RECORD OF DECISION

OPERABLE UNIT 7 -
FORMER SEWAGE TREATMENT PLANT

NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

BRAC PMO NORTHEAST
U.S. NAVY

April 2008

SDMS 284850

Record of Decision
Naval Air Station South Weymouth
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PART 1: DECLARATION

I. SITE NAME AND LOCATION

Naval Air Station South Weymouth
1134 Main Street
Weymouth, Massachusetts 02190
MA2170022022
Operable Unit 7 – Former Sewage Treatment Plant

II. STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for Operable Unit 7 (OU-7), the Former Sewage Treatment Plant, at the former Naval Air Station (NAS) South Weymouth, Weymouth, Massachusetts, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 USC § 9601 *et seq.*, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300 *et seq.*, as amended. The regulatory program performed under the context of these combined laws and regulations is commonly referred to as "Superfund."

This decision is based on the Administrative Record, which has been developed in accordance with Section 113(k) of CERCLA, and which is available for review at the Navy's Caretaker Site Office at the NAS South Weymouth in Weymouth, Massachusetts. Public information repositories are also kept at the Tufts Library in Weymouth, Massachusetts; the Abington Public Library in Abington, Massachusetts; the Hingham Public Library in Hingham, Massachusetts; and the Rockland Memorial Library in Rockland, Massachusetts. The Administrative Record Index (Appendix D) identifies each of the items comprising the Administrative Record upon which the selection of this decision is based.

This decision has been selected by the U.S. Navy and the U.S. Environmental Protection Agency (EPA). The Massachusetts Department of Environmental Protection (MassDEP) statement on the selected remedy is presented in Appendix A.

III. ASSESSMENT OF THE SITE

The selected response action is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

IV. THE SELECTED REMEDY

This Record of Decision (ROD) sets forth the selected remedy for OU-7, the Former Sewage Treatment Plant (the Site), at NAS South Weymouth, which consists of excavation of contaminated soil and sediment and off-site disposal or recycling by asphalt batching. Refer to Part 2 (The Decision Summary), Section XII (Description of the Selected Remedy), for a detailed description of the selected remedy.

The selected remedy is a comprehensive approach for the Site that addresses the current and potential future risks identified at OU-7, which include human and ecological risks associated with arsenic, 4,4'-DDT, dieldrin, benz(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene in surface soil; and arsenic, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, dieldrin, and hypothetically methyl mercury in sediment.

The major components of the selected remedy include:

- Conducting a pre-design investigation (PDI) to collect information to further delineate the types and extents of chemicals of concern (COCs) to be included in the site remediation. The PDI activities will involve additional sampling, analysis, and surveys of COC extent, and will provide a more complete delineation of the area and volume of soil and sediment that will be removed. The PDI also will identify the extent that COCs may have encroached into the Site wetlands. The results of the PDI will be used in conjunction with the past remedial investigation data in the design of the selected remedy.

- Excavating soil and sediment containing COCs concentrations that exceed preliminary remediation goals (PRGs) developed for the Site.

- Disposing of the excavated soil and sediment at an off-site, licensed, treatment, storage, disposal, or recycling facility.

- Implementing a tiered monitoring program to verify that post-remediation COC concentrations do not rebound in sediment.

- Conducting pre- and post-remediation groundwater monitoring to confirm that groundwater is not a medium of concern for the Site.

The components of the PDI are summarized in Part 2, Section XII. Details of the monitoring plans and wetlands restoration plan will be included as part of the remedial design subsequent to this ROD. Further design component details will be refined during the design and implementation process to the extent necessary to comply with engineering standards and state requirements and approvals.

OU-7, the Former Sewage Treatment Plant, is one of several OUs at NAS South Weymouth. The Former Sewage Treatment Plant has been addressed independently from the rest of NAS South Weymouth so that the Navy can proceed with closure of this site as soon as it has met the requirements of the CERCLA, or Superfund, process. The remedy selection decision for the Former Sewage Treatment Plant is not expected to have an impact on the strategy or progress for the rest of the sites at NAS South Weymouth. Additional details on the strategy and schedule for the remediation of NAS South Weymouth OUs are presented in a Site Management Plan (TtNUS, 2007b).

The selected response action addresses potential low-level threat wastes at the Site by:

- Excavating soil and sediment containing COCs at concentrations that exceed PRGs,

- Disposing of the excavated soil and sediment at an off-site, licensed, treatment, storage, disposal, or recycling facility, and

- Conducting post-remedial groundwater and sediment monitoring.

V. STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions to the maximum extent practicable.

Other remedial alternatives such as in-situ bioremediation/phytoremediation and ex-situ solvent extraction were evaluated for the Site (refer to Chapter 4 of the Feasibility Study, TtNUS, 2007a). While these technologies may achieve the RAOs if successfully implemented, there is some uncertainty in their

potential effectiveness for meeting the PRGs for all COCs. The selected remedy does not incorporate these treatment technologies; however, it has the greatest certainty in achieving PRGs through the use of common, well-proven removal and disposal practices. The selected remedy may include some treatment of wastes using an asphalt batching process if the excavated material meets specified chemical and physical criteria. Therefore, the selected remedy may satisfy the statutory preference for "treatment" as a principal element of the remedy if the waste materials are used in an asphalt batching process.

Because the selected remedy will be completed within a short timeframe and will not result in COCs remaining on-site above levels that allow for unlimited use and unrestricted exposure, groundwater and land use restrictions are not necessary, and 5-year reviews are not needed.

Consistent with Section 404 of the Clean Water Act and Executive Order 11990, the Navy's selected remedy is the least environmentally damaging practicable alternative for reducing environmental risks at the Site. Following the excavation of sediments in wetlands, the wetlands will be restored or replicated consistent with the requirements of both federal and state wetlands protection laws. The public, which was given the opportunity to review and comment on the proposed remedial action alternatives, and participate in a hearing, indicated their support for the selected remedy.

VI. ROD DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary (Part 2 of this ROD):

- COCs and their respective concentrations;
- Baseline risk represented by the COCs;
- Cleanup levels established for the COCs and the basis for the levels;
- Current and future land and groundwater use assumptions used in the baseline risk assessment and ROD;
- Land and groundwater use that will be available at the Site as a result of the selected remedy;
- Estimated capital, operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected; and
- Decisive factor(s) that led to selecting the remedy.

Additional information can be found in the Administrative Record file for this Site.

VII. AUTHORIZING SIGNATURES

This ROD documents the selected remedy, excavation of contaminated soil and sediment and off-site disposal or recycling by asphalt batching at the Former Sewage Treatment Plant, at the former NAS South Weymouth. This remedy was selected by the Navy and EPA. MassDEP's statement on the selected remedy is presented in Appendix A.

Concur and recommended for immediate implementation:

U.S. Department of the Navy

By: _____ Date: 7 APRIL 2008

David A. Barney
BRAC Environmental Coordinator
BRAC PMO Northeast
U.S. Navy

U.S. Environmental Protection Agency, Region 1

By: _____ Date: 4/30/08

James Owens
Director, Office of Site Remediation and Restoration
Region 1 – New England
U.S. EPA

PART 2: THE DECISION SUMMARY

I. SITE NAME, LOCATION, AND DESCRIPTION

The former NAS South Weymouth (the Base) property is located primarily in the Town of Weymouth, Massachusetts. Portions of NAS South Weymouth extend into the adjacent Towns of Abington and Rockland, Massachusetts. The Former Sewage Treatment Plant (STP) (the Site) is located within the Weymouth portion of the Base (Figure 2-1). The majority of the property currently is owned by the U.S. Government and, when active, was operated by the U.S. Navy.

NAS South Weymouth was developed during the 1940s for dirigible aircraft used to patrol the North Atlantic during World War II. The facility was closed at the end of the war and was reopened in 1953 as a Naval Air Station for aviation training. NAS South Weymouth was in continuous use from that time until it was operationally closed on September 30, 1996, and was administratively closed on September 30, 1997.

In May 1994, EPA placed NAS South Weymouth on the National Priorities List (NPL) pursuant to CERCLA. As such, cleanup of the CERCLA sites at NAS South Weymouth proceeds under CERCLA, 42 USC § 9601 et seq., as amended by SARA, and, to the extent practicable, the National Contingency Plan (NCP), 40 CFR Part 300 et seq., as amended. The Navy is the lead agency, and EPA provides oversight, for CERCLA activities at NAS South Weymouth. The Massachusetts Department of Environmental Protection (MassDEP) has assisted with regulatory oversight and guidance through their reviews of the Navy's Installation Restoration (IR) Program documents. The U.S. Department of Defense (DoD) is the sole source of cleanup funding for the Base property. There are several operable units (OUs) within the NAS South Weymouth NPL site (MA2170022022) that the Navy is addressing under CERCLA. This ROD pertains only to OU-7, the STP Site.

The STP Site is comprised of two main areas encompassing approximately 3.3 acres: the former Tile Bed Area (0.9 acres) and the adjacent former sewage treatment plant area (2.3 acres) (Figure 2-2). The Site is unpaved and relatively flat with a gentle slope to the west, toward an adjacent drainage channel and wetland area. A small segment of the adjacent, downgradient/downstream wetland area (0.1 acres) is also included within OU-7. The Site's ground surface is covered by grasses, shrubs, and mixed upland forest (Figure 2-3). A forested wetland, which contains several small intermittent stream channels, bounds the Site to the west. Forested areas bound the Site to the north, whereas paved roads bound the Site to the east and south. The Navy removed the tanks and associated structures of the STP Site in 1992. Structures that remain on the Site include the metal roof and frame and concrete walls of the former sludge drying bed area, an inactive transformer (PCB-free), the clay tiles and riser pipes of the former Tile Bed Area, and the various groundwater monitoring wells installed as part of the Navy's investigations of the Site.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

A. Site History

The Tile Bed Area was part of the original wastewater treatment system installed in the 1940s during construction of the Base. The Tile Bed Area was the leaching field for the treatment system. The wastewater from the Base, mainly comprised of wash water from sink and shower drains, restrooms, and sanitary sewer inlets, received primary treatment at Building 7, the Sewage Lift Station, located south of the Site near Hangar 1. The partially-treated wastewater was piped from the Sewage Lift Station to the subsurface gravel layer in the Tile Bed Area for final treatment (i.e., filtration and biodegradation) and disposal (i.e., infiltration to groundwater). Building 7 and the Tile Bed Area were used by the Navy from the 1940s until some time prior to 1953, when the SITE was constructed on the adjacent land. Details of the wastewater flow rates during operation of the Tile Bed are not available; however, available records

from the 1960s indicate that the average flow to the treatment plant was in the range of 20,000 to 70,000 gallons per day (gpd), and was over 100,000 gpd during rain events because of storm water infiltration.

In 1953, the Navy reportedly constructed the STP adjacent (north) to the Tile Bed Area. Use of the Tile Bed Area was discontinued and the STP was used as the wastewater treatment facility for the Base from 1953 to 1978. An engineering study from 1976 indicated that the average flow approached 150,000 gpd and could exceed 190,000 gpd during wet weather, which was within the STP's design capacity of 300,000 gpd. The STP initially consisted of a settling tank for primary (physical) treatment and a "trickling filter" for secondary (biological) treatment of wastewater. The treated wastewater was discharged through an outfall to a drainage ditch leading west (Figure 2-2). During the plant's 25 years of operation, the Navy completed various upgrades, including expansion of the secondary treatment system and construction of covered sludge drying beds for aerobic digestion (composting) of the wastewater sludge. Dried sludge from the drying beds was reportedly disposed at various remote locations on the west side of the Base, primarily north of Trotter Road. In 1978, the Navy decommissioned the SITE and the Base wastewater was discharged to the municipal sanitary sewer system. From the 1980s until 2005, the covered sludge drying bed area was used by Navy for storage of road salt and sand.

A more complete description of the STP can be found in Chapter 3 of the *Remedial Investigation (RI) Phase II Report* (TtNUS, 2002).

B. History of Investigations

Previous investigations that have been conducted at the STP Site are summarized below:

- **Installation Restoration (IR) Program, DoD, 1983**. In response to the growing awareness of the potential effects of hazardous materials on human health and the environment, the DoD developed the IR Program to investigate and cleanup potential problem areas created by past activities at federal facilities. The IR Program was the catalyst for environmental investigations at NAS South Weymouth.

- **Preliminary Assessment (PA), Argonne National Laboratory, 1988.** The PA included a records search, interviews, and a site walkover. The purposes of the PA were to identity and evaluate past waste practices at NAS South Weymouth and make an assessment of the associated potential for environmental contamination. As a result of the study, five sites (not including the STP Site) were identified for further environmental study.

- **Site Investigation (SI), Baker Environmental, 1991**. The SI included site walkovers, geophysical surveys, installation of groundwater monitoring wells, and the collection of soil, sediment, surface water, and groundwater samples at eight sites at the NAS South Weymouth property. The SI was conducted for screening purposes to assess the potential for contaminant migration, provide data for Hazard Ranking System (HRS) scoring, and to provide the information necessary to develop a comprehensive work plan for further study. The SI included a site visit and literature review at the STP Site, but no sampling. Further investigation of the STP Site was recommended.

- **Phase I RI Study, Brown & Root Environmental, 1998.** The Phase I RI included a literature search, a geophysical survey, a soil-vapor survey, immunoassay testing, an ecological assessment, test pit excavation, installation of monitoring wells, well points, and piezometers, hydraulic conductivity testing, groundwater gauging and water level measurements, stream gauging, sampling of surface soil, subsurface soil, groundwater, sediment, surface water, and leachate, and a human health risk assessment.

- **Phase II RI, TtNUS, 2002**. The Phase II RI was conducted to address data gaps from the previous investigations. During the Phase II RI, the Tile Bed Area was incorporated into the sampling and investigation programs along with the STP area. The Phase II RI included further ecological assessment, groundwater gauging, water level measurements, sampling of surface soil, subsurface soil, groundwater, sediment, and surface water, and a human health risk assessment.

- **Supplemental Sampling Event and Risk Assessment Addendum, TtNUS, 2006**. In February/March 2006, the Navy conducted an additional field investigation and completed additional risk calculations. The field investigation included sampling and analysis of soil beneath the former sludge drying beds (a sampling data gap) and of groundwater from an on-site monitoring well (to further evaluate arsenic concentrations in groundwater). The additional risk calculations were completed to evaluate the potential risks to future residents from exposure to site surface soils (0 to 1 foot below ground surface [bgs]), which was an exposure scenario that had not been evaluated during the Phase II RI report. The supplemental field investigation and additional risk calculations were incorporated into the Final Feasibility Study (FS) (TtNUS, 2007a).

- **Feasibility Study, TtNUS, 2007a**. The Navy's FS identified the Remedial Action Objectives (RAOs) that would be protective of human health and the environment at the Site, and then developed and evaluated various cleanup alternatives to achieve those objectives.

C. History of CERCLA Enforcement Activities

In May 1994, EPA listed NAS South Weymouth on the NPL, thereby indicating that the Base property was a federal priority for environmental investigation and cleanup. Since that time, environmental studies and activities at NAS South Weymouth have been conducted by the Navy in accordance with CERCLA and the NCP, which is consistent with the DoD's IR Program.

Based on the designation of the NAS South Weymouth property as an NPL site, a Federal Facility Agreement (FFA) was executed by the Navy and EPA. The FFA became effective in April 2000 and established the Navy as the lead agency for the investigation and cleanup of designated sites within the NAS South Weymouth property, with EPA providing oversight. MassDEP is not party to the FFA; however, in accordance with CERCLA and the NCP, MassDEP has participated in ongoing discussions and strategy sessions, as well as provided oversight and guidance through their review of the Navy's IR Program documents.

In accordance with the FFA, the Navy provides a Site Management Plan (SMP) with task schedules and deliverables, updated annually each June, and published each October. The SMP serves as a management tool for the Navy and EPA for planning, reviewing, and setting priorities for environmental investigative and remedial response activities to be conducted at NAS South Weymouth. The SMP is available for public review at the Tufts Library in Weymouth, Massachusetts; at the Abington Public Library in Abington, Massachusetts; at the Hingham Public Library in Hingham, Massachusetts; at the Rockland Memorial Library in Rockland, Massachusetts; and at the Department of the Navy, Caretaker Site Office at NAS South Weymouth, Weymouth, Massachusetts.

III. COMMUNITY PARTICIPATION

Community involvement has been ongoing throughout the Site's history. The Navy has kept the community and other interested parties apprised of Site activities through informational meetings, fact sheets, press releases, public meetings, and regular contact with local officials. Also, the Navy meets on a regular basis to discuss the status and progress of the IR Program with the Restoration Advisory Board (RAB), which includes representatives from the neighboring communities. Representatives from the

Navy, EPA Region I, MassDEP, and local government have attended public meetings and hearings. A brief chronology of the Navy's public outreach efforts regarding the STP Site is provided below:

- In September 1995, the Navy initiated a series of public meetings, at which the RAB process was explained and community members were asked to join the RAB. A sufficient number of volunteers were assembled and RAB meetings began in March 1996. Since that time, RAB meetings have been held on a monthly or bimonthly basis to keep the RAB and local community informed of IR Program activities. These meetings have provided updates of IR Program activities throughout the process to the public. RAB meetings held during February 2001 and November 2006 included presentations specifically highlighting the STP Site RI/FS. Other RAB meetings included brief updates of Site activities, as they occurred.

- In July 1998, the Navy released a community relations plan that outlined a program to address community concerns and keep citizens informed about and involved in remedial activities.

- The North and South Rivers Watershed Association (NSRWA) applied for, and was awarded a Technical Advisory Grant (TAG) from the EPA. This TAG allowed the NSRWA to hire a Technical Advisor to review documents, attend meetings, and to prepare evaluation reports. The Technical Advisor attended most RAB and technical project meetings when the TAG was active.

- The RAB for NAS South Weymouth applied for, and was given a Technical Assistance for Public Participation (TAPP) grant from the DoD. This grant allowed the RAB to obtain technical assistance from experts in the environmental field to help them understand the environmental cleanup programs at the Base.

- Several fact sheets have been prepared about the NAS South Weymouth property during the course of investigation and study at the Base. These fact sheets have been provided to the public mailing list for the NAS South Weymouth NPL site, and are listed in the Administrative Record Index (Appendix D).

- The Navy published a legal notice announcing the availability of, and the public comment period for the STP Site Proposed Plan (Navy, 2007) in the *Patriot Ledger* and the *Weymouth News* on August 29, 2007 and in the *Rockland Mariner/Standard* on August 31, 2007. In addition, the Navy provided copies of the Proposed Plan to the community mailing list for the Base, and placed a copy of the Proposed Plan at the Tufts Library in Weymouth, Massachusetts; at the Abington Public Library in Abington, Massachusetts; at the Hingham Public Library in Hingham, Massachusetts; at the Rockland Memorial Library in Rockland, Massachusetts; at the Department of the Navy, Caretaker Site Office, South Weymouth, Massachusetts; as well as on the Navy's public website for environmental activities at the former NAS South Weymouth (http://nas-southweymouth.navy-env.com).

- From August 29, 2007 to September 28, 2007, the Navy offered the Proposed Plan, as well as associated documents in the Administrative Record, for public comment, in accordance with the requirements of the NCP and the SMP developed for the NAS South Weymouth Superfund program. The Proposed Plan described Navy's preferred remedial action alternative for the Site. Written comments received during the public comment period are included in Appendix E.1 of this ROD.

- On September 13, 2007, the Navy held an informational meeting to present the Navy's Proposed Plan to the community, followed by a public hearing. At the informational meeting, representatives from the Navy answered questions from the public. During the public hearing, the Navy recorded oral comments from the public on the Proposed Plan. A transcript of the oral comments received at the public hearing is included as Appendix E.2 of this ROD.

- The Navy has provided responses to the written comments received during the comment period and the oral comments received at the public hearing. The responses are provided in a Responsiveness Summary, which is included as Part 3 of this ROD.

The Navy has generated an index of the Administrative Record to identify the documents used in the decision making process for this OU-7 ROD. The Index is provided in Appendix D of this ROD. The Administrative Record files are available for public review at several locations, including the Tufts Library in Weymouth, Massachusetts; the Abington Public Library in Abington, Massachusetts; the Hingham Public Library in Hingham, Massachusetts; the Rockland Memorial Library in Rockland, Massachusetts; and the U.S. Department of the Navy, Caretaker Site Office, Weymouth, Massachusetts.

IV. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

As outlined in the FFA for NAS South Weymouth, there are several OUs undergoing study and cleanup (as necessary) at the former Base (Table 2-1). The STP Site, OU-7, is one of the operable units being addressed, and is the subject of this ROD. The remaining OUs are progressing through the CERCLA cleanup process independently from OU-7, and are the subject of other RODs.

Regarding the other OUs, the Navy and EPA have selected the remedy for OU-3, the Small Landfill, in a ROD signed in March 2002; OU-4, the Fire Fighting Training Area, in a ROD signed September 2004; OU-8, the Abandoned Bladder Tank Fuel Storage Area Site, in a ROD signed in March 2003; OU-2 and OU-9, the Rubble Disposal Area, in a ROD signed in December 2003; OU-5, the Tile Leach Field, in a ROD signed in May 2006; and OU-1, the West Gate Landfill, in a ROD signed in September 2007. The ROD for OU-3 stipulated No Further Action under CERCLA, with one year of groundwater monitoring. The ROD for OU-4 stipulated No Acton under CERCLA. The ROD for OU-8 stipulated No Further Action. The ROD for OU-2 and OU-9 stipulated offsite disposal of PCB-impacted material from the wetlands, the construction of a soil cover over the former 4-acre disposal area, and implementing institutional controls. The ROD for OU-5 stipulated No Action. The ROD for OU-1 stipulated removal of visible landfill material from the adjacent wetland, construction of a soil cap over the disposed materials to meet substantive state regulations for landfill closure, long-term monitoring (LTM) as required under state landfill closure regulations, and institutional controls regarding the former disposal area and the groundwater conditions at the Site.

The OU that is the subject of this ROD (i.e., OU-7) addresses environmental media within the STP Site. The selected remedy provides for the removal of contaminated soil and sediment and off-site disposal or recycling by asphalt batching. The selected remedy:

- Addresses the potential current and future human health risks primarily posed by arsenic, 4,4'-dichlorodiphenyltrichloroethane (4,4'-DDT), dieldrin, benz(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene in surface soil and by arsenic and dieldrin in sediment;

- Addresses the potential ecological risks primarily posed by 4,4'-DDT in surface soil and by arsenic, 4,4'-dichlorodiphenyltrichloroethane (4,4'-DDD), 4,4'-dichlorodiphenyldichloroethylene (4,4'-DDE), 4,4'-DDT, and hypothetically methyl mercury[1] in sediment; and

- Meets all pertinent state and federal regulations.

These actions will address potential threats at the Site and present the final response actions for OU-7. The ROD for the STP Site is one component of the Superfund program at NAS South Weymouth and, as

[1] The available mercury data in sediment represent total mercury concentrations only. Methyl mercury was never directly measured at the Site. For purposes of the Site risk assessment, it was conservatively assumed that 5 percent of the total mercury detected in sediment was in the form of methyl mercury. Therefore, elevated concentrations of methyl mercury may, or may not be present at the STP Site. Further mercury sampling will be conducted under the selected remedy as part of a PDI.

such, has proceeded on an independent track to enable the Navy to expedite site closure and property transfer. The proposed remedy for the STP Site is not expected to have an impact on the strategy or progress for the rest of the OUs at NAS South Weymouth. The potential threats that this ROD addresses are summarized in Table 2-2.

