-4 would cost $307,832,000. EST/LHB-5 would cost $529,584,000. EST/LHB-6 would be the most costly at $626,936,000. Alternative SW-7 would cost $36,164,000. Alternative SW-9 would be the most costly of the site-Wide alternatives at $80,634,000 (solvent extraction) or $92,999,000 (incineration). See Exhibit 7 for a summary of the alternatives and their costs.

8. State Acceptance.

In its final choice of a remedy, EPA considers the comments the State has made on the FS and the Proposed Plan and ultimately whether the State concurs with or opposes implementation of the preferred alternative. State comments or other information received from the State may result in the choice of alternative other than the preferred alternative or in modifications of the Proposed Plan.

9. Community Acceptance.

In its final choice of a remedy, EPA also considers comments it has received from the public regarding the FS and Proposed Plan. EPA may modify the Proposed Plan or choose an alternative other than the preferred alternative, based on the comments or other information it receives from the public.

EPA's Rationale for Proposing the Preferred Alternative

The preferred alternative, together with the Hot Spot operable unit Record of Decision issued on April 6, 1990, and the addendum plan for additional bay remediation will constitute a comprehensive remedial decision with respect to PCBs for all areas of the site. Based on current information and analysis of the site investigation and FS report, EPA believes that the preferred alternative for the New Bedford Harbor site is consistent with the requirements of the Superfund law and its amendments, specifically Section 121 of CERCLA, and to the extent practicable, the National Contingency Plan.

In EPA's judgement, the preferred alternative provides the best balance of tradeoffs among the other alternatives with respect to the evaluation criteria. EPA believes the preferred alternative would be protective of human health throughout the site and the environment, complies with most ARARs and justifies a waiver of one ARAR (the FDA limit). The preferred alternative also utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

However, as noted in the **National Contingency Plan** (NCP), there will often be a range of protective alternatives that are protective and also comply with ARARs, but which vary in their cost and effectiveness. At this site, the range of protective ARAR-compliant alternatives eligible for selection is evident.

For More Information

If you have any questions about the site or would like more information, you may call or write to:

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Glossary

Administrative Record: The compilation of documents upon which EPA bases its remedy selection. The Administrative Record is available for public review at the information repositories established for a site.

Ambient Water Quality Criteria: State-adopted and EPA-approved ambient standards for water bodies. The standards cover the use of the water body and the water quality criteria which must be met to protect the designated use or uses.

Applicable or Relevant and Appropriate Requirements (ARARS): ARARs are cleanup standards, requirements, criteria, or limitations found in federal environmental law or state environmental or facility siting law which are considered applicable or relevant and appropriate to the remedial action to be taken at a Superfund site. EPA must consider whether a remedial alternative meets ARARs as part of the process for selecting a cleanup alternative for a Superfund site.

Biota: Living organisms, both plant and animal life.

Cap: A cover placed over a contaminated area to prevent surface water and rain from coming into contact with the buried contaminants. A cap is usually made from a waterproof synthetic material or clay, or some combination.

Carcinogenic: Relating to a substance that causes cancer.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): A Federal law passed in 1980 and modified in 1986 by the

Superfund Amendments and Reauthorization Act. The acts created a special tax that goes into a Trust Fund, commonly known as Superfund, to investigate and clean up abandoned or uncontrolled hazardous waste sites. Under the program, EPA can either: 1) pay for site cleanup when parties responsible for the contamination cannot be located or are unwilling or unable to perform the work or 2) take legal action to force parties responsible for site contamination to clean up the site or pay back the Federal government for the cost of the cleanup.

Confined Aquatic Disposal (CAD): A method of containing contaminants using an underwater disposal facility. The CAD at the New Bedford Harbor Superfund site was evaluated as an option for permanent storage and disposal of contaminated sediments during the Pilot Study.

Confined Disposal Facility (CDF): An on-shore facility separated into cells that can be used for sediment storage/disposal and dewatering, and water treatment. The CDF at the New Bedford Harbor Superfund site was evaluated as a disposal and water treatment option during the Pilot Study.

Cutterhead dredge: One version of hydraulic dredge which operates on the principal of the centrifugal water pump. The cutterhead dredge gets its name from the rotating basket fitted to its suction head. The basket is used to assist in breaking up densely packed materials.

Effluent: Liquid discharge from drainage pipes.

Estuary: The mouth of a river where its flow is affected by the ebb and flow of tides.

Feasibility Study (FS): A Feasibility Study is a report that summarizes the development and analysis of remedial alternatives that EPA considers for the cleanup of Superfund sites.