V. SITE CHARACTERISTICS

The STP Site comprises an approximately 3.3 acre area located in the northern portion of NAS South Weymouth and was formerly used for wastewater treatment. The Site is unpaved and relatively flat with a gentle slope to the west, toward an adjacent drainage channel and forested wetland area. The ground surface is covered by grasses, shrubs, and mixed upland forest with an artificial intermittent stream located in the southern portion of the Site. Several small intermittent stream channels flow through the wetland area and transport surface water for eventual discharge into French Stream to the west. French Stream flows south to off-Base properties in Rockland. Forested areas bound the Site to the north, while paved roads bound the Site to the east and south. A vernal pool habitat, as defined in the Massachusetts Wetlands Protection Act (M.G.L. c. 141, s. 40) and its implementing regulations (310 CMR 10.00) has been identified in a small depression located at the western end of the Tile Bed Area. Several stream channels within the wetland area to the west

The Navy constructed the Tile Bed Area in the 1940s and used it for the treatment and disposal of Base sanitary wastewater until some time prior to 1953, when the STP was constructed on the adjacent land. The STP was used until 1978, when the Base wastewater system was connected to the municipal sanitary sewer system. The Navy removed most of the STP structures by 1992. From the 1980s until 2005, the Navy stored road salt and sand under the canopy that covered the former sludge drying beds.

The primary data gathering efforts for the Site have been through two comprehensive field studies: (1) a basewide Phase I RI (conducted primarily in 1996); and (2) a Phase II RI for the STP Site (conducted primarily in 1999 and in 2000). The Navy conducted a supplemental investigation in 2006 to provide additional information about soil and groundwater chemicals of concern (COCs) and potential Site risks.

Geologic investigations during the RI indicated that the Site is underlain by a thin veneer of topsoil (generally between 0.5 and 1 feet thick), with fill in the Tile Bed Area (a gravel layer 2 to 4 feet thick constructed by the Navy in the 1940s for sewage disposal in the tile beds, which was a predecessor facility to the STP), 25 to 30 feet of Pleistocene glacial deposits (i.e., till), and fractured bedrock of the Dedham Granite formation. In some locations, the glacial till can be separated into an upper sandy till and a lower, more compact till. Some logs, near the northwestern and eastern edges of the area, have sandier deposits that may represent the edge, or outliers of, a stratified drift (glaciofluvial) deposit.

The eastern portion of the Site is located within a Massachusetts-mapped potentially productive, medium yield aquifer. In this part of the Base, groundwater flows toward the southwest, in the direction of French Stream. The water table at the Site is shallow, located only a few feet below ground surface (1 to 13 feet bgs, depending on the location and proximity to the wetland area). The geologic origin and permeability of the sediments and the fracture orientation and morphology of the underlying bedrock influence groundwater flow throughout the STP area. There appears to be a relatively uniform placement of the upper and lower till above the bedrock. This suggests that there should be a relatively uniform groundwater flow pattern throughout the Site. An exception might be the Tile Bed Area, where gravel fill is present in the shallow overburden. Since the water table occurs within this gravel, at least under some conditions, possible local effects on groundwater flow may occur, but these would probably be small. The constructed intermittent stream (southern portion of the Site) and a drainage ditch and associated wetlands (western edge of the Site) appear to exert minimal influence on groundwater flow because these features are generally above the water table and only flow as a result of occasional storm drainage.

The Navy's investigations at OU-7 included the sampling of surface soil, subsurface soil, groundwater, surface water, and sediment. Chemical parameters analyzed included Target Compound List (TCL)

volatile organic compounds (VOCs), TCL semi-volatile organic compounds (SVOCs), TCL pesticides, polychlorinated biphenyls (PCBs), and Target Analyte List (TAL) inorganics (i.e., metals). Pesticides, arsenic, and SVOCs (either as polycyclic aromatic hydrocarbons [PAHs] or phthalates) were detected in each of the sampled media but were, in many cases, within background levels for NAS South Weymouth. The types of VOCs detected in surface soil, subsurface soil, sediments, and groundwater samples were common laboratory contaminants. PCBs were detected in a limited number of surface soil, sediment, and surface water samples. The specific COCs identified during the Phase II RI included: arsenic, 4,4'-DDT, dieldrin, benz(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene in soil; arsenic, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, dieldrin, and potentially methyl mercury in sediment; PCBs in surface water; and arsenic, 4,4'-DDD and 4,4'-DDT in groundwater. The surface and subsurface soil samples collected during the 2006 supplemental investigation contained PAHs, pesticides, and metals. Arsenic was not detected in either the filtered or unfiltered groundwater sample collected during 2006. No new COCs were identified in the sludge drying bed soil samples during the 2006 supplemental investigation (TtNUS, 2007a).

The STP Site conceptual site model (CSM) depicts site conditions illustrating contaminant sources, release mechanisms, transport mechanisms, exposure pathways, and potential human and ecological receptors (Figure 2-4). The CSM summarizes current and potential future site conditions and shows what is known about human and environmental exposure through contaminant release and migration to potential receptors. The risk assessments and selected response action are based on this CSM.

The results of the human health risk assessment (HHRA) and the ecological risk assessment (ERA) for OU-7 are presented in Section VII of this ROD. Refer to Tables 2-3 and 2-8 in Section VII, Summary of Potential Site Risks, for the characteristics and concentrations of human health and ecological COCs. In general, the HHRA identified unacceptable lifetime cancer risks (i.e., greater than EPA's acceptable risk range of $1x10^{-4}$ to $1x10^{-6}$) and non-cancer risks (i.e., a Hazard Index greater than 1.0) associated with the future residential and recreational child scenarios. The ERA identified potential unacceptable risks for vertebrate wildlife based on exposures to COCs in soil and sediment.

Principal threat wastes are defined as those source materials considered to be highly toxic or highly mobile, and which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. The manner in which principal threats are addressed generally will determine whether or not the statutory preference for treatment as a principal element is satisfied. Wastes generally considered to be principal threats are liquid, mobile, and/or highly toxic source material. By definition, and based upon site characteristics and the site-specific risk assessment performed, there are no principal threat wastes at the STP Site.

Low-level threat wastes are defined as those source materials that generally can be reliably contained and that would present only a low risk in the event of exposure. Wastes that are generally considered to be low-level threat wastes include non-mobile contaminated source material of moderate toxicity, surface soil containing COCs that are relatively immobile in air or groundwater, low leachability contaminants or low toxicity source material. By definition, and based upon the site characteristics and the site-specific risk assessment performed, the presence of arsenic, pesticides, and PAHs in surface soil and arsenic, pesticides, and potentially methyl mercury in sediment may be considered as low-level threat wastes at the STP Site.

VI. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

An undeveloped, forested wetland abuts the Site to the west. A forested area abuts the Site to the north, whereas paved roads bound the Site to the east and south. A recreational ballfield is located across the road to the east. The Base's former fuel tank farm is located across the road to the south. The fuel farm is currently inactive and the tanks have been removed.

The eastern portion of the STP Site is located within a Massachusetts-mapped potentially productive, medium yield aquifer, although groundwater from this aquifer is currently not used.

Under current use of the Base, there are no regular activities occurring at the STP Site and, thus, there is limited potential for current worker exposure. Human activity is limited to possible brush clearing during summer months. NAS South Weymouth is operationally closed and the Navy generally controls access to the Base (and thereby the Site) via fencing, vehicle gates, and administrative staff present at the Base. There is no site fence separating the STP Site from the adjacent recreational ballfield. The Navy has placed signs and temporary fencing at the STP Site to deter trespassing.

The anticipated future use of the OU-7 property is based on the zoning prescribed in the *Zoning and Land Use By-Laws for the Naval Air Station South Weymouth* (SSTTDC, 2005a), which has been approved by the Towns of Weymouth, Abington, and Rockland. OU-7 falls within two separate zoning districts. The eastern (upland) portion of the Site (STP Area and Tile Bed Area) is within the Shea Village Commercial District, which is planned to be the commercial center of the Base redevelopment. Allowed commercial uses include light industry, biopharmaceutical manufacturing, research and development, office, and other commercial uses. The western (wetland) portion of the Site is zoned as open space. The open space zoning district is intended for the preservation of large, contiguous wetland areas and open space for park land, active and passive recreation, reservations, community gardens, rivers and streams, and similar uses. This zoning may also encompass wetland resource areas, open space, and recreational areas where there are important public health, safety, and welfare interests in watershed and flood potential protection, preservation of wildlife habitat, and conservation of recreational land for resident use and enjoyment. No residential use is permitted within the open space zoning district. As required under CERCLA, the potential reuse scenarios were assessed during the RI risk assessment and FS evaluations (refer to Section VII).

VII. SUMMARY OF POTENTIAL SITE RISKS

A baseline HHRA and an ERA were conducted for the STP Site. Initial assessments were performed in 1995/1996 as part of the Phase I RI (Brown & Root, 1998), and expanded assessments were performed in 1999/2000 as part of the Phase II RI (TtNUS, 2002). A supplemental investigation was performed in 2006. The 2006 Addendum to the Phase II RI HHRA provided an evaluation of human health risks to future residents exposed to surface soil only (0 to 1 foot bgs). The Addendum is presented as Appendix B of the FS (TtNUS, 2007a). The potential for population-level risks to ecological receptors at the Site was re-examined in the FS (TtNUS, 2007a). The baseline risk assessments evaluated various exposure pathways, including both current and reasonably expected future exposure scenarios for the STP Site property. Specifically, the baseline risk assessments were performed to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to chemicals of potential concern (COPCs) associated with the Site if no remedial actions were taken. The assessments provide the basis for taking action, and identify the COCs and exposure pathways that need to be addressed by the remedial action, if necessary.

A. Human Health Risk Assessment

The HHRA followed EPA's required four-step process: (1) hazard identification, which identified those hazardous substances that, given the specifics of the Site, were of significant concern; (2) exposure assessment, which identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure; (3) toxicity assessment, which considered the types and magnitude of adverse health effects associated with exposure to hazardous substances; and (4) risk characterization and uncertainty analysis, which integrated the three earlier steps to summarize the potential risks posed by hazardous substances at the Site, including potential carcinogenic and non-carcinogenic risks and a discussion of the uncertainty in the risk estimates.

Twenty of the analytes detected at the STP Site were selected for evaluation in the HHRA as COPCs. The COPCs were selected to represent potential site hazards based on toxicity, concentration, frequency of detection, and mobility and persistence in the environment, and can be found in Table 6-3 of the Phase II RI report (TtNUS, 2002). Estimates of exposure point concentrations (EPCs) for the COPCs are

presented in Tables 6-18, 6-19, and 6-20 of the Phase II RI report (TtNUS, 2002) and Table 3-1 of the Addendum to the Phase II RI HHRA (TtNUS, 2007a). A subset of the COPCs were identified in the FS as presenting a significant current or future risk and are referred to as the COCs in this ROD. Table 2-3 summarizes the human health COCs identified in the FS and EPCs used to evaluate the reasonable maximum exposure (RME) scenario in the baseline HHRA.

Table 2-3 presents the COCs and the EPCs for each of the COCs detected in surface soil and sediment (i.e., the concentration that was used to estimate the exposure and risk from each COC in surface soil and sediment). The FS eliminated primary contributors to risk in groundwater and surface water as human health COCs requiring remediation (discussed below). Therefore, no surface water or groundwater EPCs are presented on Table 2-3. Table 2-3 includes the maximum detected concentrations for each COC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the Site), the EPC, and how the EPC was derived. Benzo(a)pyrene and benzo(b)fluoranthene were the most frequently detected COCs in surface soil at the Site and arsenic was the most frequently detected COC in sediment at the Site. The 95% Upper Concentration Limit (UCL) on the arithmetic mean was used as the surface soil EPC for arsenic. However, because of the limited amount of sample data available for other surface soil and sediment COCs, the maximum concentration was used as the default EPC.

Potential human health effects associated with exposure to the COPCs were estimated quantitatively or qualitatively in the HHRA through the development of several hypothetical exposure pathways. These pathways were developed to reflect the potential for exposure to the COPCs based on present uses, potential future uses, and location of the Site. There are no regular activities occurring at the Site; therefore, there is limited potential for current worker exposure. Human activity is limited to possible brush clearing or grass cutting during the summer months. It is also possible that sewer or utility line repair work could occur at the Site. Based on the proximity to residences and public streets, the Site has been identified as having the potential for exposure by trespassers.

For future use scenarios, it was assumed that land use would change. The most conservative assumption of future residential land use was assumed, as well as the possibility of a child using the Site for recreational activities. The risk evaluation for both current site use (on-site worker, trespassing child, and construction worker), and hypothetical future site use (on-site resident and recreational child) assumed that potential human receptors would be exposed to COPCs at the Site via incidental ingestion and dermal contact with surface soil, sediment, and surface water. It was assumed that the hypothetical future resident would be exposed to groundwater via ingestion and inhalation of volatiles while showering. Future residential soil exposures were evaluated considering surface soil only as well as a combined dataset of soil 0-10 foot bgs. It was assumed that construction workers would be exposed to surface and subsurface soil via incidental ingestion, dermal contact, and inhalation of dust.

Average daily doses of COPCs were estimated in the HHRA using conservative assumptions relative to the rates of potential contact with site media, the frequency and duration of contact, and other parameters. Exposure assumptions are presented in Tables 6-11 through 6-16 of the Phase II RI report (TtNUS, 2002) and Tables 4.1 and 4.2 of the Addendum to the Phase II RI HHRA (TtNUS, 2007a). Future residential exposures to soil 0 to 10 foot bgs or surface soil, sediment, and surface water (ingestion and dermal), and groundwater (ingestion and inhalation of volatiles) were found to present a significant risk. Future recreational child exposures to surface soil, sediment, and surface water (ingestion and dermal) were found to present a significant risk. Current exposures to surface soil, subsurface soil, sediment, and surface water did not present significant risk. A brief summary of the exposure pathways presenting significant risk is presented herein. A more thorough description of the exposure pathways evaluated in the risk assessments, including estimates for an average exposure scenario, can be found in Chapter 6 of the Phase II RI report (TtNUS, 2002) and the Addendum to the Phase II RI HHRA – Appendix B of the FS (TtNUS, 2007a).

Dermal contact and incidental ingestion of surface soils and 0 to 10 foot soils were evaluated for future residents who may be exposed 150 days per year for 6 years during childhood and 24 years during adulthood, and future recreational children between the ages of 1 and 6 years who may be exposed 141 days per year for 6 years. Dermal contact and incidental ingestion of sediment and surface water were evaluated for future residents who may be exposed 104 days per year for 6 years during childhood and 12 days per year for 24 years during adulthood, and future recreational children between the ages of 1 and 6 years who may be exposed 104 days per year for 6 years. For groundwater, ingestion of 2 liters/day, 350 days/year for 24 years was presumed for an adult and 1 liter/day, 350 days/year for 6 years was presumed for a child.

Excess lifetime cancer risks were determined for each receptor by multiplying a daily dose by the chemical-specific cancer potency factor. Cancer potency factors have been developed by EPA from epidemiological or animal studies to reflect a conservative "upper bound" of the risk posed by potentially carcinogenic compounds. That is, the true risk is unlikely to be greater than the risk predicted. The resulting risk estimates are expressed as a probability (e.g., 1×10^{-6} or 1/1,000,000), which indicates that an average individual is not likely to have greater than a one in a million chance of developing cancer over 70 years as a result of site-related exposure to the compound at the stated concentration. The estimated cancer risks represent an "excess lifetime cancer risk" or the additional cancer risk above the background level from other causes. EPA's generally acceptable risk range for site-related exposure is 1×10^{-4} to 1×10^{-6}. EPA's protocol at the time of risk characterization considered carcinogenic risks to be additive when assessing exposure to a variety of substances.

Table 2-4 presents a summary of the potential carcinogenic toxicity data relevant to the COCs for the Site. Table 2-4 provides the carcinogenic risk information that is relevant to the COCs in surface soil and sediment at the Site. At the time of risk characterization, there were no slope factors available for the dermal route of exposure. Therefore, in accordance with EPA guidance, the oral slope factors for these chemicals were used to evaluate dermal exposure. Different absorption adjustment factors were used for the oral and dermal exposure routes.

In assessing the potential for adverse effects other than cancer, a hazard quotient (HQ) was calculated by dividing the calculated daily dose by a reference dose (RfD) or other suitable benchmark. RfDs have been developed by EPA and represent a level to which an individual may be exposed that is not expected to result in any deleterious effect. RfDs are derived from epidemiological or animal studies and incorporate uncertainty factors to help ensure that adverse health effects will not occur. An HQ ratio less than or equal to 1 indicates that a receptor's dose of a single COPC is less than the RfD, and that adverse non-carcinogenic effects from that chemical are unlikely. The HQs for each COPC, for which the receptor is potentially exposed to via a specific pathway, are summed to yield the Hazard Index (HI) for that pathway. A total HI is then calculated for each receptor by summing the pathway-specific HIs. An HI less than or equal to 1 indicates that adverse non-carcinogenic effects are unlikely. Tables 2-5 and 2-6 present a summary of the potential non-carcinogenic toxicity data relevant to the COCs at the Site. These tables provide the non-carcinogenic risk information that is relevant to COCs in soil and sediment. Similar to the carcinogenic risk data, the dermal dose-response values applied during risk characterization were the same as the oral dose-response values for these chemicals.

The results of the risk assessment showed that potential carcinogenic risks and non-carcinogenic risks under the current use scenarios were within or below the acceptable risk benchmarks at the Site. However, potential risks under the future scenario were above acceptable carcinogenic and non-carcinogenic risk benchmarks for the future residential and recreational child receptors. The theoretical non-cancer risk exceedances were based primarily on the presence of dieldrin in surface soil and PCBs in surface water for both future residents and future recreational children exposed to surface soil, sediments, and surface water. Arsenic in groundwater also contributed to a lesser degree to total site non-cancer risk for residents. Total cancer risk for the resident and recreational child exposed to surface soils, sediment, and surface water exceed the acceptable cancer risk range, primarily based on dieldrin in surface soil. Arsenic, 4,4'-DDT, benzo(a)pyrene, benz(a)anthracene, and benzo(b)fluoranthene in

surface soil; arsenic and dieldrin in sediment; and PCBs in surface water also contributed to cancer risk. In addition to risks from surface soil, sediment, and surface water, much of the excess cancer risk for the future resident is associated with potential exposure to arsenic in groundwater. The pesticides 4,4'-DDT and 4,4'-DDD also contributed to cancer risks from groundwater exposure. Table 2-7 depicts the human health risk summary for the COPCs in soil, sediment, surface water, and groundwater evaluated to reflect current and potential future site use corresponding to the RME scenario. Those risks exceeding EPA acceptable levels are highlighted. Refer to Chapter 6 of the Phase II RI report (TtNUS, 2002) and the Addendum to the Phase II RI HHRA – Appendix B of the FS (TtNUS, 2007a) for more comprehensive risk summaries.

The risk assessment uses assumptions that have uncertainties associated with them. Some of the assumptions have a firm scientific basis, while others do not. Some level of uncertainty is introduced into the risk characterization process every time an assumption is made. In regulatory risk assessment, the methodology dictates that assumptions err on the side of overestimating potential exposure and toxicity. Such estimates may be useful for regulatory decision-making, but do not provide a realistic estimate of potential health impacts. The effect of using numerous assumptions that each overestimate potential exposure and toxicity is to exaggerate estimates of potential human risk.

After further evaluation of Site groundwater data and surface water data, the Navy, with input from EPA, concluded that groundwater and surface water cleanup is not necessary at the Site for the following reasons:

- The detected arsenic concentration does not exceed the state and federal standards for public drinking water supplies (10 µg/L). Furthermore, arsenic was detected in only one groundwater sample (5.7 J µg/L) from February 2000. It is believed that the single detection of arsenic in groundwater was not representative of site conditions because arsenic was not detected in the corresponding duplicate sample from the Phase II RI (4.4 UJ µg/L) and arsenic was not detected in any groundwater samples during other sampling rounds, including the re-sampling of the same well during the 2006 supplemental sampling event (which employed an analysis with a lower detection limit of 1 µg/L).

- The two other groundwater COCs (4,4'-DDD and 4,4'-DDT) were each detected in only one sample at concentrations that resulted in an estimated risk slightly exceeding $1x10^{-6}$, which is within EPA's acceptable risk range of $1x10^{-4}$ to $1x10^{-6}$, as described in the NCP Section 300.430(e)(2)(i)(A)(2).

- A detection of PCBs in one surface water sample resulted in estimated risks slightly exceeding the acceptable thresholds for human health cancer and non-cancer risk. However, no PCBs were detected in the co-located sediment sample at that location or in any of the other surface water samples from the Site, and PCBs were not identified as COCs in soil or sediment at the Site. Because PCBs have relatively low solubility in water and strongly sorb to soil and sediment, PCBs would not be expected to occur in surface water if the surrounding sediment did not also contain PCBs. Therefore, it is believed that the single PCB detection in surface water was an isolated, non-representative result of the actual Site conditions.

The PDI will be conducted to confirm these conclusions.

B. Ecological Risk Assessment

In addition to the HHRA described above, the Navy performed a Tier II ERA for the Site. The ERA evaluated potential risks to ecological receptors that may occur in the presence of chemical stressors in environmental media. The ERA was completed in three steps: (1) problem formulation; (2) risk analysis; and (3) risk characterization, as described below.

Problem Formulation

The habitats evaluated at the Site during the ecological assessment included upland forested areas, a palustrine forested wetland, intermittent streams, and a now-certified vernal pool. The Navy collected and evaluated information about the Site conditions (e.g., type of habitat, and types of plant and animal species at the Site), the COPCs, and the potential exposure pathways.

The following analytes were identified as ecological COPCs:

- 13 inorganic compounds, 14 pesticides/PCBs, 7 SVOCs, and 8 VOCs in surface soil;
- 8 inorganic constituents, 8 pesticides/PCBs, 3 SVOCs, and 2 VOCs in sediment;
- 5 pesticides/PCBs and 1 SVOC in surface water;
- 6 pesticides/PCBs in terrestrial invertebrates;
- 10 inorganic compounds and 2 pesticides/PCBs in small mammal tissue;
- 1 inorganic compound and 4 pesticides/PCBs in amphibian tissue; and
- 1 inorganic compound and 4 pesticides/PCBs in aquatic invertebrates.

The COPCs used in the ERA can be found in Tables 7-4 through 7-9 of the Phase II RI report (TtNUS, 2002). Estimates of average exposure concentrations for the COPCs in the media evaluated are presented in Table 7-13 of the Phase II RI report (TtNUS, 2002). For ecological media presenting a significant risk (surface soil and sediment only), a subset of the COPCs were identified in the FS as presenting a significant risk to ecological receptors and are referred to as the COCs in this ROD. These surface soil and sediment COCs are presented in Table 2-8. Table 2-8 contains the EPCs used to evaluate the maximum exposure in the ERA for the COCs in surface soil and sediment.

The ecological receptor groups evaluated included terrestrial vertebrates (small mammals and birds), terrestrial invertebrates (earthworms), wetland vertebrates (amphibians, small mammals, and birds), wetland invertebrates (midges), and terrestrial and wetland plants.

Risk Analysis

Similar to the HHRA, in the ERA, the Navy evaluated the possible harmful effects to the ecological receptors from the COPCs. The chemical concentrations to which the ecological receptors might be exposed were determined by sampling soil, water, sediment, plant, and animal tissue. These concentrations were used directly and in modeling doses to ecological receptors to determine risk. Effects were determined by the following methods: screening against toxicity thresholds; laboratory toxicity tests with plants and terrestrial and aquatic invertebrates; a tissue burden evaluation for terrestrial invertebrates; an informal and qualitative assessment of the amphibian populations; a tissue burden evaluation for amphibians; a small mammal tissue burden analysis; an informal and qualitative assessment of the upland mammalian and avian populations; and a comparison of modeled daily uptake with literature ingestion thresholds for terrestrial and wetlands birds and mammals to calculate a HQ. An HQ greater than 1.0 indicates potential unacceptable risk.

The ecological exposure pathways evaluated included:

- Direct contact with surface soil by terrestrial plant species;
- Direct contact with surface soil by terrestrial invertebrates;
- Incidental ingestion of surface soil by terrestrial vertebrate wildlife;
- Direct contact with sediment and surface water by wetland invertebrates;
- Direct contact with sediment by wetland plant species;
- Direct contact with sediment and surface water by wetland vertebrates (amphibians);
- Incidental ingestion of sediment/hydric soil and surface water by wetland vertebrate wildlife;

- Terrestrial and wetland vertebrate wildlife ingestion of prey items that have bioaccumulated COPCs from surface water, surface soils, sediment, and hydric soils.

The measurement and assessment endpoints used in the ERA are presented in Table 2-9.

Risk Characterization

The results from the risk analysis were used to determine the probability of adverse effects to the ecological receptors at the Site. The result of an ERA is based on an interpretation of the overall weight-of-evidence collected from the Site.

The ERA results indicated acceptable risks for terrestrial plants, terrestrial invertebrates, amphibians, wetland plants, and wetland invertebrates and indicated potential unacceptable risks for vertebrates from exposure to COPCs in surface soil and sediment at the Site. Unacceptable risks were found for terrestrial vertebrates (birds and mammals) associated with exposure to several pesticides in surface soil and food items at the Site. 4,4'-DDE, 4,4'-DDT, arsenic, and dieldrin in terrestrial soil were identified as posing potential risk to birds (American Robin) and mammals (Short-tailed Shrew).

Potential unacceptable risks were found for birds and small mammals associated with exposure to pesticides and metals in sediment and food items at the Site. 4,4'-DDT, 4,4'-DDD, 4,4'-DDE, arsenic, and methyl mercury in sediment were identified as posing potential risk to birds (American Robin and Carolina Wren) and mammals (Short-tailed Shrew and Star-nosed Mole). Refer to Chapter 7 of the Phase II RI (TtNUS, 2002) for a comprehensive ERA presentation.

Similar to the HHRA, the ERA uses assumptions that have uncertainties associated with them, which influence the results and conclusions of the risk assessment. Some of the assumptions may underestimate potential risk, some have an unknown effect on potential risk, while some assumptions tend to overestimate potential risk. Uncertainties in the ecological risk assessment process for the Site are summarized in Table 7-39 of the Phase II RI (TtNUS, 2002). While these uncertainties generally tend to overestimate the potential ecological risks at the Site, the use of limited site-specific toxicity testing data results in fewer uncertainties than are often contained in ecological risk assessments.

After further evaluation of Site data during the FS, the Navy, with input from EPA, concluded that 4,4'-DDE, dieldrin, and arsenic in soil did not pose risk to populations of birds and mammals and should not be considered ecological COCs.

C. Basis for Response Action

In summary, the HHRA indicated potential risks that exceed regulatory risk thresholds under the future scenario for residents and recreational children from exposures to COCs in surface soil and sediment. These theoretical risk exceedances were based on the presence of dieldrin, arsenic, 4,4'-DDT, benzo(a)pyrene, benz(a)anthracene, and benzo(b)fluoranthene in surface soil and arsenic and dieldrin in sediment. The ERA concluded that terrestrial and wetland vertebrates may potentially be at risk from exposure to COCs in surface soil and sediment. 4,4'-DDT in terrestrial soil was identified as posing potential risk to birds (American Robin) and mammals (Short-tailed Shrew). 4,4'-DDT, 4,4'-DDD, 4,4'-DDE, arsenic, and methyl mercury in sediment were identified as posing potential risk to birds (American Robin and Carolina Wren) and mammals (Short-tailed Shrew and Star-nosed Mole).

The HHRA also indicated potential risks that would exceed regulatory risk thresholds if, in the future, groundwater beneath the Site were to be used as drinking water for on-site residents and unacceptable risks from residential and recreational child exposures to PCBs in surface water. However, after further evaluation of the data, the Navy, with input from EPA, concluded that groundwater and surface water cleanup is not necessary at the Site.

No other human health or ecological risks were identified for the current and future use scenarios evaluated.

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment because:

- The baseline HHRA revealed that future recreational children potentially exposed to COCs in surface soil and sediment via ingestion and dermal contact, and future residents potentially exposed to COCs in surface soil and sediment via ingestion and dermal contact may present an unacceptable human health risk exceeding an HI of concern (1.0);

- The baseline HHRA revealed that future recreational children potentially exposed to COCs in surface soil and sediment via ingestion and dermal contact, and future residents potentially exposed to COCs in surface soil and sediment via ingestion and dermal contact may present an unacceptable human health risk exceeding a cancer risk level of concern (10^{-4});

- The baseline ERA revealed that birds and mammals potentially exposed to COCs in surface soil via ingestion of soil and prey may present an ecological risk based on elevated HQs; and

- the baseline ERA revealed that birds and mammals potentially exposed to COCs in sediment via ingestion of sediment and prey may present an ecological risk based on elevated HQs.

VIII. REMEDIATION OBJECTIVES

Remediation objectives, or Remedial Action Objectives (RAOs), are media-specific goals that are established to protect human heath and the environment. RAOs are typically based on COCs, exposure pathways, and receptors present or available at the site. Additionally, RAOs are developed to ensure compliance with federal and state Applicable or Relevant and Appropriate Requirements (ARARs). Based on the gathered information relating to types of COCs, environmental media of concern, and potential exposure pathways, RAOs were developed to mitigate, restore and/or prevent existing and future potential threats to human health and the environment, and to comply with ARARs. The RAOs for the Site that were established during the FS, and expanded upon during the development of the Proposed Plan (based on discussions with EPA and MassDEP) are as follow:

- Eliminate potential human and ecological receptor exposure to COCs present in Site soil at concentrations above the selected preliminary remediation goals (PRGs).

- Eliminate potential human and ecological receptor exposure to COCs present in Site sediment at concentrations above the selected PRGs.

Groundwater and surface water were not identified as media of concern at OU-7 (see Section VII.A). PRGs, or cleanup concentration goals, were developed in the FS (TtNUS, 2007a) for the identified human health/ecological COCs in Site soil and sediment. The Site COCs and their respective PRG concentrations are presented in Table 2-13 of the FS. Cleanup levels for Site surface soil and sediment are discussed in Section XII of this ROD.

IX. DEVELOPMENT AND SCREENING OF ALTERNATIVES

Statutory Requirements/Response Objectives

The Navy's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other

statutory requirements and preferences, including: a requirement that the response action, when complete, must comply with all federal and more stringent state environmental and facility siting standards, requirements, criteria or limitations, unless a waiver is invoked; a requirement that the response action is cost-effective and utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and a preference for response actions in which treatment significantly reduces the volume, toxicity, or mobility of the hazardous substances is a principal element over remedies not involving such treatment. Response alternatives were developed to be consistent with these Congressional mandates.

Technology and Alternative Development and Screening

CERCLA and the NCP set forth the process by which remedial actions are evaluated and selected. In accordance with these requirements, a range of alternatives were developed for the Site. However, the level of response (e.g., degree of cleanup, regulatory basis, etc.) varies in order to provide a broad range of alternatives to consider. In addition, a No Action alternative is included, per the NCP and regulatory guidance, as a baseline for comparison to the other remedial alternatives.

As presented in the FS for the Site (TtNUS, 2007a), remedial technologies and process options were identified, assessed, and screened based on their potential effectiveness, implementability, and cost at OU-7. The individual technologies retained from this screening were then combined into whole-site remedial alternatives. Chapter 4 of the FS presented the remedial alternatives developed by combining the technologies identified in the screening process in the categories identified in Section 300.430(e)(3) of the NCP. The purpose of the initial screening was to narrow the number of potential remedial actions for further detailed analysis while preserving a range of options. Each alternative was then evaluated in detail in Chapter 5 of the FS. Four remedial alternatives were selected for detailed analysis in the FS. Further details are provided in Section X of this ROD.

X. DESCRIPTION OF ALTERNATIVES

This section provides a summary of the following remedial alternatives that were developed and evaluated for OU-7:

- Alternative 1: No Action
- Alternative 2: In-Situ Bioremediation and Phytoremediation
- Alternative 3: Excavation and Off-Site Disposal or Recycling (Asphalt Batching)
- Alternative 4: Excavation and Ex-Situ Solvent Extraction

Each of the alternatives and their major components, as evaluated and presented in the FS, are summarized below and in Table 2-10. A more complete, detailed presentation of each alternative is found in Chapter 5 of the FS (TtNUS, 2007a). Additional details regarding the selected remedy (Alternative 3) are provided in Section XII of this ROD.

A. Alternative 1: No Action

Pursuant to Section 300.430(e)(6) of the revised NCP, the No Action alternative was developed as a baseline for comparison against the other remedial alternatives. The No Action alternative includes no current or future remedial actions and no institutional controls. The No Action alternative would only include 5-year reviews of the Site status by the Navy, EPA, and MassDEP. Some monitoring (sampling) also may be conducted in support of the 5-year reviews. Alternative 1 would not be protective of human health and the environment and would not achieve RAOs because COC concentrations exceeding PRGs in soil and sediment would be left in-place, and the associated potential risks to human health and ecological receptors would not be mitigated.

B. Alternative 2: In-Situ Bioremediation and Phytoremediation

Alternative 2 specifies in-situ remediation of COC concentrations in soil and sediment to achieve the selected PRGs. Successful completion of Alternative 2 (i.e., achieving the PRGs and, thereby, the RAOs) would render the Site suitable for unrestricted use and unlimited exposure because residual risks for current and future use scenarios would be within acceptable ranges.

Alternative 2 includes the following components:

Institutional Controls

Interim institutional controls would be included as temporary measures used for the protection of human health during the remediation period (anticipated to require 2 or more years). The institutional controls would include (1) interim site use restrictions (e.g., deed restrictions) that prohibit residential or recreational use of the Site until remedial actions have been completed; (2) installation and maintenance of a chain-link fence and signage to prevent trespassing; and, (3) in the event of property transfer prior to completion of the site remediation, a requirement that future property owner(s) implement a policy for the use of personal protective equipment and consult with the Navy prior to any construction, demolition, or use of the Site property.

Pre-Design Investigation (PDI)

A PDI would be conducted to further delineate the types and extents of COCs requiring remediation in soil and sediment. Additional sampling for methyl mercury in sediment and PCBs in surface water would be conducted to verify the conclusions of the risk assessments. The PDI also would include a comprehensive water level round to help evaluate groundwater flow at the Site as well as a further Site inspection to determine whether there are potential migration pathways that have not been adequately investigated.

Treatability Study

A treatability study would be conducted to assist in the design of the bioremediation and phytoremediation systems and to evaluate the potential effectiveness of those full-scale systems for mitigating COCs concentrations in soil and sediment. This study would evaluate soil and sediment characteristics (e.g., soil chemistry, microorganism presence, limiting nutrients) and would include tests to evaluate the potential effectiveness of bioremediation and the requirements for implementing an effective bioremediation remedy. The study also would evaluate site-specific factors that would affect selection and growth of phytoremediation plant species, identify plant species that could effectively uptake and/or degrade site COCs, and identify other design criteria for implementing an effective phytoremediation remedy. The treatability study also would evaluate the potential for bioremediation to augment the removal of arsenic in sediment via phytoremediation (i.e., bioremediation alone is not expected to be effective in achieving arsenic PRGs in sediment, but it may be able to render the arsenic more available for uptake by plants or transform it to a less bioavailable form).

Bioremediation and Phytoremediation

In-situ bioremediation would be accomplished by promoting the activity of indigenous microbial populations in surface soil and sediment. Depending on the results of the treatability study, this may include adding soil amendments such as water, limiting nutrients, oxygen-rich compounds, and/or secondary food sources. Soil amendments are usually aqueous solutions applied one or more times, as needed. The solution could also be introduced in smaller doses over controlled periods of time using spray irrigation from an on-site storage tank through an engineered hydraulic system. Seeding with additional bacteria can be considered based on the results of the treatability study and/or the results of the COC reduction rates; however, seeding with additional bacteria is often not required for effective

biodegradation. Given that COCs exceeding PRGs are believed to be present primarily in the top 0 to 1 foot of soil and sediment, bioremediation will likely be conducted under aerobic conditions (i.e., in the presence of oxygen).

In-situ phytoremediation would be conducted to mitigate arsenic concentrations and assist with the remediation of pesticides in surface soil and sediment; it may also assist in remediation of PAHs in surface soil. Phytoremediation could be conducted concurrent with, or following, bioremediation treatment. Phytoremediation would be accomplished through the introduction of plant species with maximum capability for the uptake of arsenic and the degradation of pesticides. Several different plant species, may be necessary for treatment of COCs via the various remediation processes utilized in phytoremediation (e.g., phyto-degradation; phyto-volatilization, phyto-extraction/accumulation; and phyto-stabilization). Selection of plant species would be determined during the remedial design phase, based in part on the results of the treatability study. Plant location and density would also be determined by engineering analysis of the Site soils, the design (and possibly the effectiveness) of the bioremediation system, and the COC "hot spot" areas.

It is anticipated that pesticide compounds would be degraded by the phytoremediation processes (broken down by metabolic processes within the plant or by action of plant enzymes in the root zone), whereas arsenic from soil and sediment would be taken up into the plant and accumulated in the plant tissue (phyto-extraction or phyto-accumulation). Accordingly, plant species used for the uptake of arsenic may require harvesting and proper off-site treatment or disposal. Some of the existing Site vegetation may have to be removed to ensure successful growth of planted vegetation to be used for phytoremediation; this would be determined during the treatability study and remedial design phase. Plant species used for the treatment of pesticides may require harvesting and disposal once remediation has been completed if they may adversely affect the indigenous species of the Site habitat (i.e., invasive species).

The areas for treatment under Alternative 2 are identical to those under the selected remedy (Figure 2-5). Following completion of bioremediation/phytoremediation activities, the areas impacted by remediation would be restored as necessary (e.g., removal and off-site treatment/disposal of phytoremediation plant species, backfilling and/or regrading areas of disturbed soil and/or wetland sediment).

Bioremediation and Phytoremediation Monitoring

A tiered monitoring program would be conducted to evaluate the success of bioremediation and phytoremediation for reducing COC concentrations and achieving PRGs in soil and sediment. The tiered monitoring program would include periodic collection of surface soil and sediment samples from the bioremediation treatment areas. The monitoring program would include analyses for the Site COCs, the COC degradation by-products, parameters associated with the biological remediation processes (e.g., presence of nutrients, pH of soil, etc.), as well as evaluations of the health of the plant species included in the phytoremediation program.

Pre- and Post-Remediation Groundwater Monitoring

Additional groundwater characterization activities will be conducted prior to and following implementation of the soil and sediment remedy to confirm that groundwater is not a medium of concern for the Site.

Five-Year Review(s)

In accordance with CERCLA Section 121(c), the Navy, EPA, and MassDEP would conduct 5-year reviews as long as residual COC concentrations remain on-site in exceedance of levels that allow for unrestricted use and unlimited exposure (i.e., COCs present above PRGs). The 5-year review(s) would focus on remediation rates and would evaluate the status of the remedy through Site visits and data generated during the tiered monitoring program to determine whether RAOs have been met or further action is warranted.

C. Alternative 3: Excavation and Off-Site Disposal or Recycling (Asphalt Batching)

Alternative 3 specifies the removal and off-site disposal (or recycling) of COC-impacted soil and sediment to achieve the selected PRGs. Successful completion of Alternative 3 (i.e., achieving the PRGs and, thereby, the RAOs) would render the Site suitable for unrestricted use and unlimited exposure because residual risks for current and future use scenarios would be within acceptable ranges. No 5-year reviews would be required.

Alternative 3 includes the following components:

Pre-Design Investigation

A PDI would be conducted to further delineate the types and extents of COCs requiring remediation in soil and sediment. Additional sampling for methyl mercury in sediment and PCBs in surface water would be conducted to verify the conclusions of the risk assessments. The PDI also would include a comprehensive water level round to help evaluate groundwater flow at the Site as well as a further Site inspection to determine whether there are potential migration pathways that have not been adequately investigated. Results from the PDI would be used to support the planning of the excavation activities.

Excavation

Alternative 3 includes the excavation of soil and sediment containing COCs at concentrations exceeding PRGs. The areas for excavation under Alternative 3 are depicted in Figure 2-5. The total area of soils requiring excavation and off-site disposal is estimated to be approximately 23,000 square feet and the total area of sediment requiring remedial action is estimated to be approximately 6,400 square feet. The required excavation depth for the sediment and soil and is estimated to be 1 foot. Additional sampling would be conducted during the PDI to more accurately determine the required extent of remediation. Once confirmatory samples indicate that PRGs have been achieved, the excavated areas would be backfilled with clean soil, compacted, and restored with vegetation.

Off-Site Disposal or Recycling (Asphalt Batching)

The final disposition of the excavated and stockpiled soil/sediment would include loading, transport, and disposal of the material at an off-site, licensed, treatment, storage, recycling, or disposal facility. The acceptance of the transported material would be dependent upon the waste characterization (sampling and analysis) of the material conducted prior to disposal. If selected, asphalt batching would involve combining the excavated materials with an asphalt emulsion to bind the COCs into the mixture. In this process, the asphalt emulsion coats the soil particles and immobilizes Site COCs. The asphalt product can then be beneficially reused (e.g., for paving projects).

Post-Remediation Sediment Monitoring

A tiered monitoring program would be implemented to verify that post-remediation COC concentrations do not rebound in Site sediment. Conceptually, this program may include the annual collection of sediment samples from the drainage channel along the northern boundary of the STP Area, as well as samples from the remediation area west of the Tile Bed Area. Samples would be analyzed for the sediment COCs. The scope of the monitoring program (number of samples, sampling frequency) can be modified based on evaluations of the sample results over time. Given that Alternative 3 includes the removal and treatment of impacted media (only clean material, as verified by post-treatment samples, would be backfilled at the Site), it is anticipated that the post-remediation monitoring program can be quickly concluded (e.g., one or two sampling events).

Pre- and Post-Remediation Groundwater Monitoring

Additional groundwater characterization activities will be conducted prior to and following implementation of the soil and sediment remedy to confirm that groundwater is not a medium of concern for the Site.

D. Alternative 4: Excavation and Ex-Situ Solvent Extraction

Alternative 4 specifies the removal and ex-situ treatment of COC-impacted soil and sediment to achieve the selected PRGs. Successful completion of Alternative 4 (i.e., achieving the PRGs and, thereby, the RAOs) would render the Site suitable for unrestricted use and unlimited exposure because residual risks for current and future use scenarios would be within acceptable ranges. No 5-year reviews would be required.

Alternative 4 includes the following components:

Pre-Design Investigation

A PDI would be conducted to further delineate the types and extents of COCs requiring remediation in soil and sediment. Additional sampling for methyl mercury in sediment and PCBs in surface water would be conducted to verify the conclusions of the risk assessments. The PDI also would include a comprehensive water level round to help evaluate groundwater flow at the Site, as well as a further Site inspection to determine whether there are potential migration pathways that have not been adequately investigated. Results from the PDI would be used to support the planning of the excavation activities.

Treatability Study

A treatability study would be conducted to evaluate the effectiveness of solvent extraction for removing each of the COCs, given the specific physical and chemical characteristics of the Site soil and sediment. The treatability study would also provide information to be used to design the full-scale solvent extraction process, for example: determining the type(s) of solvent mixture necessary to treat the COCs in soil and sediment; the necessary contact time to fully treat the soil/sediment; whether a single wash or sequential treatments with one or more solutions are required; and the operating temperature and other operating parameters.

Excavation

Alternative 4 includes the excavation of soil and sediment containing COCs at concentrations exceeding PRGs. The areas, depths, volumes, and methods of excavation would be identical to those described for Alternative 3, the selected remedy (Figure 2-5). Confirmatory sampling, backfilling, soil stockpiling, and site restoration would also be the same as described for Alternative 3. Under Alternative 4, a staging area would be required for the temporary soil stockpile(s). Control of fugitive dust may be necessary. Stockpiled soil would be placed on 10-mil polyethylene sheeting to prevent potential migration of COCs to non-impacted soil. To prevent infiltration of rain water and erosion/runoff, the soil would be covered by polyethylene sheeting at all times, except when soil is being added to or removed from the soil pile.

Solvent Extraction

COCs would be removed from the excavated soil and sediment using a solvent extraction technology. An ex-situ batch reactor would be set up at the Site and the excavated soil and sediment would be staged for processing. The treatment process involves the mixing of an aqueous solvent solution with the soil/sediment to transfer the COCs from the soil particles to the aqueous stream. Various types of solvent solutions can be used. The treatability study results would be used to determine which type of solution is best suited for the Site materials and to determine whether sequential treatment with different solvent solutions would be required for removing all COCs.

The soil/sediment treated by the solvent extraction process would be sampled and analyzed to ensure that COCs have been reduced to acceptable levels and that no unacceptable levels of residual solvent remain. Soil/sediment can be re-treated, if required, to achieve PRGs. If post-treatment characterization samples are acceptable, then the treated soil/sediment could be backfilled to the areas from which they were excavated. If some of the treated material is unsuitable to backfill at the Site, then that material would be disposed off-site and clean fill would be purchased and used to make up the difference. The aqueous waste stream from the batch reactor (which contains the COCs) would be collected, containerized, and properly treated or disposed off-site. Upon complete processing of the soil/sediment, the batch reactor would be removed from the Site.

Post-Remediation Sediment Monitoring

A tiered monitoring program would be implemented to verify that post-remediation COC concentrations do not rebound in site sediment. Conceptually, this program may include the annual collection of sediment samples from the drainage channel along the northern boundary of the STP Area, as well as samples from the remediation area west of the Tile Bed Area. Samples would be analyzed for the sediment COCs. The scope of the monitoring program (number of samples, sampling frequency) can be modified based on evaluations of the sample results over time. Given that Alternative 4 includes the removal and treatment of impacted media (only clean material, as verified by post-treatment samples, would be backfilled at the Site), it is anticipated that the post-remediation monitoring program can be quickly concluded (e.g., one or two sampling events).

Pre- and Post-Remediation Groundwater Monitoring

Additional groundwater characterization activities will be conducted prior to and following implementation of the soil and sediment remedy to confirm that groundwater is not a medium of concern for the Site.