Federal and State Natural Resource Trustees: The officials designated to act on behalf of the public to protect the natural resources, such as land, fish, wildlife, biota, etc. This trustee may be a federal, state or local official or a representative of an Indian tribe.

Flux: A continued flow of matter or energy.

Footprint: The area of contaminated sediment greater than a given action level and upon which a CDF would be constructed.

Geotextile: A synthetic material which may be used in construction, particularly to reduce permeability.

Groundwater: Water found beneath the earth's surface that fills pores between materials such as sand, soil, gravel and cracks in bedrock and often serves as a principal source of drinking water.

Hydrodynamic and Food Chain Model: A mathematical tool for simulating various activities. For the New Bedford Harbor site, a three-dimensional model was used to estimate the transport, deposition, resuspension and fate of PCBs in the harbor.

In-situ: In place.

Institutional Controls: Legal restrictions established to prevent specified activities from occurring in a designated area. Examples include deed restrictions, easements, and zoning.

Intertidal: The region between the extremes of high and low tide.
Leachate: A contaminated liquid resulting when water percolates, or trickles through waste materials and collects components of those wastes.

National Contingency Plan (NCP): The plan codified at 40 CFR Part 300 that sets forth the procedures and standards for responding to releases of hazardous substances.

National Priorities List (NPL): EPA's list of top priority hazardous waste sites that are eligible to receive Federal funds for investigation and cleanup under the Superfund program.

Net Present Worth (NPW): The amount of money necessary, at the present time, to cover future payments of an item, at an assumed interest rate.

Operable Unit: An action taken as one part of an overall Superfund site cleanup. A number of operable units can be used in the course of a site cleanup.

Parts per Million (ppm): A unit of measurement used to describe levels of contamination. For example, one gallon of a solvent in one million gallons of water is equal to one part per million.

Permeability: The rate that one material spreads, penetrates, or passes through a porous material.

Pilot Study: A physical demonstration of dredging equipment and construction and testing of disposal facilities conducted by the Army Corps of Engineers in a cove within the New Bedford Harbor Superfund site between 1988 and 1989. Results of the Pilot Study provided supporting documentation to the Corps' Engineering Feasibility Study of the New Bedford Harbor site.

Polychlorinated biphenyls (PCBs): A group of organic chemicals used since 1926 in electric transformers as insulation and coolants, in lubricants, carbonless copy paper, adhesives and caulking compounds. PCBs are extremely persistent in the environment because they do not break down to new and less harmful chemicals. If ingested by humans or animals, PCBs can be stored in fatty tissues. EPA banned most uses of PCBs in 1977. Acute and chronic exposure to PCBs can cause liver damage. PCBs have also caused cancer in lab animals and have adversely affected the survival rate and reproductive success of fish.

PCB Action Level: Concentration of PCB in sediment that causes examination of remedial alternatives.

Record of Decision (ROD): A legal document signed by EPA that describes the final cleanup action or remedy selected for a site, the basis for EPA's choice of that remedy, public comment on alternative remedies, and the cost of the remedy.

Remedial Action Master Plan (RAMP): A work plan developed to determine the need for immediate or fast-track activities to remediate emergency problems at a Superfund site.

Remedial Alternatives: Options evaluated by EPA to reduce the source and migration of contaminants at a Superfund site to meet health-based cleanup goals.

Remedial Investigation (RI): A summary report of the information collected on the nature and extent of contamination found at a Superfund site and the problems that the contamination causes. It directs the types of cleanup options that are developed in the Feasibility Study.

Residual PCB Level: The level of PCBs that remain after an action is taken.

Resuspension: The churning up of sediments in water in a manner similar to the stirring up of dust resting on a table top.

Risk Assessment: A study conducted by EPA to determine the risks posed to human health and/or the environment by contamination at a Superfund site.

Sediment: Material that settles to the bottom of a stream, creek, lake, or other body of water.

Solvent Extraction: An innovative technology for treatment of contaminated soils and sediments. Solvent extraction chemically separates contaminants from the material, leaving clean soil or sediment and a separate contaminated liquid component.

Stabilization: The process of mixing a settling agent (such as cement, lime or other material) with waste to form a product in which contaminants are chemically bound and/or entrapped (immobilized) by the solidified mass.

Water column: The water overlying a particular region, as distinguished from the sediment or air.

Wetlands: An area that is regularly saturated by surface or ground water and subsequently is characterized by a prevalence of vegetation that is adapted for life in saturated soil conditions.