XI. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

Section 121(b)(1) of CERCLA presents several factors that, at a minimum, the Navy is required to consider in its assessment of the remedial alternatives. Building upon these specific statutory mandates, the NCP articulates nine evaluation criteria to be used in assessing the individual remedial alternatives.

A detailed analysis was performed on the alternatives using the nine evaluation criteria in order to select a Site remedy. These criteria are summarized below, followed by a summary of the comparison of each alternative's strengths and weaknesses with respect to the nine evaluation criteria.

Threshold Criteria

The two threshold criteria described below must be met in order for an alternative to be eligible for selection in accordance with the NCP.

1. **Overall protection of human health and the environment** addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

2. **Compliance with applicable or relevant and appropriate requirements (ARARs)** addresses whether or not a remedy will meet all federal environmental and more stringent state environmental and facility siting standards, requirements, criteria or limitations, unless a waiver is invoked.

Primary Balancing Criteria

The following five balancing criteria are used to compare and evaluate the elements of alternatives that meet the threshold criteria against each other:

3. **Long-term effectiveness and permanence** addresses the criteria that are utilized to assess alternatives for the long-term effectiveness and permanence they afford, along with the degree of certainty that they will prove successful.

4. **Reduction of toxicity, mobility, or volume through treatment** addresses the degree to which alternatives employ recycling or treatment that reduces toxicity, mobility, or volume, including how treatment is used to address the principal threats posed by the site.

5. **Short term effectiveness** addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period, until cleanup goals are achieved.

6. **Implementability** addresses the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

7. **Cost** includes estimated capital and Operation Maintenance (O&M) costs, as well as present-worth costs.

Modifying Criteria

The two modifying criteria are used as the final evaluation of remedial alternatives, generally after public comments on the RI/FS and Proposed Plan have been received.

8. **State/Support agency acceptance** addresses the state's position and key concerns related to the preferred alternative and other alternatives, and the state's comments on ARARs or the proposed use of waivers.

9. **Community acceptance** addresses the public's general response to the alternatives described in the Proposed Plan and RI/FS report.

Following the detailed analysis of each individual alternative, a comparative analysis, focusing on the relative performance of each alternative against the nine criteria, was conducted. This comparative analysis can be found in Chapter 5 of the FS (TtNUS, 2007a), and a summary is included as Table 2-11 in this ROD.

The discussion below presents a summary of the comparative analysis of the four remedial alternatives relative to the NCP evaluation criteria, as presented in the FS (TtNUS, 2007a).

Overall Protection of Human Health and the Environment

Overall, Alternative 1 (no action) would not be protective of human health and the environment, whereas Alternative 2 (in-situ bioremediation and phytoremediation), Alternative 3 (excavation and ex-situ solvent extraction), and Alternative 4 (excavation and off-site disposal or recycling) would be protective of human health and the environment. Based on the HHRA, unacceptable risks for future use of the Site were associated with future residential and recreational child exposure to Site soil and sediment. The results of the ERA indicated that terrestrial and wetland vertebrates may also potentially be at risk from exposure to surface soil and sediment.

Alternative 1 would not be protective because no remedial actions or institutional controls would be implemented to mitigate the identified unacceptable risks. Elevated COC concentrations would not be reduced or otherwise addressed and the identified risks would persist. Natural attenuation of COC concentrations would occur, but given the nature of the Site COCs (pesticides, PAHs, and arsenic), it is not expected that PRGs would be achieved within a reasonable timeframe. Alternatives 2, 3, and 4 would be protective through direct actions implemented to reduce Site COC concentrations to acceptable levels. Achieving the PRGs would render the Site suitable for unrestricted use and unlimited exposure.

Assuming that each alternative was successfully implemented, Alternatives 2, 3, and 4 would be equally protective with respect to the reduction of COC concentrations at the Site. However, there is some uncertainty in the potential effectiveness of Alternatives 2 and 4 for achieving all the PRGs. Alternative 2 has the highest degree of uncertainty because of the use of an emerging, relatively unproven technology (phytoremediation) and in-situ bioremediation, which has inherent complicating factors such as variations in the composition of the media, micro-organism presence, and seasonal factors such as temperature and precipitation. There is also some uncertainty in the effectiveness of solvent extraction (Alternative 4) for treating arsenic to the desired concentration. Alternative 3 has the greatest degree of certainty in achieving PRGs because it includes simple, well-proven disposal and remediation practices.

Compliance with Applicable or Relevant and Appropriate Requirements

Overall, Alternative 1 would not comply with ARARs, whereas Alternatives 2, 3, and 4 would be conducted in compliance with ARARs. Alternative 3 would be the most reliable and effective.

There are no identified chemical-specific ARARs for site soil or sediment; therefore, chemical-specific TBCs were used in evaluation of Site data and in the development of PRGs. Alternatives 2, 3, and 4 would each aim to achieve PRGs, whereas Alternative 1 includes no provisions to achieve PRGs.

Alternatives 2, 3, and 4 would be conducted in accordance with location-specific ARARs for the protection of wetlands and listed species. Alternative 1 would not comply with the identified location-specific ARARs because COCs would remain on-site and would have the potential to adversely impact adjacent/downstream wetland areas.

Alternatives 2, 3, and 4 would be conducted in accordance with their respective action-specific ARARs (equivalent compliance). No action-specific ARARs were identified for Alternative 1 because no remedial actions are specified.

Long-Term Effectiveness and Permanence

Overall, Alternative 1 would not be an effective or permanent remedy for the Site, whereas Alternatives 2, 3, and 4 would be effective and permanent to varying degrees.

Alternative 1 would not be effective in the long-term for achieving RAOs. COC concentrations would persist and the associated risks would not be mitigated. No controls would be implemented to mitigate Site risks. Although natural attenuation may reduce COC concentrations over time, no monitoring would be conducted to evaluate natural attenuation processes and it is not expected that natural attenuation mechanisms would achieve PRGs within a reasonable timeframe because of the nature of the site-specific COCs (e.g., pesticides and arsenic).

If successfully implemented, Alternatives 2, 3, and 4 would be effective for achieving RAOs (i.e., reducing COC concentrations to meet PRGs) and would present permanent solutions to mitigate Site risks. However, there is some uncertainty in the potential effectiveness of Alternatives 2 and 4 for meeting the PRGs for all COCs.

The effectiveness of Alternative 2 has the highest degree of uncertainty because of the use of an emerging, relatively unproven technology (phytoremediation), as well as in-situ bioremediation, which has inherent difficulties associated with factors such as variations in the composition of the media, micro-organism presence, and seasonal effects. The effectiveness of Alternative 4 is more certain than Alternative 2 because of the reliability of the excavation component; however, there is less certainty in the effectiveness of the solvent extraction process for treating some of the target COCs such as arsenic. Treatability studies would be conducted as part of Alternatives 2 and 4 in order to further evaluate the potential effectiveness of these options and to optimize the treatment processes.

Alternative 3 has the greatest certainty of achieving PRGs because it uses common, well-proven disposal and remediation/recycling practices. Under Alternative 3, permanent remediation would be accomplished by excavating the soil and sediment to be addressed and transporting it off-site for disposal in an appropriately permitted facility; or if it meets specified chemical and physical criteria, the waste would be treated in an asphalt batching facility to immobilize the COCs, and the treated material would be reused in a paving application.

Reduction of Toxicity, Mobility, or Volume Through Treatment

In accordance with the NCP, EPA has a preference for remedies that employ treatment as a principal element to reduce the toxicity, mobility, and volume of COCs in site media. As such, Alternatives 2 and 4 would satisfy this preference, whereas Alternative 3 may satisfy this preference provided that the excavated soil and sediment are recycled/treated using an asphalt batching process. Alternative 1 would not satisfy this preference because no treatment technologies are specified.

Although some natural attenuation of COC concentrations may occur under Alternative 1, it is unlikely that toxicity, mobility, or volume of the COCs would be reduced within a reasonable timeframe because of the persistent/recalcitrant nature of the COCs (pesticides and arsenic) and no monitoring would be conducted to evaluate natural attenuation mechanisms.

Alternative 2 would treat site COCs through bioremediation and phytoremediation. Bioremediation, and potentially phytoremediation, would degrade (break down) pesticides and PAHs into less toxic or innocuous compounds/elements. Phytoremediation may result in uptake of arsenic from soil and sediment into plants that would likely have to be harvested and disposed off site. Through biological uptake and establishing an enhanced, stabilizing root zone across the surface of the Site (i.e., improved erosion and runoff control), the mobility of COCs would also be reduced.

Alternative 4 would remove COCs from Site soil and sediment using ex-situ solvent extraction. By removing COCs from the impacted media and concentrating them in the solvent waste solution, Alternative 4 would significantly reduce the volume of contaminated media. The ex-situ solvent extraction process would not destroy COCs or render them less toxic, but would instead transfer them from soil/sediment to a smaller volume of an aqueous solvent solution that would be transported off-site for treatment or disposal.

The goal of Alternative 3 is to remove the target COCs from the Site quickly and effectively. Alternative 3 specifies excavation and off-site land disposal as the primary strategy. If final disposal consists solely of off-site disposal at a licensed facility, then no treatment would occur, but the volume of impacted media remaining at the Site would be greatly reduced. However, Alternative 3 includes a preference for offsite asphalt batching of excavated materials if costs are comparable to direct land disposal and if waste characterization samples indicate that the material is suitable for asphalt batching (to be determined at the time of remediation). If final disposal for some of the waste consists of asphalt batching, then some treatment of the COCs would be realized. Asphalt batching would immobilize the COCs within the asphaltic matrix, thereby rendering that material suitable for beneficial reuse (e.g., paving projects).

Short Term Effectiveness

Overall, Alternative 1 would not provide short-term effectiveness, whereas Alternatives 2, 3, and 4 would be effective in the short-term, but to varying degrees. Alternative 3 would require the shortest implementation time. Alternative 1 would not be effective in the short-term because RAOs would not be achieved; however, no new short-term impacts would occur from implementation of Alternative 1 because no on-site actions would be conducted.

Once the design is completed and remediation workers are mobilized to the Site, Alternative 3 would require the shortest time (days/weeks) to achieve RAOs because the impacted soil and sediment could be quickly excavated and transported to an off-site disposal or asphalt batching facility. Alternative 4 would require slightly more time (weeks/months) than Alternative 3 to achieve RAOs because of the complications of setting up an on-site treatment facility, conducting ex-situ solvent extraction (possibly requiring multiple solvents and multiple batch treatments to meet PRGs), and ensuring that treated soils are suitable for backfilling. Alternative 2 would require the longest time to achieve RAOs (2 or more years) because in-situ remediation processes that rely on slower biodegradation and phyto-extraction mechanisms are utilized. The cold winter climate in the region also would slow remediation efforts under Alternative 2 for a portion of each year.

Alternative 2 would present the least risk to the community and site workers because there would be minimal disturbance of impacted soil/sediment and natural biological processes would be employed for the degradation/extraction of Site COCs. Alternatives 3 and 4 include the excavation of impacted materials that would require additional precautionary measures (e.g., personal protective equipment, dust controls) to ensure worker and community safety. Noise generated at the Site during remedial activities is not expected to be a nuisance given the short timeframes for remediation and because the Site is set back from occupied areas.

Alternative 3 would require transporting impacted soil/sediment to an off-site facility and bringing in replacement soil from an off-site source (approximately 55 truckloads each). This additional trucking would present some temporary nuisances, such as increased traffic, vehicle exhaust, and noise along those public roads (Shea Memorial Drive and Route 18 in particular, which are already high-traffic areas supporting commercial, hospital, and residential areas). However, as part of the ongoing Base redevelopment (including Route 18 expansion), such an increase in construction vehicle traffic will be small.

If successful solvent extraction can be realized, then Alternative 4 would retain the treated soil/sediment on-site; however, incomplete extraction may necessitate the trucking of some impacted material over public roads to an off-site disposal facility. Alternative 4 also may generate new risks if unacceptable solvent residuals are present in the treated soil. If so, that material may require off-site disposal and clean fill would need to be brought to the Site. Alternative 4 may also present additional risks to remediation workers because of increased handling of impacted soil/sediment (i.e., increased staging for processing through the solvent extraction reactor) and potentially from the types of solvent solution used.

Alternative 2 would disturb the physical environment the least because, unlike Alternatives 3 and 4, the soil and sediment to be treated would be left in-place. Excavation under Alternatives 3 and 4 would result in the destruction of the existing habitat (including some wetland area) within the excavation area that would require restoration (i.e., clean backfill plus reseeding) after remediation has been completed. However, the extent of excavation under Alternatives 3 and 4 is small compared to the overall Site extent, and the overall habitat should not be adversely affected. Some clearing of existing vegetation may be required under Alternative 2 in order to accommodate the phytoremediation component. Backfill using treated soil under Alternative 4 would have to be tested to ensure that no residual solvent solution concentrations are present that may adversely impact the Site or adjacent/downstream habitats.

Post-remediation site restoration would be required under Alternatives 2, 3, and 4. Under Alternative 2, phytoremediation plantings may need to be removed and the treatment area reseeded or restored. Similarly, the bioremediation areas (and access roads) may require restoration (e.g., removal of equipment, regrading, reseeding). Under Alternatives 3 and 4, the excavated areas would need to be backfilled, graded, and reseeded. Any wetland areas that are adversely impacted by remedial actions under Alternatives 2, 3, and 4 (e.g., treatment/excavation of the FSD-3 area) would be restored.

Implementability

In a technical sense, Alternative 1 would be easiest to implement because it includes no remedial actions or institutional controls. Alternatives 2, 3, and 4 are technically implementable to varying degrees; Alternative 3 would be the easiest to implement.

Alternative 3 would be the easiest to implement because excavation and off-site disposal are commonly used remediation practices. The required services and equipment are readily available. The technical challenge under Alternative 3 primarily relates to the confirmation that PRGs have been achieved and in any potential dewatering of excavated sediment (although, given that the drainage channel is characterized by intermittent flow, dewatering requirements could be minimized or eliminated by conducting the excavation during a dry season).

Alternatives 2 and 4 would be more difficult to implement because they include treatability/pre-design studies, design, construction, and operation of on-site remediation systems (Alternative 4 also includes excavation similar to Alternative 3). The complex batch reactor system used in Alternative 4 would be somewhat difficult to implement, as it would require careful coordination of efforts with heavy equipment crews, skilled operators for the solvent extraction system, and laboratory services. Because multiple organic and inorganic COCs are present in two different media, separate treatment processes may be required for each media and sequential batch treatments with different solvents may be needed to effectively treat all COCs. Alternative 2 would require less intensive efforts because a more passive remediation system is employed (i.e., plants and indigenous microbes); however, the remediation process can be difficult to control, as the effectiveness of biological systems is dependent upon many complicating factors (e.g., soil chemistry, weather, presence/absence of limited nutrients, heterogeneity in soil geochemistry, and COC distribution). Therefore, monitoring and evaluation of site conditions would be required over the treatment period. Additional/modified nutrient additions and vegetation plantings can be conducted in attempts to optimize the bioremediation and phytoremediation process. The required equipment and services to implement Alternative 2 (bio/phytoremediation) and Alternative 4 (solvent extraction) are less common than for Alternative 3 (excavation), but are nonetheless available.

In an administrative sense, Alternative 1 cannot be implemented (because it does not achieve RAOs or threshold criteria), whereas Alternatives 2, 3, and 4 would be implementable. Alternative 2 may be the easiest to implement administratively because institutional controls can be readily implemented on the Navy-owned property and biological remediation systems tend to be well received by regulatory and public agencies. An exception to this would be if the redevelopment authority requires use of the property sooner than bioremediation and phytoremediation can achieve PRGs. Alternative 3 would also be readily implementable in an administrative sense because excavation and off-site disposal is a common practice that is well received by regulatory and public agencies; however, additional coordination with other agencies would be required to handle potential disturbances to wetland areas, as well as transportation and final disposal of excavated materials. Alternative 4 would be the most complicated to implement in an administrative sense because, in addition to coordination with other agencies regarding potential disturbances to wetland areas, coordination with state agencies would be required for the installation of an on-site remediation system that employs chemical solvents and for the backfilling of cleaned soils that may contain treatment residuals.

Cost

In accordance with CERCLA FS guidance (EPA, 2000), the preliminary cost estimates are anticipated to be between +50 and -30 percent of the actual costs for completing the remedial actions. Therefore, the costs portrayed are to be used as an order of magnitude comparison. More accurate cost estimates will be developed during the remedial design phase subsequent to the ROD.

The net present worth cost estimates for the four remedial alternatives range from $139,000[2] (Alternative 1) to $1,485,000 (Alternative 4) (Table 2-11). Alternative 2 ($1,263,000) is comparable in cost to Alternative 4 and Alternative 3 ($671,000) is near the middle of that range. The actual costs for Alternative 3 may be much lower ($411,000) if all the excavated material can be recycled using asphalt batching instead of sending the material to a landfill for final disposal. Given that Alternatives 2, 3, and 4 each achieve RAOs and threshold evaluation criteria for the Site, Alternative 3 is the most cost-effective option for remediation of OU-7.

State (Support Agency) Acceptance

MassDEP's statement on the selected remedy is presented in Appendix A.

Community Acceptance

During the public comment period, the community expressed its support and preference for the selected remedy (Alternative 3). Refer to Appendices E.1 and E.2 for a copy of the verbal and written comments received during the public comment period on the Proposed Plan for the Site.

XII. THE SELECTED REMEDY

Summary of the Rationale for the Selected Remedy

The Navy and EPA have selected Alternative 3 – *excavation and off-site disposal or recycling (asphalt batching)*. The Navy has concluded that this remedy is protective of human health and the environment, complies with ARARs, and achieves the RAOs established for the Site. The Navy proposes that this remedy be the final remedy for the STP Site.
The selected remedy includes the following steps:

- Conduct a PDI to further delineate the types and extents of COCs in soil and sediment requiring remediation and to verify that surface water is not a medium of concern for the Site.

- Excavate soil and sediment containing COCs at concentrations exceeding PRGs (Figure 2-5). The total area of soils requiring excavation and off-site disposal is estimated to be approximately 23,000 square feet and the total area of sediment requiring remedial action is estimated to be approximately 6,400 square feet. The required treatment depth for soil and sediment is estimated to be 1 foot. The estimated volume of soil and sediment requiring remediation is 1,100 cubic yards.

- Load, transport, and dispose of the excavated and stockpiled soil and sediment at an off-site, licensed, treatment, storage, disposal, or recycling facility. If waste characterization samples indicate that the excavated material is classified as non-hazardous, then the material will be disposed either in a licensed solid waste landfill or sent to a licensed asphalt batching facility. To be accepted for asphalt batching, the material must have contaminant concentrations that fall

[2] For purposes of cost comparison in the FS, a hypothetical 30-year period of performance was assumed for Alternative 1. However, its actual period of performance is indefinite. Costs for Alternatives 2, 3, and 4 were based on the anticipated periods of performance for each alternative (i.e., 5 years for Alternative 2 and 2 years for Alternatives 3 and 4).

below the maximum allowable concentrations included in the recycling facility's permit and must have physical characteristics suitable for the process. If waste characterization samples indicate that the excavated material is classified as hazardous, then the material will be disposed at a landfill licensed to accept such materials.

- Implement a tiered monitoring program to verify that post-remediation COC concentrations do not rebound in sediment. Conceptually, this program may include the annual collection of sediment samples from the drainage channels along the northern boundary of the STP Area and along the west side of the Tile Bed Area. Samples will be analyzed for the sediment COCs.

- Conduct pre- and post-remedial groundwater monitoring to verify that groundwater is not a medium of concern for the Site.

The South Shore Tri-Town Development Corporation (SSTTDC) prepared a revised reuse plan in 2005 that shows that OU-7 falls within two separate zoning districts (SSTTDC, 2005b). The eastern (upland) portion of the Site (STP Area and Tile Bed Area) is within the "Shea Village Commercial District", which is planned to be the commercial center of the Base redevelopment. Allowed commercial uses therein include light industry, biopharmaceutical manufacturing, research and development, office space, and other commercial uses. The western (wetland) portion of the Site is zoned as "Open Space". The open space zoning district is intended for the preservation of large, contiguous wetland areas and open space for park land, active and passive recreation, reservations, community gardens, rivers and streams, and similar uses. The zoning may also encompass wetland resource areas, open space, and recreational areas where there are important public health, safety, and welfare interests in watershed and flood potential protection, preservation of wildlife habitat, and conservation of recreational land for resident use and enjoyment. No residential use is permitted within the open space zoning district.

The Navy evaluated a variety of criteria and followed available EPA guidance to select an alternative that is protective and cost-effective. When completed, Alternative 3 will: (1) be protective of human health and the environment (e.g., achieve the Site-specific RAOs); (2) comply with all pertinent state and federal regulations (i.e., ARARs); (3) provide short- and long-term effectiveness; (4) be readily implementable using proven technologies, and (4) provide a cost-effective remedy.

Description of the Remedial Components

Alternative 3 specifies the removal and off-site disposal (or recycling) of COC-impacted soil and sediment to achieve the selected PRGs. Successful completion of Alternative 3 (i.e., achieving the PRGs and, thereby, the RAOs) will render the Site suitable for unrestricted use and unlimited exposure because residual risks for current and future use scenarios will be within acceptable ranges. The components of the selected remedy are as follow:

<u>Pre-Design Investigation</u>

The selected remedy includes a PDI intended to further delineate the types and extents of COCs requiring remediation. The PDI will consist of one additional sampling round that includes the following scope:

- <u>Soil</u> – Sampling to further delineate the extent of COCs exceeding PRGs in surface soil is described below. Areas requiring additional investigation are shown in Figure 2-5.

  - Past sampling data indicated that surface soil in the area of locations FSS-1 and FSS-3 contained PAH concentrations that exceeded PRGs. Additional investigation is needed in this area to better define the limits of the areas requiring remediation in surface soil. The investigation area around FSS-1 and FSS-3 will be expanded to encompass FSS-4 because, although this location was not identified as exceeding PRGs based on the average of a duplicate pair, one sample of the duplicate pair exceeded the PRG for benz(a)anthracene.

Surface soil samples collected from the area around FSS-1, FSS-3, and FSS-4 will be analyzed for PAHs, pesticides, and arsenic.

- Past sampling data indicated that surface soil at location FSS-6 contained pesticide concentrations that exceeded PRGs. Additional investigation is needed in this area to better define the limits of the area requiring remediation. Because only pesticides exceeded PRGs in this area, analysis only for the pesticide COCs will be required to characterize the extent of remediation associated with FSS-6.

- The PDI will also include additional sampling to characterize a soil stockpile located southwest of the former location of the treatment plant. This area has been identified as a potential concern because it may contain soil moved from the former STP Area during demolition. Based on the described location of the stockpile, it is believed to be located in the area near FSS-6. Therefore, the investigation described above for FSS-6 will also address this area. Soil samples in the stockpile area will be analyzed for PAHs, pesticides, and arsenic. For the purposes of cost estimation, it was assumed that the stockpile investigation area covers half of the FSS-6 area.

- Sediment – Sampling to further delineate the extent of COCs exceeding PRGs in sediment/hydric soil is described below. Areas requiring additional investigation are shown in Figure 2-5.

  - Past sampling data indicated sediment in the drainage channel along the north side of the Site (from locations FSD-2 at the headwall to FSD-5 near the lower end of the channel) contained several COCs at concentrations that exceeded PRGs. This area is already well defined by the topography of the channel itself and does not require further delineation.

  - Location FSD-3 (in the wetland area at the end of the northern drainage channel) had one potential PRG exceedance (methyl mercury). Between FSD-5 and FSD-3, the ditch becomes less defined and discharges into the wetland channels. In order to refine the limits of remediation in this area, additional sediment sampling will be conducted between FSD-5 and FSD-3 and in the downstream wetland channels. Sediment samples from this area will be analyzed for arsenic, methyl mercury, and the pesticide COCs because sediment samples in the northern portion of the drainage channel exceeded PRGs for these COCs.

  - Location FSD-7, adjacent to the Tile Bed Area also had one potential PRG exceedance (methyl mercury) and adjacent sample locations had limited pesticide data. Therefore, additional samples will be collected around location FSD-7 and FSD-8 to delineate the extent of COCs exceeding PRGs in the drainage ditch adjacent to the Tile Bed Area.

- Sampling to determine whether methyl mercury is present in sediment (hydric soil). Methyl mercury was never directly measured during the RI. However, methyl mercury in sediment was identified as a COC for ecological receptors. For purposes of risk assessment, it was conservatively assumed that 5 percent of the total mercury concentrations detected at the Site would be present in the form of methyl mercury. Therefore, direct analysis for methyl mercury is required to determine whether this COC is actually present in Site sediment at levels requiring remediation. If the methyl mercury sample results are below the PRG, then no action will be required for this tentatively identified COC. Analysis for methyl mercury is proposed at all locations identified as potentially exceeding the PRG for methyl mercury, as well as at least one background location determined to be unaffected by Site activities.

- Sampling for PCBs to verify that surface water is not a medium of concern for the Site. Three to four samples each of surface water, sediment, and surface soil near and upstream of location

FSW-1 (i.e., in the drainage ditch in between the former STP Area and Tile Bed Area) will be collected for this purpose.

In addition to the sampling described above, the PDI will include a comprehensive round of water level measurements to further evaluate groundwater flow at the Site. Existing groundwater monitoring wells and piezometers on and near the Site (approximately 20) will be included. Up to four hand-driven piezometers/staff gauges will be installed in the wetlands area west of the Site and included in the comprehensive water level round to help evaluate the influence of the wetlands on Site groundwater. The data from the comprehensive water level round will be used to help determine the locations of new and/or replacement wells to be installed at the Site following implementation of the remedial action.

The PDI will also include an additional site inspection, including the drainage channel west of the Tile Bed Area, to determine whether there are potential migration pathways that have not been adequately investigated. Further details of the scope of work for the PDI will be developed during the remedial design phase following signature of this ROD. Determinations of the number of samples, sample locations, analytical parameters, and other details of the investigation will be made with input from the regulatory agencies. Results from the PDI will be used to support the excavation design.

Excavation

Alternative 3 includes the excavation of soil and sediment containing COCs at concentrations exceeding PRGs. The planned areas for excavation are depicted in Figure 2-5. A comparison of the PRGs to the past sample results indicates that the following locations require remediation: surface soil locations FSS-1, FSS-3, and FSS-6; sediment in the north drainage channel from FSD-2 (headwall) down to FSD-3 (beginning of the wetland area); and sediment at location FSD-7 and the drainage channel west of the Tile Bed Area. The total area of soils requiring excavation and off-site disposal is estimated to be approximately 23,000 square feet and the total area of sediment requiring remedial action is estimated to be approximately 6,400 square feet. The required excavation depth for the sediment and soil and is estimated to be 1 foot. As described above, additional sampling will be conducted during the PDI to help refine the delineation of the area to be excavated.

Post-excavation confirmatory soil and sediment samples will be collected from the bottom and sidewalls of the excavation areas and sent to a laboratory for COC analyses. Warning tape will be installed around the perimeter of the excavated area(s) to prevent access until the area is backfilled. If laboratory analyses of the confirmatory samples indicate that COCs are still present above PRGs, then the impacted area will be further excavated and additional confirmatory samples will be collected. Once confirmatory samples indicate that PRGs have been achieved, the excavated areas will be backfilled with clean soil, compacted, and restored with vegetation. Wetland areas impacted by the remedial action will be restored.

Safety precautions will be required during remedial excavation activities because of the disturbance and handling of COC-impacted soil. A staging area will be required for the temporary soil stockpile(s). Control of fugitive dust may be necessary.

The target soil and sediment areas will be excavated using a track-mounted excavator and will be temporarily stockpiled on-site. Stockpiled soil will be placed on 10-mil polyethylene sheeting to prevent potential migration of COCs to non-impacted soil. To prevent infiltration of rain water and erosion/runoff from the soil pile, the stockpiles will be covered with 10-mil polyethylene sheeting at all times, except when materials are being added or removed.

Off-Site Disposal or Recycling (Asphalt Batching)

The final disposition of the excavated and stockpiled soil/sediment will include loading, transport, and disposal of the material at an off-site, licensed, treatment, storage, recycling, or disposal facility. The

acceptance of the transported material will be dependent upon the waste characterization of the material conducted prior to disposal. If waste characterization samples indicate that the excavated material is classified as hazardous, then the material will be disposed at a landfill licensed to accept such materials. If the material is non-hazardous, then it will be disposed either in a licensed solid waste landfill (e.g., used as daily cover at a RCRA Subtitle D landfill) or sent to a licensed asphalt batching facility. Determination of the disposal/treatment facility for non-hazardous materials will be made based on the chemical content and physical characteristics of the excavated materials. To be accepted for asphalt batching, materials must have contaminant concentrations that fall below the maximum allowable concentrations included in the recycling facility's permit and must have physical characteristics suitable for the process.

In accordance with CERCLA's preference for remedial alternatives that include treatment, asphalt batching will be the preferred option for materials that are determined to be suitable for that process. Asphalt batching would involve combining the excavated materials with an asphalt emulsion to bind the COCs into the mixture. In this process, the asphalt emulsion coats the soil particles and immobilizes site COCs. The asphalt product can then be beneficially reused (e.g., for paving projects).

Post-Remediation Sediment Monitoring

Drainage channels at the Site will continue to receive and transport stormwater. Overland runoff can affect sediment quality within those channels. In order to verify that post-remediation COC concentrations do not rebound in Site sediment, a tiered monitoring program will be implemented. The scope of the monitoring program will be determined during the remedial design phase following signature of this ROD. Conceptually, this program may include the annual collection of sediment samples from the drainage channel along the northern boundary of the STP Area, as well as samples from the remediation area west of the Tile Bed Area. Samples will be analyzed for the sediment COCs. The scope of the monitoring program (number of samples, sampling frequency) can be modified based on evaluations of the sample results over time. Given that Alternative 3 includes the removal and off-site disposal of impacted media, it is anticipated that the post-remediation monitoring program can be quickly concluded (e.g., one or two sampling events).

It is anticipated that the remedial action will be successfully completed (with no COCs remaining on the Site at concentrations greater than PRGs) within 2 years after signing the ROD; therefore, no 5-year reviews will be required.

Pre- and Post-Remediation Groundwater Monitoring

Additional groundwater characterization activities will be conducted prior to, and following implementation of the soil and sediment remedy, to verify that groundwater is not a medium of concern for the Site. The following activities will be included in the monitoring program:

- Conduct two synoptic water level rounds including all wells at and near the STP Site: one round before implementation of the remedy and one round after the remedy has been completed.

- Replace any critical monitoring wells that are destroyed by the remedial action. Move one or more of the replacement wells to new locations to better evaluate site groundwater. It is anticipated that MW-33 and MW-35 will have to be replaced, but MW-35 may be moved to a location southwest of the former sludge drying beds.

- Conduct post-remedial confirmatory sampling and analysis of approximately five monitoring wells to evaluate groundwater to confirm that it is not a medium of concern. Analyze samples for VOCs, SVOCs, pesticides, PCBs, and metals.

The results of the groundwater monitoring efforts will be documented in two technical memoranda: one summarizing activities and conclusions of the pre-remedial investigation and one summarizing post-remedial investigation activities and the overall conclusions of the groundwater monitoring program.

Summary of the Estimated Remedy Costs

Table 2-12 presents a summary of the capital costs, annual O&M costs, and periodic costs associated with the selected remedy, as presented in the FS (TtNUS, 2007a).

The information in the cost estimate summary table is based on the best available information regarding the anticipated scope of the remedial alternative as detailed in the FS. Changes in the cost elements are likely to occur as a result of new information and data collected during the PDI and the engineering design of the remedial alternative. In accordance with EPA guidance (EPA, 2000), the estimate provided on the table is an order-of-magnitude engineering cost estimate from the FS that is expected to be within +50 to -30 percent of the actual project cost.

In calculating LTM costs, a net present value was used to express estimated expenditures in current dollar values. Pursuant to the references in EPA guidance (EPA, 2000), a 2.5% discount rate was used for analyzing on-going costs. This rate was the average of all of the "real discount rates" options in the U.S. Office of Management and Budget (OMB) circular A-94 (January 2007 edition). Further, in calculating present value costs, it was assumed that there would be no inflation of the annual dollar amounts. The FS cost estimates reflect a 2007 net present value.

Expected Outcomes of the Selected Remedy

The expected outcome of the selected remedy is to eliminate potential human and ecological receptor exposure to COCs present in Site soil and sediment at concentrations above the selected PRGs. The Navy estimates that approximately 2 years will be needed to achieve these goals, when considering the remedy design, implementation, and post-remediation monitoring.

The OU-7 area falls within two separate zoning districts. The eastern (upland) portion of the Site (STP Area and Tile Bed Area) is within the Shea Village Commercial District, which is planned to be the commercial center of the Base redevelopment. The western (wetland) portion of the Site is zoned as Open Space. The selected remedy satisfies the needs of the planned future site use because, upon successful completion, it will allow for unlimited use and unrestricted exposure of the Site.

As described in Section VII, a baseline HHRA and ERA were conducted during the RI, the results of which indicated that remediation of Site soil and sediment is warranted. Additional sampling of groundwater and surface water will be conducted as part of the selected remedy to verify that these are not media of concern for OU-7.

<u>Cleanup Levels for Surface Soil</u>

The risk assessment concluded potential risks to hypothetical future receptors (the recreational child and on-site residents) and/or ecological receptors associated with arsenic, 4,4'-DDT, dieldrin, benz(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene in surface soil. PRGs were established based on COC concentrations that represent an acceptable exposure level to which the human population, including sensitive subgroups, and ecological receptors may be exposed without adverse affect during a lifetime or part of a lifetime. Calculations of PRGs included an adequate margin of safety (i.e., a HQ equal to 1 and a cancer risk of 10^{-5}) and considered the exposure of future receptors to soil. Tables 2-13 and 2-14 summarize the PRGs for the human health risk-based and ecological risk-based COCs identified in surface soil. The site is expected to be available for unrestricted land use following implementation of the remedy.

Cleanup Levels for Sediment

The risk assessment concluded potential risks to hypothetical future receptors (the recreational child and on-site residents) and/or ecological receptors associated with arsenic, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, dieldrin, and potentially methyl mercury in sediment. In the absence of any chemical-specific ARARs, PRGs for sediment have been established. PRGs were established based on COC concentrations that represent an acceptable exposure level to which the human population, including sensitive subgroups, and ecological receptors may be exposed without adverse affect during a lifetime or part of a lifetime. Calculations of PRGs included an adequate margin of safety (i.e., a HQ equal to 1 and a cancer risk of 10^{-5}) and considered the exposure of future receptors to sediment. Tables 2-13 and 2-14 summarize the PRGs for the human health risk-based and ecological risk-based COCs identified in sediment. The site is expected to be available for unrestricted land use following implementation of the remedy.

XIII. STATUTORY DETERMINATIONS

The remedial action selected for implementation at the Site is consistent with CERCLA and the NCP. The selected remedy is protective of human health and the environment, complies with ARARs, and is cost effective. In addition, the selected remedy utilizes permanent solutions to the maximum extent practicable. As explained below, no five-year review is required.

The Selected Remedy Is Protective of Human Health and the Environment

The selected remedy will protect human health and the environment by eliminating, reducing and controlling exposures to human and environmental receptors by excavating soil and sediment containing COCs at concentrations exceeding PRGs, and removing such materials off-site. The alternative meets short-term effectiveness, long-term effectiveness and permanence, and ARARs. Exposure levels will be reduced to within EPA's acceptable risk range of 10^{-4} to 10^{-6} for carcinogenic risk and below an HI of 1 for non carcinogens. The remedy also provides adequate protection to terrestrial and wetland vertebrates by removing contaminated soil. The remedy will include post remedial monitoring to ensure that COC concentrations do not rebound, and post remedial groundwater monitoring to verify that groundwater is not a medium of concern at the Site.

Successful completion of the selected remedy will render the Site suitable for unrestricted use and unlimited exposure because residual risks for current and future use scenarios, as well as for the identified ecological receptors, would be within acceptable ranges.

The selected remedy will have minimal short-term and cross-media impacts (e.g., potential dust generation, disturbance of wetlands) during surface restoration activities. These impacts would be relatively minor, as precautions would be applied to minimize wetland and other disruptions during implementation. Wetland restoration efforts would follow site work, to restore and enhance wetland conditions in the areas disturbed by the remedial action.

The Selected Remedy Complies with ARARs

The selected remedy will comply with federal and state ARARs and consider TBCs during the implementation of the remedial action (Appendix F). Additional details, including citations, regarding why these various requirements are applicable or relevant and appropriate may be found in Section 2.1 of the FS (TtNUS, 2007a).

Section 404 of the Clean Water Act and Executive Order 11990 (Protection of Wetlands) requires a determination that federal actions involving dredging and filling activities or activities in wetlands minimize the destruction, loss, or degradation of wetlands and preserve and enhance the natural and beneficial values of wetlands. The Navy's preferred alternative, Alternative 3, is the least environmentally damaging practicable alternative (LEDPA) for reducing environmental risks at the Site. Following the excavation of

sediments in wetlands, the wetlands will be restored or replicated consistent with the requirements of both Federal and State wetlands protection laws.

In addition, it should be noted that while requirements governing transportation and disposal of hazardous wastes are not ARARs since they apply to offsite activities, the Navy will ensure that the transportation and disposal of excavated soils which are determined to be hazardous waste will be conducted in accordance with all applicable federal and state laws and regulations.

The Selected Remedy is Cost Effective

In the Navy's judgment, the selected remedy is cost effective because the remedy's costs are proportional to its overall effectiveness (see 40 CFR 300.430(f)(1)(ii)(D)). This determination was made by evaluating the overall effectiveness of those alternatives that satisfied the threshold criteria (i.e., that are protective of human health and the environment and comply with all federal and any more stringent ARARs, or as appropriate, waive ARARs). Overall effectiveness was evaluated by assessing three of the five balancing criteria: long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness, in combination. The overall effectiveness of each alternative then was compared to the alternative's costs to determine cost effectiveness. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs and hence represents a reasonable value for the money to be spent. Refer to Table 2-11 for the cost of each remedial alternative considered.

Although Alternatives 2, 3 and 4 were found to achieve long and short term effectiveness, Alternative 3 was found to be a superior choice. Alternative 3 would require the shortest time to implement because impacted soil and sediment would be quickly excavated and removed from the site in comparison to longer term, onsite treatments. While all these alternatives would achieve long-term effectiveness, greater uncertainty exists with Alternatives 2 and 4 of achieving PRGs and RAOs because they include newer, less-tested technologies. While Alternative 3 is less likely to use a treatment technology, asphalt recycling is preferred and may be achievable. Because Alternative 3 is the least expensive and most reliable method, however, it was determined to be the most cost-effective alternative.

The Selected Remedy Utilizes Permanent Solutions and Alternative Treatment or Resource Recovery Technologies to the Maximum Extent Practicable

Of the remedial alternatives that attain the threshold criteria of compliance with ARARs and protectiveness of human health and the environment, EPA has a preference for alternatives that utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Of the alternatives that are protective of human health and the environment and comply with ARARs, the Navy and EPA determined Alternative 3 to be the most effective and permanent solution for site remediation. The selected alternative provides the best balance of trade offs in terms of: (1) long-term effectiveness and permanence; (2) reduction of toxicity, mobility or volume through treatment; (3) short-term effectiveness; (4) implementability; (5) cost; (6) state acceptance; and (7) community acceptance.

Although Alternatives 2 and 4 may achieve the RAOs if successfully implemented, uncertainty exists in their potential effectiveness for meeting the PRGs for all COCs. While the selected remedy does not incorporate treatment technologies like Alternatives 2 and 4, it has the greatest certainty of achieving PRGs. The selected remedy, however, may include some treatment of wastes using an asphalt batching process if the excavated material meets specified chemical and physical criteria. Therefore, the selected remedy may actually satisfy the statutory preference for treatment as a principal element of the remedy if the waste materials are used in an asphalt batching process. As such, Alternative 3 was chosen because it provides the most reliable, least expensive option to achieve PRGs and RAOs, while still offering the potential of treatment technology through asphalt recycling. In addition, the selected remedy is supported by the state and the community. (See Appendices A and E, respectively).

The Selected Remedy does not Satisfy the Preference for Treatment as a Principal Element

Treatment technologies that "reduce the toxicity, mobility, and volume of contaminants" were evaluated during the FS. However, based on the conditions at the Site, the selected remedy that best satisfied the nine NCP evaluation criteria does not include treatment as a principal element. However, if waste characterization sampling results of the excavated material are acceptable, then waste treatment/recycling via asphalt batching would be the preferred option rather than disposal at an off-site landfill.

Five-Year Reviews of the Selected Remedy are not Required

Because this remedy will result in site conditions that allow for unlimited use and unrestricted exposure within a short time frame (anticipated to be 2 years), no 5-year reviews will be required after the remedial action is completed and post-remediation monitoring verifies the remedy's protection of human health and the environment.

XIV. DOCUMENTATION OF NO SIGNIFICANT CHANGES

The Navy presented a Proposed Plan for excavation of COCs in soil and sediment with off-site disposal or recycling (asphalt batching) of the excavated material to the public on August 29, 2007. After the public comment period (which closed on September 28, 2007), the Navy reviewed all written and verbal comments submitted during the public comment period.

During the public comment period, the community expressed its support for the selected remedy. Refer to Appendices E.1 and E.2 for a copy of the verbal and written comments received during the public comment period on the Proposed Plan for the Site. Responses to public comments are presented in Part 3, the Responsiveness Summary, of this ROD. Therefore, it was determined that no significant changes to the decision, as originally identified in the Proposed Plan, were necessary.

XV. STATE ROLE

MassDEP has reviewed the various alternatives. MassDEP has also reviewed the RI and FS to determine if the selected remedy is in compliance with applicable or relevant and appropriate state environmental and facility siting laws and regulations. MassDEP's statement on the selected remedy in this ROD is presented in Appendix A.

TABLE 2-1

**SUMMARY OF OPERABLE UNITS
SEWAGE TREATMENT PLANT, OPERABLE UNIT 7
NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS**

Site	IR Program Site Designation	Operable Unit Designation	Site Abbreviation	Site Description	Regulatory Status (as of September 2007)
West Gate Landfill	1	1	WGL	Disposal area used for a variety of construction and demolition debris, municipal, and other waste materials.	PA, SI, RI, FS, PRAP, and ROD completed. ROD signed in September 2007 (excavation and offsite disposal of PCB-impacted material, construction of a soil cap for the landfill material, long-term monitoring, and institutional controls).
Rubble Disposal Area (Upland)	2	2	RDA	Disposal area used for primarily building demolition debris.	PA, SI, RI, FS, PRAP, ROD, Remedial Design, Remedial Action including excavation and offsite disposal of PCB-impacted material, construction of a soil cap for the landfill material, long-term monitoring, and institutional controls is completed and long-term monitoring is underway.
Small Landfill	3	3	SL	Disposal area used primarily for concrete, metal, and wood.	PA, SI, RI, PRAP, and ROD (No Action with groundwater monitoring) completed. Monitoring program completed. Closure under MA Solid Waste Regulations is underway.
Fire Fighting Training Area	4	4	FFTA	Area designated for dispensing fuels for igniting and extinguishing fires.	PA, SI, and RI completed. No FS required. PRAP and No Action ROD completed, site transferred to MCP. MCP assessment to be completed in 2007.
Tile Leach Field	5	5	TLF	Sand bed used to receive and distribute treated industrial wastewater.	PA, SI, and RI completed. No FS required. PRAP and No Action ROD completed.
Fuel Farm	6	Not applicable (no longer CERCLA)	None	Tank farm and fuel dispensing area.	Site transferred into the MCP program based on exhibiting only fuel-related issues.
Sewage Treatment Plant	7	7	STP	Wastewater treatment plant used primarily for domestic wastewater.	PA, SI, RI, and FS completed. PRAP issued August 2007.
Abandoned Bladder Tank Fuel Storage Area	8	8	ABTFSA	Area in which aboveground tanks temporarily were stored in support of aircraft refueling training operations.	PA, SI, RI completed. No FS necessary. Completed PRAP and No Action ROD.
Rubble Disposal Area	2	9	RDA	Steep sloping area adjacent to the RDA.	Combined with OU-2. No separate actions being performed.
Building 81	9	10	None	Release of solvents from former motor pool.	Former MCP site moved to CERCLA program. Conducted *in situ* chemical oxidation pilot study for groundwater. RI report being prepared.
Building 82	10	11	None	Release of solvents from former aircraft hangar operations.	Former MCP site moved to CERCLA program. RI report being prepared.
Solvent Release Area	11	12	SRA	Release of solvents from unidentified source.	Former Environmental Baseline Survey background location moved to CERCLA program. RI report being prepared.

NOTES:

PA = Preliminary Assessment.
SI = Site Inspection.
RI = Remedial Investigation (Phase I and II).
FS = Feasibility Study.
PRAP = Proposed Remedial Action Plan.
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act.
ROD = Record of Decision.
MCP = Massachusetts Contingency Plan.
OU = Operable Unit.

TABLE 2-2

**POTENTIAL (i.e., LOW-LEVEL) THREATS
SEWAGE TREATMENT PLANT, OPERABLE UNIT 7
NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS**

Contaminants	Medium	Receptor	Action to be Taken
4,4'-DDT	Surface Soil	Terrestrial vertebrates (birds and mammals)	Excavate impacted surface soil to protect ecological receptors from exposure to elevated concentrations of COCs.
Arsenic 4,4'-DDT Dieldrin Benz(a)anthracene Benzo(b)pyrene Benzo(b)fluoranthene	Surface Soil	Humans	Excavate impacted surface soil to protect human exposure to elevated concentrations of COCs.
Arsenic 4,4'-DDD 4,4'-DDE 4,4'-DDT Methyl Mercury[(a)]	Sediment	Terrestrial vertebrates (birds and mammals)	Excavate impacted sediment to protect ecological receptors from exposure to elevated concentrations of COCs.
Arsenic Dieldrin	Sediment	Humans	Excavate impacted sediment to protect human exposure to elevated concentrations of COCs.
Arsenic 4,4'-DDD 4,4'-DDT	Groundwater	Humans	Conduct pre- and post-remediation groundwater monitoring to verify that groundwater is not a medium of concern. Each of these COCs had individual cancer risks that were within EPA's acceptable risk range of 10^{-4} to 10^{-6}. The single detection of arsenic in groundwater did not exceed drinking water standards and was not detected in subsequent sampling of the same groundwater well. DDD and DDT also were detected in only one sample.
PCBs	Surface Water	Humans	Conduct additional sampling during the PDI to verify that surface water is not a medium of concern. The single detection of PCB in a surface water sample is believed to have been an isolated, non-representative result.

(a) Potential ecological COC. Methyl mercury was not part of the analytical list for sediment samples at the Site and its potential presence is estimated based on conservative assumptions relative to the total mercury concentrations detected in sediment. The PDI will include additional sampling specifically for methyl mercury to verify whether this is a valid site COC.

TABLE 2-3

SUMMARY OF HUMAN HEALTH CHEMICALS OF CONCERN AND
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATIONS
SEWAGE TREATMENT PLANT, OPERABLE UNIT 7
NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

Scenario Timeframe: Current and Future							
Exposure Point	**Human Health Chemical of Concern**	**Maximum Detected Concentration**	**Units**	**Frequency of Detection**	**Exposure Point Concentration**	**Units**	**Statistical Measure**
Surface Soil	Arsenic	6.1	mg/kg	12/13	4.3	mg/kg	95% UCL
	Benz(a)anthracene	8.8 J	mg/kg	11/13	8.8	mg/kg	Max
	Benzo(a)pyrene	3.6	mg/kg	13/13	3.6	mg/kg	Max
	Benzo(b)fluoranthene	5.3 J	mg/kg	13/13	5.3	mg/kg	Max
	Dieldrin	13	mg/kg	5/13	13	mg/kg	Max
	4,4'-DDT	3.9	mg/kg	12/13	3.9	mg/kg	Max
Sediment	Arsenic	31.7	mg/kg	9/9	31.7	mg/kg	Max
	Dieldrin	0.56	mg/kg	5/7	0.56	mg/kg	Max

NOTES:

95% UCL — 95% Upper Confidence Limit of the mean.
Max — Maximum concentration.
Frequency of Detection displayed as: number of detected values/ total number of samples collected, not including duplicates.

TABLE 2-4

**POTENTIAL CARCINOGENIC TOXICITY DATA SUMMARY FROM HUMAN HEALTH RISK ASSESSMENT
SEWAGE TREATMENT PLANT, OPERABLE UNIT 7
NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS**

Human Health Chemical of Concern	Oral Cancer Slope Factor (c) $(mg/kg\text{-}day)^{-1}$	Reference (Last Verified)	Inhalation Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Reference (Last Verified)	Weight of Evidence Cancer Guideline Description
Arsenic	1.5E+00	IRIS (6/00)	1.5E+01	IRIS (6/00) (b)	A
Benz(a)anthracene	7.3E-01	(a)	3.1E-01	(a)	B2
Benzo(a)pyrene	7.3E+00	IRIS (6/00)	3.1E+00	RBC (4/00)	B2
Benzo(b)fluoranthene	7.3E-01	(a)	3.1E-01	(a)	B2
Dieldrin	1.6E+01	IRIS (6/00)	1.6E+01	IRIS (6/00) (b)	B2
4,4'-DDT	3.4E-01	IRIS (6/00)	3.4E-01	IRIS (6/00) (b)	B2

NOTES:

IRIS: Integrated Risk Information System, an online computer database of toxicological information (EPA, 2000)
RBC: Region III Risk based concentration table (EPA, 2000)
(a): Cancer Slope Factor for benzo(a)pyrene is multiplied by the appropriate Toxicity Equivalence Factor.
(b): Converted from unit risk of $1/ug/m^3$ to an inhalation Cancer Slope Factor of 1/mg/kg-day.
(c): In accordance with EPA guidance, dermal slope factors were based on the oral slope factors for these chemicals. Different absorption adjustment factors were used for the oral and dermal exposure routes.
A: Human carcinogen
B1: Probable human carcinogen — Indicates limited evidence of carcinogenicity in humans
B2: Probable human carcinogen — Indicates sufficient evidence in animals or no evidence in humans
C: Possible human carcinogen
D: Not classifiable as a human carcinogen

TABLE 2-5

**POTENTIAL NON-CARCINOGENIC TOXICITY DATA SUMMARY FROM HUMAN HEALTH RISK ASSESSMENT
CHRONIC EXPOSURE THROUGH INGESTION
SEWAGE TREATMENT PLANT, OPERABLE UNIT 7
NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS**

Human Health Chemical of Concern	Oral Dose-Response Value* (mg/kg-day)	Target Organ/ Critical Effect at LOAEL	EPA Confidence Level	Reference (Last Verified)
Arsenic	3.0E-04	Hyperpigmentation, keratosis, and possible vascular complications	Medium	IRIS (6/00)
Benz(a)anthracene	3.0E-02	Kidney effects	Low	IRIS (6/00)(a)
Benzo(a)pyrene	3.0E-02	Kidney effects	Low	IRIS (6/00)(a)
Benzo(b)fluoranthene	3.0E-02	Kidney effects	Low	IRIS (6/00)(a)
Dieldrin	5.0E-05	Liver lesions	Medium	IRIS (6/00)
4,4'-DDT	5.0E-04	Liver lesions	Medium	IRIS (6/00)

NOTES:

*In accordance with EPA guidance, dermal slope factors were based on the oral slope factors for these chemicals. Different absorption adjustment factors were used for the oral and dermal exposure routes.

IRIS: Integrated Risk Information System, an online computer database of toxicological information (EPA, 2000)
(a): Dose response value for pyrene, based on structural similarity

TABLE 2-6

POTENTIAL NON-CARCINOGENIC TOXICITY DATA SUMMARY FROM HUMAN HEALTH RISK ASSESSMENT SUBCHRONIC EXPOSURE THROUGH INGESTION SEWAGE TREATMENT PLANT, OPERABLE UNIT 7 NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

Human Health Chemical of Concern	Oral Dose-Response Value* (mg/kg-day)	Target Organ/ Critical Effect at LOAEL	EPA Confidence Level	Reference (Last Verified)
Arsenic	3.0E-04	Hyperpigmentation, keratosis, and possible vascular complications	NA	HEAST 97(d)
Benz(a)anthracene	3.0E-02	Kidney effects	Low	IRIS (6/00)(a)
Benzo(a)pyrene	3.0E-02	Kidney effects	Low	IRIS (6/00)(a)
Benzo(b)fluoranthene	3.0E-02	Kidney effects	Low	IRIS (6/00)(a)
Dieldrin	5.0E-05	Liver lesions	NA	HEAST 97(b)
4,4'-DDT	5.0E-04	Liver lesions	NA	HEAST 97(b)

NOTES:

*In accordance with EPA guidance, dermal slope factors were based on the oral slope factors for these chemicals. Different absorption adjustment factors were used for the oral and dermal exposure routes.

HEAST: Health Effects Assessment Summary Tables, EPA (1997)
IRIS: Integrated Risk Information System, an online computer database of toxicological information (EPA, 2000)
LOAEL: Lowest observed adverse effects level
NA: Not available
(a): Dose response value for pyrene, based on structural similarity
(b): Sub-chronic Reference Dose (RfD)

TABLE 2-7

SUMMARY OF HUMAN HEALTH RISK ASSESSMENT
SEWAGE TREATMENT PLANT, OPERABLE UNIT 7
NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

Scenario Evaluated	Medium	Total Carcinogenic Risk (statistical chance)	Total Non-Carcinogenic Risk (hazard index)
Onsite Worker			
Ingestion/Dermal Contact	Surface Soil	3.1E-05	0.11
	Sediment	3.0E-07	0.0024
	Surface Water	4.5E-07	0.0266
Onsite Worker Total		*3.2E-05*	*0.14*
Construction Worker			
Ingestion/Dermal Contact and Inhalation of Dust	Surface Soil	2.1E-06	0.33
	Subsurface Soil	1.5E-08	0.097
Construction Worker Total		*2.1E-06*	*0.43*
Trespassing Child			
Ingestion/Dermal Contact	Surface Soil	1.5E-05	0.13
	Sediment	1.8E-06	0.034
	Surface Water	4.5E-06	0.7
Trespassing Child Total		*2.1E-05*	*0.86*
Future Resident – Phase II RI			
Ingestion/Dermal Contact	0 to 10 foot Soil	1.2E-05	0.19
	Sediment	6.2E-06	0.20
	Surface Water	8.8E-06	**2.0**
Ingestion	Groundwater	9.5E-05	**1.2**
Future Resident Total		***1.2E-04*** (1)	***3.5*** (2)
Future Resident – Addendum to Phase II RI			
Ingestion/Dermal Contact	Surface Soil	**1.8E-04**	**1.9**
	Sediment	6.2E-06	0.2
	Surface Water	8.8E-06	**2.0**
Ingestion	Groundwater	9.5E-05	**1.2**
Future Resident Total		***2.9E-04*** (1)	***5.3*** (3)
Future Recreational Child (1-6)			
Ingestion/Dermal Contact	Surface Soil	**1.1E-04**	**1.8**
	Sediment	5.6E-06	0.2
	Surface Water	7.9E-06	**2.0**
Future Recreational Child Total		***1.3E-04*** (1)	***3.9*** (3)

NOTES:

Bold and shaded values exceed EPA acceptable risk levels.

(1) The primary contributors to cancer risk for residential and recreational child exposures were arsenic, dieldrin, 4,4'-DDT, and PAHs in surface soil; arsenic and dieldrin in sediment; and PCBs in surface water. Arsenic, 4,4'-DDT, and 4,4'-DDD in groundwater contributed to cancer risk to residents.

(2) PCBs in surface water were the primary contributors to this non-cancer risk estimate. Arsenic, chromium, and 4,4'-DDT in groundwater contributed to a lesser degree for residential non-cancer risks.

(3) Dieldrin in surface soil and PCBs in surface water were the primary contributors to this non-cancer risk estimate to residents and recreational children. Arsenic, chromium, and 4,4'-DDT in groundwater contributed to a lesser degree for residential non-cancer risks.

TABLE 2-8

SUMMARY OF CHEMICALS OF CONCERN USED IN ECOLOGICAL RISK ASSESSMENT
SEWAGE TREATMENT PLANT, OPERABLE UNIT 7
NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS

Ecological Chemical of Concern	Frequency of Detection[b]	Minimum Concentration	Maximum Concentration	Units	Exposure Point Concentration	Units	Statistical Measure
SEDIMENT							
Inorganics							
Arsenic	9/9	3	31.7	mg/kg	32	mg/kg	Max
Total Mercury [a]	8/9	0.2	7.2	mg/kg	7.2	mg/kg	Max
Pesticides/PCBs							
4,4'-DDD	5/7	0.24	7	mg/kg	7	mg/kg	Max
4,4'-DDE	6/7	0.023	0.26	mg/kg	0.166	mg/kg	95% UCL
4,4'-DDT	5/7	0.014	1.8	mg/kg	1.8	mg/kg	Max
SOIL							
Pesticides/PCBs							
4,4'-DDT	12/13	0.0072	3.9	mg/kg	3.9	mg/kg	Max

NOTES:

(a) The ecological COC (methyl mercury) was based on a conservative assumption that 5 percent of the total mercury detected was in the form of methyl mercury.
(b) Frequency of Detection displayed as: number of detected values/ total number of samples collected, not including duplicates.
mg/kg – milligram per kilogram.
95% UCL —95% upper concentration limit on the arithmetic mean.

TABLE 2-9

SUMMARY OF ECOLOGICAL RISK ASSESSMENT MEASUREMENT AND ASSESSMENT ENDPOINTS – SURFACE SOIL, HYDRIC SOIL, SEDIMENT, SURFACE WATER, AND BIOTA TISSUE
SEWAGE TREATMENT PLANT, OPERABLE UNIT 7
NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS
PAGE 1 OF 2

Potential Receptor	Sensitive Environment (Yes/No)	Sensitive Species (Yes/No)[a]	Exposure Route Evaluated	Assessment Endpoints	Measurement Endpoints	Findings
Terrestrial Plants	No	No	Direct contact with soil	Sustainability of terrestrial plant community that reflects the available habitat at the Site and can serve as a forage base for higher trophic level receptors.	• Comparison of surface soil COPC concentrations to soil screening benchmarks for plants. • Laboratory toxicity testing of plants (lettuce seed toxicity testing) using Site soil.	No significant potential ecological risk to terrestrial plants because of exposure to Site soil.
Terrestrial Invertebrates	No	No	Direct contact with soil	Sustainability of terrestrial invertebrate that reflects the available habitat at the Ssite and can serve as a forage base for higher trophic level receptors.	• Comparison of surface soil COPC concentrations to soil screening benchmarks for invertebrates. • Laboratory toxicity testing of earthworms using Site soil. • Analysis of earthworm tissue for bioaccumulative COPCs and comparison of earthworm tissue COPC burdens to background concentrations and literature-based effect values (e.g., critical body residues).	No significant potential ecological risk to terrestrial invertebrates because of exposure to Site soil.
Terrestrial Vertebrate Wildlife	No	No	Ingestion of soil. Ingestion of prey.	Sustainability of terrestrial small mammal and avian populations that reflect the available habitat at the STP Site and can serve as a forage base for higher trophic level receptors.	• Sampling and analysis of surface soil and earthworms from the Site. COPC measurements in excess of ingestion thresholds calculated from available toxicological data. • Tissue analysis of small mammals from the Site. Concentrations of bioaccumulative COPCs in small mammals used to help evaluate higher tropic level exposure, as well as evaluate potential risks to small mammals. • Field assessment of the small mammal and avian community at Site and at reference locations. • Food chain modeling.	Pesticide residues (dieldrin and 4,4'-DDT) in surface soil and the food chain may pose a potential risk to terrestrial vertebrates. The majority of HQs for the terrestrial species were well below 1. Several inorganic COPCs had HQs in excess of 1; however, the results of the uncertainty analysis indicate these are because of conservative assumptions in the food chain analysis or are attributable to background conditions.

TABLE 2-9

SUMMARY OF ECOLOGICAL RISK ASSESSMENT MEASUREMENT AND ASSESSMENT ENDPOINTS – SURFACE SOIL, HYDRIC SOIL, SEDIMENT, SURFACE WATER, AND BIOTA TISSUE
SEWAGE TREATMENT PLANT, OPERABLE UNIT 7
NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS
PAGE 2 OF 3

Potential Receptor	Sensitive Environment (Yes/No)	Sensitive Species (Yes/No)[a]	Exposure Route Evaluated	Assessment Endpoints	Measurement Endpoints	Findings
Wetland Plants	No	No	Direct contact with hydric soil	Sustainability of wetland plant community that reflects the available habitat at the Site and can serve as a forage base for higher trophic level receptors.	• Comparison of bulk hydric soil analytical chemistry results to soil quality benchmarks for terrestrial plants.	Little to no significant potential ecological risk to wetland plants because of exposure to Site wetland hydric soil.
Wetland Invertebrates	No	No	Direct contact with hydric soil and surface water	Sustainability of wetland invertebrate community in site wetlands that is typical of comparable Massachusetts wetlands with similar structure, morphology, and hydrology.	• Comparison of bulk sediment/hydric soil analytical chemistry results to sediment quality benchmarks. • Comparison of total recoverable and dissolved metals concentrations in surface water to state and EPA acute and chronic water quality criteria for the protection of aquatic life. • Evaluation of simultaneously extracted metals (SEM)/acid volatile sulfides (AVS) relationships to indicate potential bioavailability of divalent cationic metals in sediment/hydric soils. • Bulk sediment invertebrate toxicity testing. • Surface water invertebrate and fish toxicity testing.	Little to no significant potential ecological risk to wetland invertebrates because of exposure to Site wetland hydric soil and surface water.

TABLE 2-9

SUMMARY OF ECOLOGICAL RISK ASSESSMENT MEASUREMENT AND ASSESSMENT ENDPOINTS – SURFACE SOIL, HYDRIC SOIL, SEDIMENT, SURFACE WATER, AND BIOTA TISSUE
SEWAGE TREATMENT PLANT, OPERABLE UNIT 7
NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS
PAGE 3 OF 3

Potential Receptor	Sensitive Environment (Yes/No)	Sensitive Species (Yes/No)[a]	Exposure Route Evaluated	Assessment Endpoints	Measurement Endpoints	Findings
Wetland Amphibians	No	No	Direct contact with hydric soil and surface water	Sustainability of healthy amphibian populations that reflects the available habitat at the Site and can serve as a forage base for higher trophic level receptors in wetlands adjacent to or at the Site.	• Comparison of hydric soil COPC concentrations to sediment quality benchmarks and comparison of dissolved metals concentrations to state and federal water quality criteria. • Tissue analysis of amphibians for bioaccumulative COPCs. • Field assessment of the amphibian community at the Site site and at reference locations.	Little to no significant potential ecological risk to wetland vertebrates because of exposure to Site wetland hydric soil and surface water.
Wetland Vertebrate Wildlife	No	No	Ingestion of surface water and sediment. Ingestion of prey.	Sustainability of wetland small mammal and avian populations that reflect the available habitat at the Site and can serve as a forage base for higher trophic level receptors.	• Tissue analysis of small mammals from the Site. Concentrations of bioaccumulative COPCs in small mammals used to help evaluate higher tropic level exposure, as well as evaluate potential risks to small mammals. • Field assessment of the small mammal and avian community at the Site and at reference locations. • Food chain modeling.	Several pesticides (primarily dieldrin, DDT, and its metabolites) may pose a potential risk to small mammals and avian receptors associated with exposure to in sediment and the food chain at the Site. The majority of HQs for the wetland species were well below 1. Several inorganic COPCs had HQs in excess of 1; however, the results of the uncertainty analysis indicate these are because of conservative assumptions in the food chain analysis or are attributable to background conditions.

SOURCE: Data from the RI (TtNUS, 2002).

NOTES:

(a) One state-listed threatened species, the Northern Harrier, occurs at and in the vicinity of the Site; however, it is unlikely that this species would use the terrestrial upland in and around the Site for nesting. Further, it is not anticipated that this site will pose unacceptable ecological risk to this species. Future site activities, however, should adhere to state-mandated avoidance, protection, and mitigation measures based on the potential presence of this species. One state-listed "species of special concern," the eastern box turtle (*Terrapene Carolina)*, is known to be present at the Naval Air Station South Weymouth; however, despite extensive surveys, this species has not been located at or in the vicinity of the Site.

HQ = Hazard Quotient
STP = Sewage Treatment Plant
COPC = Chemical of Potential Concern

TABLE 2-10

**SUMMARY OF REMEDIAL ALTERNATIVES AND THEIR MAJOR COMPONENTS
SEWAGE TREATMENT PLANT, OPERABLE UNIT 7
NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS**

Remedy Components	Alternative 1	Alternative 2	Alternative 3	Alternative 4
• Institutional Controls (land use)		●		
• Physical Controls (fencing and signage)		●		
• Pre-Design Investigation		●	●	●
• Treatability Study		●		●
• Clearing, Grubbing, Grading		●	●	●
• Wetland Restoration		●	●	●
• Removal of impacted soil and sediment			●	●
• Treatment of impacted soil and sediment		●	TBD	●
• Off-site disposal of wastes		TBD	●	TBD
• Post Remediation Monitoring		●	●	●
• 5-Year Review(s)	●	TBD		

NOTES:

TBD = to be determined
Alternative 1: No Action
Alternative 2: In-Situ Bioremediation and Phytoremediation
Alternative 3: Excavation and Off-Site Disposal or Recycling (Asphalt Batching)
Alternative 4: Excavation and Ex-Situ Solvent Extraction

TABLE 2-11

**DETAILED COMPARISON OF REMEDIAL ALTERNATIVES
SEWAGE TREATMENT PLANT, OPERABLE UNIT 7
NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS**

Comparative Criteria	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Criteria Analysis				
Achieves RAOs for soil and sediment	⊖	(●)	●	(●)
Reduces risks	⊖	●	●	●
Preserves natural resources	⊖	(●)	(●)	(●)
Achieves ARARs and TBCs	⊖	●	●	●
Achieves long-term effectiveness	⊖	(●)	●	●
Reduces the toxicity of waste through treatment	⊖	●	(●)	●
Reduces the mobility of waste through treatment	⊖	●	(●)	●
Reduces the volume of waste through treatment	⊖	●		●
Short-term effectiveness	⊖	●	(●)	(●)
Minimal disturbance to existing ecological habitat during remediation	NA	(●)	⊖	⊖
Moderate disturbance to existing ecological habitat during remediation	NA	⊖	●	●
Technical Implementability	●	(●)	●	(●)
Administrative Implementability	⊖	(●)	●	●
Cost on par with level of effort and/or scope of remediation (cost effectiveness)	⊖	⊖	●	⊖
State support/agency acceptance			**Yes**	
Community acceptance			**Yes**	
Costs (2007 dollars)				
• Capital	$0	$316,000	$587,000	$1,401,000
• Annual Operation and Maintenance (O&M)	$0	$197,000	$43,000	$43,000
• Periodic Costs	$38,000	$38,000	$0	$0
• Total Present Value	$139,000	$1,263,000	$671,000	$1,485,000
Estimated Timeframes (years)				
Designing and Constructing the Alternative	NA	1	1	1
Achieving the RAOs	NA	5	2	2
Assumed duration for purposes of cost estimate (years)	30	5	2	2

NOTES:

⊖ = This remedial alternative does not meet the specified evaluation criterion.
● = This remedial alternative includes the specified component or satisfies the specified evaluation criterion.
(●) = This remedial alternative partially satisfies the specified evaluation criterion or satisfies the criterion with some difficulty or special consideration.
ARAR = applicable or relevant and appropriate requirement
NA = not applicable
RAO = Remedial Action Objective
TBC = to be considered (guidance)
Alternative 1 — No Action
Alternative 2 — In-Situ Bioremediation and Phytoremediation
Alternative 3 — Excavation and Off-Site Disposal or Recycling (Asphalt Batching)
Alternative 4 — Excavation and Ex-Situ Solvent Extraction

TABLE 2-12

ESTIMATED COSTS ASSOCIATED WITH THE SELECTED REMEDY AS PRESENTED IN THE FS
SEWAGE TREATMENT PLANT, OPERABLE UNIT 7
NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS
PAGE 1 OF 2

Description	QTY	Unit	Unit Cost	Total	Notes
CAPITAL COSTS					
Pre-Design Investigation					
Mobilization/Prepare Documents (sampling plan, safety plan, procurement, field prep, etc.)	1	LS	$25,000	$25,000	TtNUS
Sampling Labor, Equipment, and Materials (consumables, rentals, labor, per diem)	1	LS	$23,500	$23,500	TtNUS
Analyze soil samples for pesticides	27	EA	$100	$2,700	Laboratory
Analyze soil samples for PAHs	22	EA	$195	$4,290	Laboratory
Analyze soil samples for arsenic	22	EA	$140	$3,080	Laboratory
Analyze sediment samples for methyl mercury	14	EA	$205	$2,870	Laboratory
Analyze sediment samples for pesticides	13	EA	$100	$1,300	Laboratory
Analyze sediment samples for arsenic	8	EA	$140	$1,120	Laboratory
Analyze soil samples for PCBs	4	EA	$100	$400	Laboratory
Analyze sediment samples for PCBs	4	EA	$100	$400	Laboratory
Analyze surface water samples for PCBs	4	EA	$100	$400	Laboratory
Data Validation	1	LS	$9,580	$9,580	Contractor
Report Preparation	1	LS	$25,000	$25,000	TtNUS
SUBTOTAL				**$ 99,640**	
Selective Excavation and Off-Site Disposal					
Mobilize Equipment	1	LS	$2,400	$2,400	Means
Clear and Grub	1	ACRE	$4,725	$4,725	Means
Excavation and Loading into Trucks	1,100	CY	$2.73	$3,003	Means
Haul to Stockpile Area	1,375	CY	$3.02	$4,153	Means
Confirmatory Sampling	300	EA	$120	$36,000	TtNUS
Backfill and Compaction	1,375	CY	$9.47	$13,024	Means
Site Restoration	30	MSF	$43.50	$1,305	Means
Waste Characterization Samples	28	EA	$250	$7,000	TtNUS
Transportation and Landfill Disposal (all materials) (non-hazardous)	2,063	TON	$100	$206,250	Means
Transportation and Asphalt Batching	0	TON	$50	$0	Means
SUBTOTAL				**$ 275,460**	
CUMULATIVE SUBTOTAL				**$ 375,100**	
Other Costs					
Project Management	8%			$30,008	EPA
Engineering Design	15%			$56,265	EPA
Construction Management	10%			$27,546	EPA
Location Adjustment	8.4%			$23,139	Means
Contingency	20%			$75,020	TtNUS
SUBTOTAL				**$ 211,977**	
TOTAL CAPITAL COSTS				**$ 587,077**	

TABLE 2-12

ESTIMATED COSTS ASSOCIATED WITH THE SELECTED REMEDY AS PRESENTED IN THE FS
SEWAGE TREATMENT PLANT, OPERABLE UNIT 7
NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS
PAGE 2 OF 2

Description	QTY	Unit	Unit Cost	Total	Notes
ANNUAL OPERATION AND MAINTENANCE COSTS					
Annual Monitoring Costs (assume annual monitoring for 2 years)					
Mobilization/Field Prep	1	LS	$5,000	$5,000	TtNUS
Sampling Labor, Equipment, and Materials	1	LS	$15,000	$15,000	TtNUS
Analyze sediment samples for pesticides	8	EA	$100	$800	TtNUS
Analyze sediment samples for arsenic	8	EA	$140	$1,120	TtNUS
Data Validation	1	LS	$2,000	$2,000	TtNUS
Report Preparation	1	LS	$5,000	$5,000	TtNUS
SUBTOTAL (annual cost)				**$ 28,920**	
Other Costs					
Project Management	10%			$2,892	EPA
Engineering Design	20%			$5,784	EPA
Contingency	20%			$5,784	TtNUS
SUBTOTAL (annual cost)				**$ 14,460**	
Total Annual O&M Costs				**$ 43,380**	
Calculated 2-Year Annual O&M Net Present Value				**$ 83,612**	
PERIODIC COSTS					
Five-Year Reviews	0	Event	$ 50,000	$ 0	TtNUS
Calculated 2-Year Periodic Cost Net Present Value				**$ 0**	
TOTAL COST (CAPITAL COST, PLUS O&M AND PERIODIC COSTS)				**$ 670,689**	

NOTES:
The pre- and post-remediation groundwater monitoring program and associated costs will be developed during the remedial design phase.
LS = lump sum
CY = cubic yards
MSF = thousand square feet

TABLE 2-13

**SURFACE SOIL/SEDIMENT HUMAN HEALTH RISK-BASED REMEDIAL GOALS
SEWAGE TREATMENT PLANT, OPERABLE UNIT 7
NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS**

Carcinogenic Chemical of Concern	Cancer classification	Remedial Goal (1) (mg/kg)	Basis	RME Risk (from risk assessment) (2)	Post Remedial Risk(3)
Surface Soil					
Arsenic	A, Human carcinogen	9.1	Cancer risk = 10^{-5}	2.89E-06	2.2E-06
4,4'-DDT	B2, Probable human carcinogen	2.8	Ecological risk	6.88E-07	1.05E-07
Dieldrin	B2, Probable human carcinogen	0.88	Cancer risk = 10^{-5}	1.08E-04	1.94E-06
Benz(a)anthracene	B2, Probable human carcinogen	14.5	Cancer risk = 10^{-5}	1.19E-06	4.14E-07
Benzo(a)pyrene	B2, Probable human carcinogen	1.8	Background	4.87E-06	1.48E-06
Benzo(b)fluoranthene	B2, Probable human carcinogen	14.5	Cancer risk = 10^{-5}	7.16E-07	2.75E-07
			Sum of Carcinogenic Risks for Soil COCs	**1.2E-04**	**1E-05**
Sediment					
Arsenic	A, Human carcinogen	23.7	Ecological risk	4.2E-06	9.87E-07
Dieldrin	B2, Probable human carcinogen	5.7	Cancer risk = 10^{-5}	1.1E-06	1.69E-07
			Sum of Carcinogenic Risks for Sediment COCs	**5.3E-06**	**1.16E-06**
Non-carcinogenic Chemical of Concern	**Target Endpoint**	**Remedial Goal(1) (mg/kg)**	**Basis**	**RME Hazard Quotient (from risk assessment) (2)**	**Post Remedial Hazard Quotient**
Surface Soil					
Dieldrin	Liver lesions	0.88	Cancer risk = 10^{-5}	1.57	0.00337
			Sum of Non-carcinogenic Risks for Soil COCs	**1.57**	**0.00337**

NOTES:

(1): If a value described by any of the above methods is not capable of being detected with good precision and accuracy or is below what was deemed to be the background value, then the practical quantitation limit or background value will be used as appropriate.

(2): The "RME Risk" represents Site risks from residential exposures to calculated Exposure Point Concentrations (EPCs), which are generally based on 95% UCLs. Updated risk summary tables are in Appendix B of the FS (TtNUS, 2007a).

(3): "Post Remedial Risk" represents risk from future residential child exposures to the Remedial Goal concentrations. These risks were calculated using the exposure assumptions and toxicity factors from the STP Site Phase II RI (TtNUS, 2002), as updated in the STP Site FS (TtNUS, 2007a) with the exception of dermal absorption factors and GI absorption factors (used to determine adjusted dermal toxicity factors), which were obtained from EPA RAGS Part E, Dermal Guidance, 2004.

TABLE 2-14

**SURFACE SOIL/SEDIMENT ECOLOGICAL RISK-BASED REMEDIAL GOALS
SEWAGE TREATMENT PLANT, OPERABLE UNIT 7
NAS SOUTH WEYMOUTH, WEYMOUTH, MASSACHUSETTS**

Ecological Chemical of Concern	Remedial Goal (1) (mg/kg)	Basis	Max. Eco. Hazard Quotient (from risk assessment) (2)
Surface Soil			
4,4'-DDT	2.8	Ecological risk	1.38
Sediment			
Arsenic	23.7	Ecological risk	1.38
4,4'-DDD	0.73	Background	23.6
4,4'-DDE	0.23	Background	2.5
4,4'-DDT	0.29	Background	6.6
Methyl Mercury	0.02	Ecological risk	17.3

NOTES:

(1): If a value described by any of the above methods is not capable of being detected with good precision and accuracy or is below what was deemed to be the background value, then the practical quantitation limit or background value will be used as appropriate.

(2): The "Max. Eco. Hazard Quotient" represents the maximum Site risks from vertebrate wildlife exposures presented in Table 2-9 of the FS (TtNUS, 2007a).

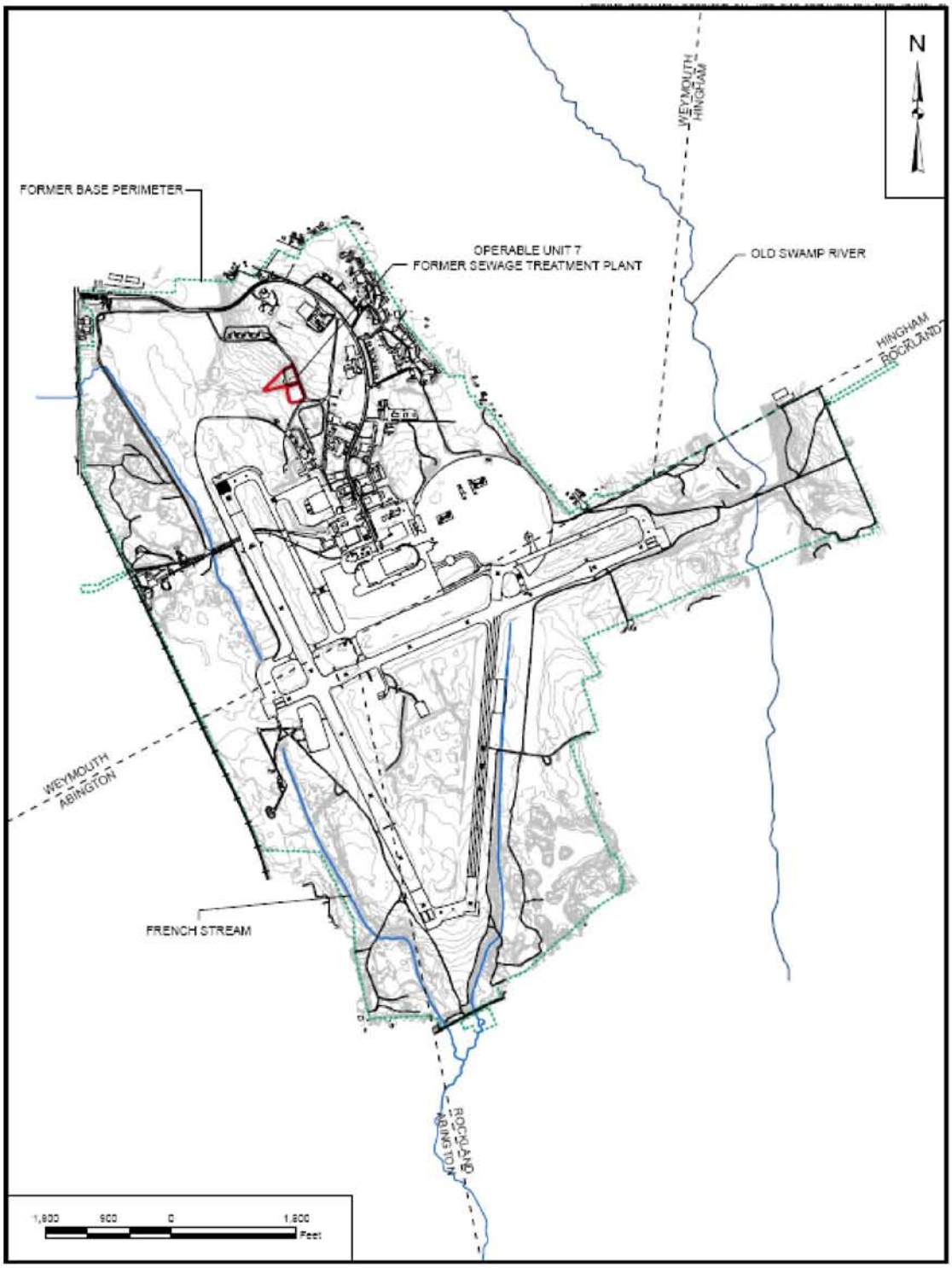

Figure 2-1 – Site Location Map

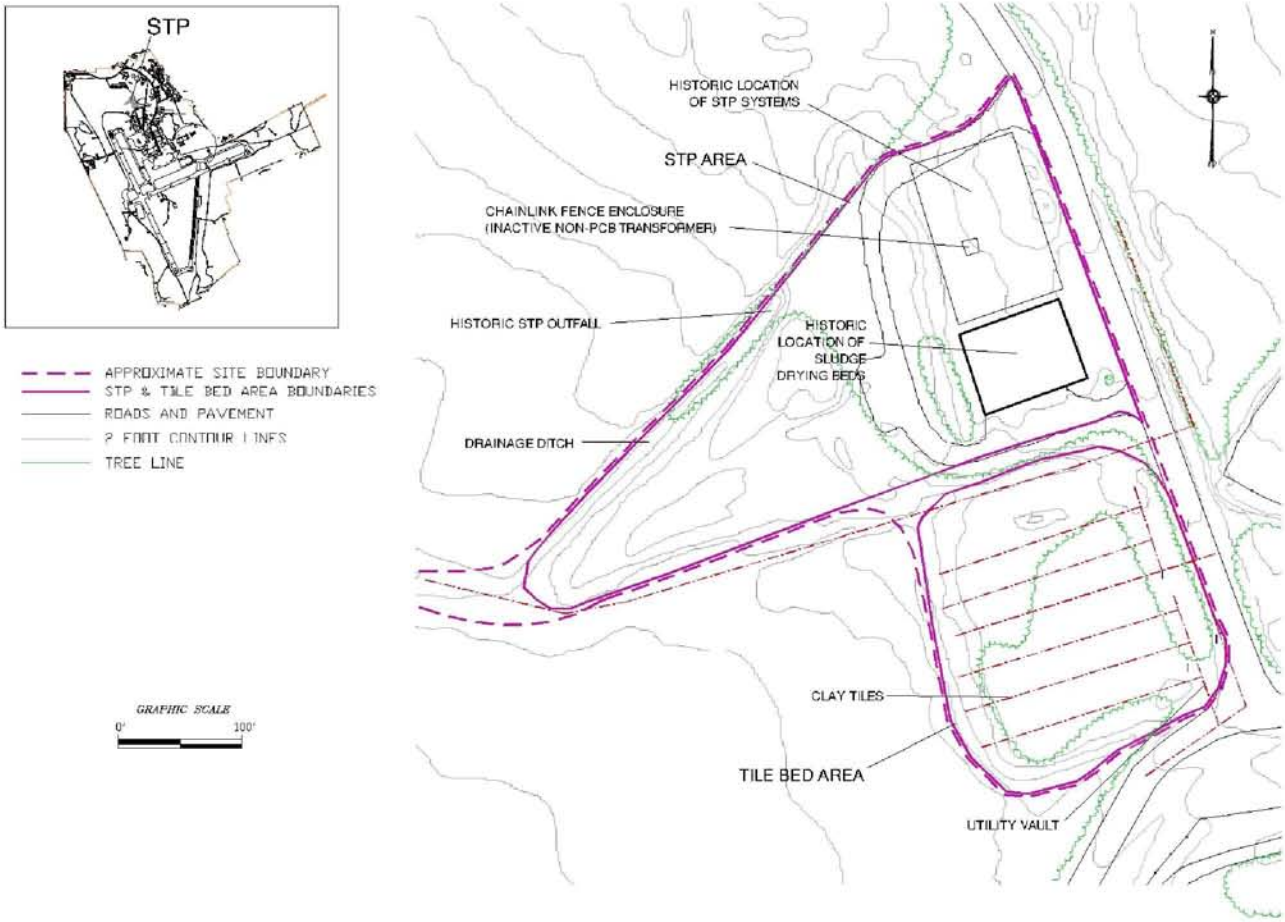

Figure 2-2 - Site Schematic Including Inferred Engineered Structures

Aerial View, 1985

Former STP Area, southwest view from roadway (northeast corner of the site), 2002

Figure 2-3 – Site Photographs

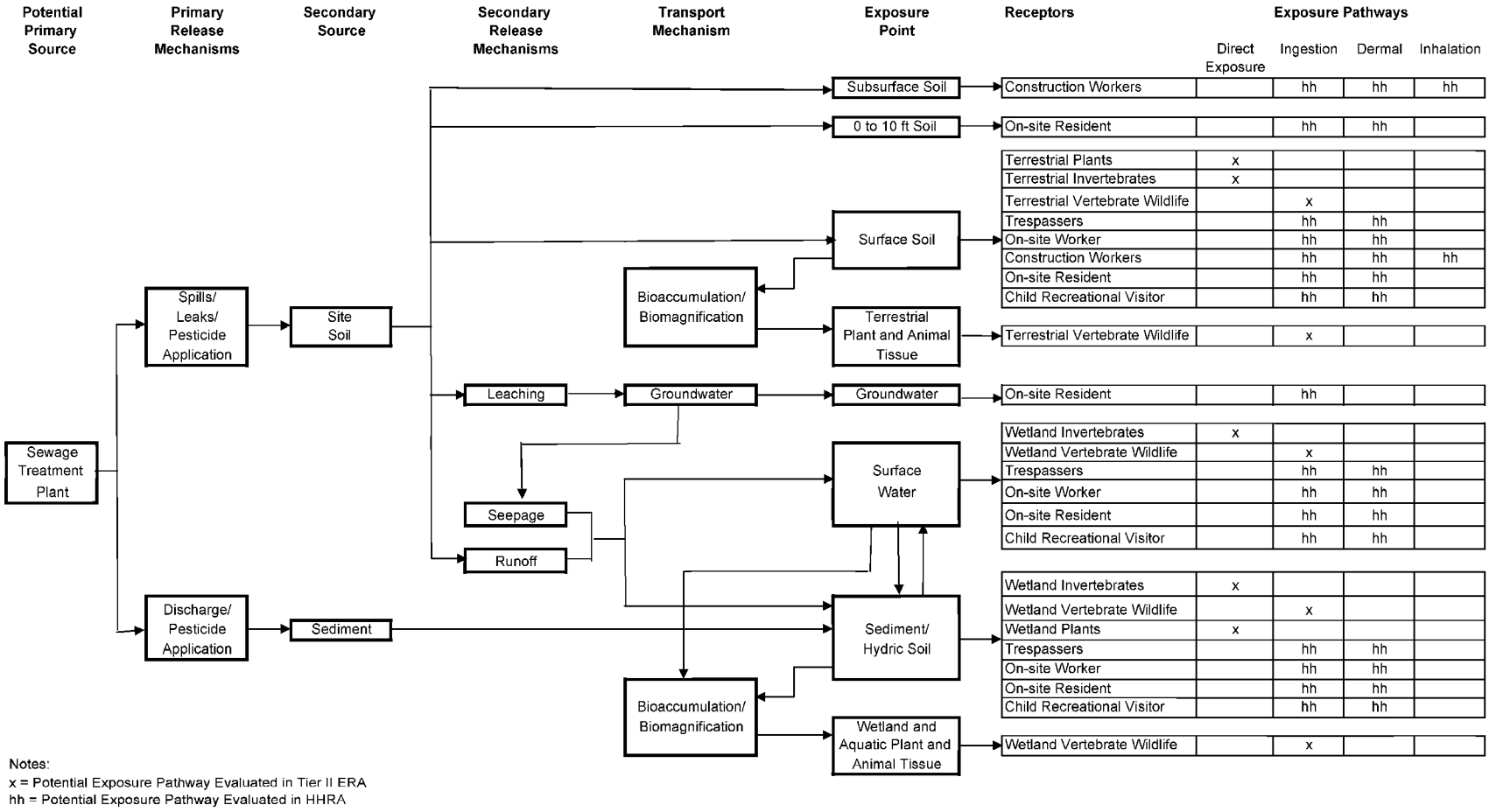

Figure 2-4 – Conceptual Site Model

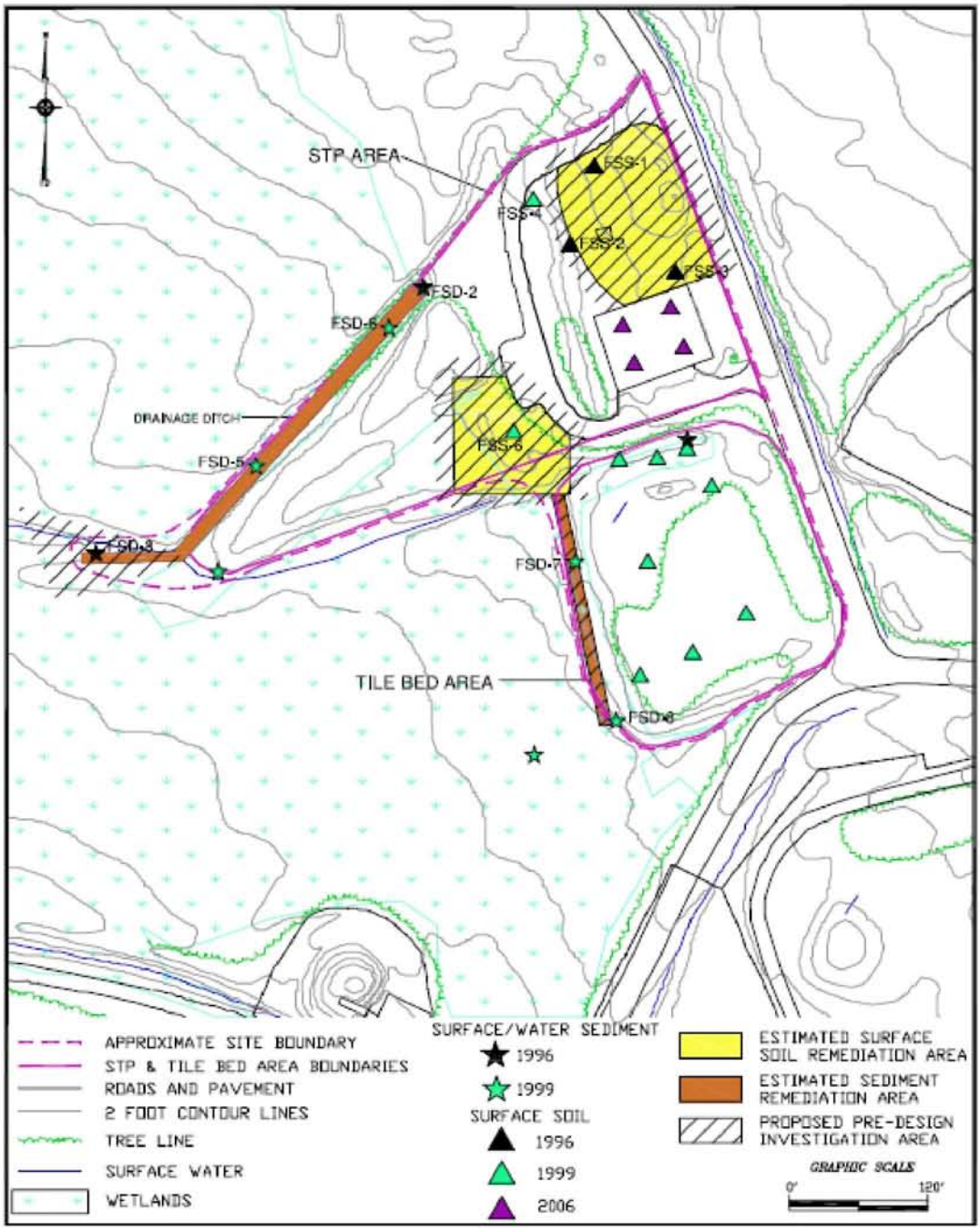

Figure 2-5 – Estimated Remedial Action Areas

(not all sample locations are shown)

PART 3: RESPONSIVENESS SUMMARY

I. STAKEHOLDER ISSUES AND NAVY RESPONSES

The Navy received various comments during the public comment period and at the public hearing on the Proposed Plan for the Former Sewage Treatment Plant (STP) Site, Operable Unit 7. The 30-day comment period was from August 29, 2007 to September 28, 2007. The public hearing was held on September 13, 2007. A copy of the comments received during the public comment period and a copy of the transcript for the public hearing are attached as Appendix E1 and Appendix E2, respectively. Comment responses are provided in Section III.

II. TECHNICAL AND LEGAL ISSUES

The Navy has reviewed all comments received from the public and support agencies regarding the Proposed Plan for the STP Site at NAS South Weymouth. Navy does not believe that any of the comments necessitate a change from the preferred alternative. Therefore Navy and EPA believe that there is sufficient technical basis to proceed with the preferred alternative, Alternative 3 – *excavation of contaminated soil and sediment and off-site disposal or recycling by asphalt batching*.

III. COMMENT RESPONSES

The following sections present written comments received during the public comment period and verbal comments received at the public hearing, with Navy responses.

A. Written Comments and Responses

This section presents the one written comment received during the public comment period (August 29, 2007 to September 28, 2007) and the Navy's response to this comment. Refer to the attached comment package in Appendix E.1 for a copy of the written comment.

1. Comment from Mr. Waldo Bainter, Weymouth resident. I like Alternative #3 for clean up of the site. The longer we wait the more tax dollars it will cost. We spend millions of dollars for studies that almost always say the same thing. If the cleanup had been done at the time of the base closing, it would have saved millions and been finished months ago. "Less studies more action."

Navy Response: The Navy appreciates the support for the selected site remedy. It is in the Navy's interest to complete the required environmental investigations and cleanups in a timely manner such that the former Base property can be transferred back to the local communities. Since NAS South Weymouth is included on the National Priorities List (NPL), the Navy is obligated to investigate the identified operable units in accordance with the process set by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986. The STP Site was one of the identified operable units to be investigated under CERCLA. The CERCLA process is designed to encourage public participation in the decision making process and to ensure that the selected site remedy is protective of human health and the environment and complies with federal, state, and local applicable or relevant and appropriate requirements (ARARs). CERCLA does include mechanisms to expedite site cleanups, but this was not the case at the STP Site where human activity is limited, risks are relatively low, and where the identified contaminants are relatively immobile in site soil and sediment. The Navy has completed expedited cleanups at other sites around NAS South Weymouth.

B. Verbal Comments and Responses

This Section presents verbal comments recorded at the public hearing on September 13, 2007, with Navy responses. Note that the following comments are paraphrased. Refer to the Public Hearing Transcript in Appendix E.2 for a complete set of verbal comments recorded at the public hearing.

1. Comment from Ms. Mary Parsons, Rockland Resident: I'm glad you're going to dig something out and remove it off-site. I wish that you would do the same with the Small Landfill and a few other places, but at least we are getting one of them done.

Navy Response: The Navy appreciates the support for the selected site remedy. The Navy will continue to work with EPA, MassDEP, and the local communities to select site remedies that are protective of human health and the environment, comply with pertinent regulatory requirements, and are cost-effective.

2. Comment from Mr. Jim Cunningham, Weymouth resident: My only concern is the remediation is so close to the wetlands that I would hope that a very thorough investigation has been done of the tile field and other areas to make sure that all the contaminants have been removed. It's a good thing we are removing them and depositing them off site, although I don't know what the people off site are going to think about that. My only other concern with that is with so many places being polluted and so many things being trucked off site, at what point do we have no more off site to truck things to? Then when you make road tar and so forth out of these contaminated soils, I wonder how stable that is for the future too, whether or not if that gets broken up, so forth, it may also lead to contaminants. I suppose I will have to leave that to the engineers and hope for the future.

Navy Response: The Navy appreciates the support for the selected site remedy. The Navy has conducted several investigations of the STP Site in coordination with EPA and MassDEP. The delineated extent of COCs (surficial soil and drainage swale sediment) is consistent with the conceptual site model for releases from the former STP Site. The results are available for public review as part of the Administrative Record (see Index in Appendix D of this ROD). Prior to implementing the Remedial Action at the STP Site (excavation), the Navy will conduct additional sampling as part of a pre-design investigation (PDI) to confirm the delineation of site chemicals of concern (COCs) and to ensure the remedial design is comprehensive. Confirmatory sampling will be conducted following excavation to ensure that soil and sediment exceeding action levels have been removed. Navy will also implement a tiered sediment monitoring program to ensure that the remedy is protective. The remedial action will be conducted to minimize impacts to the wetlands but also ensure that all sediment that exceeds the cleanup criteria will be excavated and removed from the Site. The wetlands will then be restored consistent with a restoration plan that will be reviewed by EPA and MassDEP.

Excavated material either will be disposed at a licensed landfill or recycled using an asphalt batching process. Additional sampling of the excavated material will be used to evaluate which option is more appropriate. If sent to a recycling facility, the facility would determine the reuse of the asphalt in accordance with its license. Reuse of the asphalt would only occur if waste characterization samples indicated that the material was acceptable.

3. Comment from Mr. Dan Punchard, Rockland resident. I am not so concerned with the past on the base, but I am concerned with the future. I am thinking of 11,000 people on the base and their disposal of materials into Rockland. Before the Navy transfers land to LNR, I think we ought to take a close look at all the waters that are coming down French Stream. In 2006, my land had at least a quarter of a million gallons of water on it. French Stream goes through my land, and Rockland is facing this problem of all new waters coming down French Stream with a new sewer plant proposed. We know that sewer plants can fail in daily operations or when a major rainstorm of 10 inches occurs. I don't know how many homes in Rockland have been flooded in their backyard. I put 10 yards of sand down in my lower yard because I don't trust all the contaminants that that stream has overflowed on my land through the years. I don't

think necessarily that people have died from the contaminants of the base because I think a lot of it has been leached out, but I do see a lot of problems in the future with all the materials that might be coming from a sewer plant and it failing or being poorly operated on a particular day. I don't think it's right for LNR to go ahead and without adequate piping using French Stream as a conveyor of the water from this area. I would like to see a containment pond and probably spending about $20 million to build one similar to Reed's Pond. I would like to see the Army Corps of Engineers come down and see what can be done in containing the water from this vast watershed which not only includes the former base but areas outside Route 18. They are all fed in by pipes to French Stream. It floods the area and many homes in Rockland are affected. I am surprised that Rockland's Conservation Commission has not spoken to this issue.

Navy Response: The Navy has conducted several studies of French Stream. A human health risk assessment and an ecological risk assessment for French Stream have been completed this year and were presented at Restoration Advisory Board meetings in April and August, respectively. Both risk assessments concluded that there is no unacceptable risk to people or organisms in French Stream due to exposure to surface water, sediment, or floc from French Stream. These risk assessments were conducted using samples of surface water, sediment, and floc collected from French Stream. Information about the Navy's investigations of French Stream is available for public review at the Navy's NAS South Weymouth Caretaker Site Office (617-753-4656). Questions and concerns about the Base redevelopment and the effect on French Stream should be directed to LNR and/or the South Shore Tri-Town Development Corporation (SSTTDC) (781-682-2187).

4. Comment from Mr. Michael Acciola, Weymouth resident. What type of people does LNR have that are experts in moving all this material and how cleanly can they do it, safely without any hazard to the general public that live around this area, the base? How long does LNR think it would take to actually take the contaminated soil out and replace it? Are they going to use the contaminated soil again right here on the spot without sending it out to have it cleaned and bring back in or which way will they do that?

Navy Response: The Navy is responsible for all environmental cleanup activities at the Base, including the Site 7 remedial action described in this ROD. The Navy staff, and its environmental consultants and contractors, include experienced environmental personnel (engineers, scientists, geologists, etc.). Design documents are reviewed by professional engineers registered in the state of Massachusetts. The Navy's Installation Restoration Program at NAS South Weymouth is designed to be protective of human health and the environment and to comply with federal, state, and local regulations. Environmental investigations and remedial actions at NAS South Weymouth are coordinated with EPA and MassDEP and conducted with EPA and MassDEP oversight.

The Navy anticipates that the required remedial actions at Site 7 could be completed within 1 year of signing this ROD. As described in Part II of this ROD, the excavated material would be either disposed at an off-site licensed facility (e.g., landfill) or recycled at an off-site asphalt batching facility. The reuse of the asphalt would be up to that facility and would only occur if waste characterization samples indicated that the material was acceptable to do so. The excavated areas will be backfilled with clean off-site material and then the remediated area and wetlands will be restored. Questions about LNR's environmental capabilities and plans should be directed to their company representatives.

5. Comment from Mr. Harvey Welch, Weymouth resident. I was wondering if they have done any studies on not just one particular chemical but on all these chemicals combined and how they affect people when it's in a particular area. It has to have some kind of accumulating effect.

Navy Response: The current state of Toxicology is such that most of the available information pertains to the effects of individual chemicals rather than the synergistic/combined effects of different chemicals. CERCLA risk assessments utilize the available information for chemical effects and then sum up the individual effects based on the different types of COCs present and the likely exposure routes. CERCLA risk assessments incorporate several conservative assumptions/parameters to account for the

uncertainties in toxicological effects and, therefore, may over-estimate actual risks at a site. While to date, the science supporting risk assessments has been based on studies of individual chemicals, rather than combinations of chemicals, EPA has noted that studies on mice using combinations of chemicals are now being conducted. The risk assessment process may be modified in the future should there be a scientifically-supported basis demonstrating significantly different synergistic risks resulting from combinations of chemicals, but this may be many years away. It is important to note that while many chemicals appear frequently at sites, the actual COCs can vary based on the known or assumed source(s) of contamination.

APPENDIX A: MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION LETTER OF CONCURRENCE

Refer to attached copy.

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY & ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
ONE WINTER STREET, BOSTON, MA 02108 617-292-5500

DEVAL L. PATRICK
Governor

TIMOTHY P. MURRAY
Lieutenant Governor

IAN A. BOWLES
Secretary

LAURIE BURT
Commissioner

April 17, 2008

Mr. James T. Owens, Director
Office of Site Remediation and Restoration
U.S. Environmental Protection Agency
One Congress Street, Suite 1100
Boston, MA 02114-2023

Re: Record of Decision
Sewage Treatment Plant Site
Former South Weymouth NAS
MassDEP RTN 4-3002621

Dear Mr. Owens:

The Massachusetts Department of Environmental Protection (MassDEP) has reviewed the *Record of Decision for Operable Unit 7,* Sewage Treatment Plant Site, *Naval Air Station South Weymouth*, dated April 2008. The Record of Decision (ROD) summarizes the results from the associated remedial investigation and feasibility study, and provides the Navy's rationale for selecting a remedy consisting of excavation and off-site disposal of contaminated soil and sediment at a licensed facility. MassDEP concurs with the selected remedy.

If you have any questions or comments, please contact David Chaffin, Project Manager (617-348-4005), or Anne Malewicz, Federal Facilities Section Chief (617-292-5659).

Very truly yours,

Janine Commerford
Assistant Commissioner
Bureau of Waste Site Cleanup

cc: D. Barney, USN-S. Weymouth
K. Keckler, USEPA
Executive Director, SSTTDC
RAB Members

This information is available in alternate format. Call Donald M. Gomes, ADA Coordinator at 617-556-1057. TDD# 1-866-539-7622 or 1-617-574-6868.

MassDEP on the World Wide Web: http://www.mass.gov/dep
Printed on Recycled Paper

APPENDIX B: REFERENCES

Argonne, 1988. Preliminary Assessment, NAS South Weymouth, MA. Argonne National Laboratories, 1988.

Baker Environmental, 1991. Site Investigation at Naval Air Station South Weymouth. Baker Project Number 16746-19. December 1991.

Brown & Root Environmental, 1998. NAS South Weymouth. Phase I Remedial Investigation, South Weymouth, Massachusetts. Volumes I-IV. July 1998.

[U.S.] EPA, 2000. *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study*. EPA 540-R-00-002. OSWER 9355.0-75. July 2000.

[U.S.] Navy, 2007. Proposed Plan, Operable Unit 7 – Sewage Treatment Plant, Naval Air Station South Weymouth, Massachusetts. August 2007.

South Shore Tri-Town Development Corporation (SSTTDC), 2005a. Zoning and Land Use By-Laws for the Naval Air Station South Weymouth. May 5, 2005.

SSTTDC, 2005b. Reuse Plan for Naval Air Station South Weymouth. May 5, 2005.

Tetra Tech NUS, Inc (TtNUS). 2002. *Final Phase II Remedial Investigation, Sewage Treatment Plan, Naval Air Station South Weymouth, Weymouth, Massachusetts*. Prepared under subcontract by ENSR International for Engineering Field Activity Northeast, Naval Facilities Engineering Command, Lester, Pennsylvania. April 2002.

TtNUS, 2007a. Final Feasibility Study, Revision 1, for Former Sewage Treatment Plant, Naval Air Station South Weymouth, Weymouth, Massachusetts. February 19, 2007.

TtNUS, 2007b. Site Management Plan, Revision 7.0, Naval Air Station South Weymouth, Weymouth, Massachusetts. September 2007.

APPENDIX C: GLOSSARY

Background Level - Chemicals or concentrations of chemicals present in the environment due to naturally occurring geochemical processes and sources, or to human activities not related to specific point sources or site releases.

Benchmark - Concentration of a chemical considered to be protective of human health or the environment.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) - A federal law passed in 1980 and amended in 1986 by the Superfund Amendments and Reauthorization Act. The Act 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. Navy compliance with CERCLA/Superfund Amendments and Reauthorization Act (see Installation Restoration Program definition) is funded by the Department of Defense under the Defense Environmental Restoration Act.

Chemical of Concern (COC) - A compound or element identified in a risk assessment as one of the primary drivers of unacceptable risks.

Chemical of Potential Concern (COPC) - A compound or element identified as a possible source of risk, based upon a comparison between the chemical concentration and established screening levels.

Excess Lifetime Cancer Risk Range - Upper bound probability of an individual developing cancer over a lifetime as a result of exposure to a particular level of a potential carcinogen. The predicted cancer risk level is compared against an acceptable range of 1×10^{-4} to 1×10^{-6}.

Feasibility Study (FS) - An engineering study under CERCLA that develops and evaluates potential cleanup alternatives for a site.

Groundwater - Water found beneath the Earth's surface in soil pore spaces and fractures in geologic formations. When formations yield water in sufficient quantity and quality (i.e., an aquifer), groundwater is often used as a water supply.

Hazard Index - A measure of the potential for toxic (non-cancer related) effects from exposure to non-carcinogenic chemicals. A Hazard Index of 1 or less is considered an acceptable risk level by the U.S. Environmental Protection Agency.

Installation Restoration (IR) Program - A component of the Defense Environmental Restoration Act created under CERCLA regulations and funded by the Department of Defense. The purpose of the Program is to identify, assess, characterize, and clean up or control contamination from past hazardous waste disposal operation and hazardous material spills at military activities.

Institutional Control - Any legal or administrative barrier, such as an easement, restrictive covenant, or zoning ordinance, that prevents access or certain uses of land.

Monitoring Well - A well drilled at a specific location allowing groundwater to be sampled at selected depths to determine the direction of groundwater flow and the types and quantities of chemicals present in groundwater.

National Priorities List (NPL) - U.S. Environmental Protection Agency's list of sites for priority cleanup under the Superfund program.

Operable Unit - Operable units are site management tools that define discrete steps toward comprehensive actions, based on geographical portions of a site, specific site problems, initial phases of action, or any set of actions performed over time or concurrently at different parts of the site.

Polycyclic Aromatic Hydrocarbons - Chemical compounds such as benzo(a)pyrene, naphthalene, anthracene, and phenanthrene, which are usually byproducts of incomplete combustion. PAHs can occur naturally (e.g., from forest fires) and as the consequence of human activities.

Polychlorinated Biphenyls (PCBs) - A chemical mixture commonly used in electrical transformers and other electrical components because they conduct heat well while being heat resistant and good electrical insulators. The sale and re-use of PCBs were banned in 1979.

Preliminary Remediation Goals (PRGs) - Target cleanup concentrations for individual contaminants of concern in each media.

Proposed Plan - A CERCLA document that summarizes the lead agency's (in this case, the Navy's) preferred cleanup remedy for a site and provides the public with information on how they can participate in the remedy selection process.

Record of Decision (ROD) - A legal, technical, and public document under CERCLA that explains the rationale and final cleanup decision for a site. It contains a summary of the public's involvement in the cleanup decision.

Remedial Action Objectives (RAOs) - RAOs are goals that are set to protect human health and the environment, and provide the basis to select cleanup methods.

Remedial Investigation (RI) - A step in the CERCLA process that is completed to gather sufficient information to support selection of a cleanup approach to a site. The RI involves site characterization or the collection of data and information necessary to characterize the nature and extent of contamination at a site. The RI also determines whether or not the contamination presents a significant risk to human health or the environment.

Responsiveness Summary - A CERCLA document containing the responses to the formal comments submitted by the public regarding the Proposed Plan. This summary is issued as an appendix to the ROD.

APPENDIX D: ADMINISTRATIVE RECORD INDEX

File No.	Vol.	Document No.	Document Type[a]	Document Title	Document Date	Document Author	Document Recipient	Document Location	Operable Unit
1.0 SITE ASSESSMENT									
1.2 Preliminary Assessment									
1.2		1.2-1	R	Preliminary Assessment, NAS South Weymouth, Massachusetts	1988	Argonne National Laboratory	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9
1.3 Site Inspection/Investigation									
1.3		1.3-1	R	Work Plan Site Investigation at Naval Air Station South Weymouth, Massachusetts	3/1990	Baker Environmental Inc.	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9
1.3		1.3-2	R	Site Investigation at Naval Air Station South Weymouth, Massachusetts	12/1991	Baker Environmental Inc.	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9
3.0 REMEDIAL INVESTIGATION									
3.2 Sampling and Analysis Data									
3.2		3.2-1	R	Data Validation Addenda Remedial Investigation South Weymouth, Massachusetts Addenda Volumes I, II, III, IV, V, and VI	1/1997	Brown and Root Environmental (ENSR)	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9
3.2		3.2-2	R	Final Summary Report of Background Data Summary Statistics for Naval Air Station South Weymouth, Massachusetts	2/2000	Stone & Webster	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9, 10
3.2		3.2-3	R	Supplement to Final Summary Report of Background Data Summary Statistics for NAS South Weymouth	11/2002	Stone & Webster	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9, 10
3.2		3.2-3	L	Field Summary Memorandum, Well Inspection and Re-Development – February 14, 2006, Former Sewage Treatment Plant, Naval Air Station South Weymouth, Weymouth, Massachusetts	2/2006	Tetra Tech NUS	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	7
3.6 Remedial Investigation Reports									
3.6		3.6-1	R	Phase I Remedial Investigation, Naval Air Station South Weymouth, Massachusetts Volumes I, II, III, and IV	7/1998	Brown and Root Environmental (ENSR)	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9
3.6		3.6-4	R	Final Basewide Groundwater Flow Assessment Phase II Remedial Investigation	12/2000	Tetra Tech (ENSR)	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9, 10
3.6		3.6-8	R	Turtle Investigation Report for CY 2000	4/2001	Tetra Tech NUS (ENSR)	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9, 10

File No.	Vol.	Document No.	Document Type[a]	Document Title	Document Date	Document Author	Document Recipient	Document Location	Operable Unit
3.6 Remedial Investigation Reports (cont.)									
3.6		3.6-12	R	Potential Effects of Elevated pH Values on the Representativeness of Groundwater Samples, NAS South Weymouth (secondary document, supplement to Phase II RI)	2/2002	Tetra Tech NUS (ENSR)	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9, 10, 11
3.6		3.6-18	R	Final Phase II Remedial Investigation, Sewage Treatment Plant, NAS South Weymouth, Weymouth, Massachusetts	4/2002	Tetra Tech NUS (ENSR)	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	7
3.6		3.6-12	R	Addenda for Final Phase II Remedial Investigation, Sewage Treatment Plan, Naval Air Station South Weymouth, Weymouth, Massachusetts.	11/2002	Tetra Tech NUS (ENSR)	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	7
3.7 Work Plans and Progress Reports									
3.7		3.7-1	R	Final Remedial Investigation Work Plan, NAS Weymouth, Massachusetts	7/1995	Brown and Root Environmental (ENSR)	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9
3.7		3.7-2	R	Final Remedial Investigation Work Plan (Phase I) Field Sampling Plan, Quality Assurance Project Plan, Health and Safety Plan Volumes I and II	11/28/1995	Brown and Root Environmental (ENSR)	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9
3.7		3.7-3	L	Ecological Technical Memorandum Work Plan, NAS South Weymouth, Massachusetts	7/1998	Brown and Root Environmental (ENSR)	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9
3.7		3.7-4	R	Phase II Remedial Investigation Work Plan, NAS South Weymouth, Massachusetts (7 volumes including appendix)	4/1999	Tetra Tech NUS (ENSR)	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9
3.7		3.7-5	L	Response to Comments: Draft Soil and Groundwater Sampling Plan, Site 7, Former Sewage Treatment Plant, Naval Air Station South Weymouth, Weymouth, Massachusetts	12/12/2005	Tetra Tech NUS	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	7
3.7		3.7-6	L	Navy Responses to Comments, Navy December 12, 2005 Response Package Draft Soil and Groundwater Sampling Plan Former Sewage Treatment Plant, Naval Air Station South Weymouth, Weymouth, Massachusetts	1/25/2006	Tetra Tech NUS	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	7
3.7		3.7-8	R	Soil and Groundwater Sampling Plan, Former Sewage Treatment Plant, Naval Air Station South Weymouth, Weymouth, Massachusetts	3/2006	Tetra Tech NUS	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	7

File No.	Vol.	Document No.	Document Type[a]	Document Title	Document Date	Document Author	Document Recipient	Document Location	Operable Unit
3.9 Health Assessments									
3.9		3.9-1	R	Public Health Assessment for Naval Air Station South Weymouth, Massachusetts CERCLIS No. MA2170022022	3/1998	U.S. Department of Health and Human Services	Public	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9
3.9		3.9-2	R	Public Health Assessment for Naval Air Station South Weymouth, Massachusetts CERCLIS No. MA2170022022	9/1999	U.S. Department of Health and Human Services	Public	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9
3.9		3.9-3	R	Public Health Assessment for Naval Air Station South Weymouth, Massachusetts CERCLIS No. MA2170022022	8/30/01	U.S. Department of Health and Human Services	Public	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9
4.0 FEASIBILITY STUDY									
4.2 Feasibility Study									
4.2		4.2-1	L	Response to Comments from the Massachusetts Department of Environmental Protection on the Draft Feasibility Study for Operable Unit 7 (Sewage Treatment Plant), Naval Air Station South Weymouth, Massachusetts [included as part of the draft final FS]	12/16/2002	EA Engineering, Science, and Technology	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	7
4.2		4.2-1	L	Response to Comments from the U.S. Environmental Protection Agency on the Draft Feasibility Study for Operable Unit 7 (Sewage Treatment Plant), Naval Air Station South Weymouth, Massachusetts [included as part of the draft final FS]	12/16/2002	EA Engineering, Science, and Technology	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	7
4.2		4.2-1	L	Responses to EPA and MADEP comments on the draft final Feasibility Study and response-to-comment document for Operable Unit (OU)-7, Sewage Treatment Plant, at the former Naval Air Station South Weymouth, Massachusetts	3/20/2003	EA Engineering, Science, and Technology	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	7
4.2		4.2-1	L	[Comments on the] Response to Comments (dated 21 January 2003) from the U.S. Environmental Protection Agency (EPA) Region 1 on the Draft Final Feasibility Study and Response to Comment Document (dated December 2002) for Operable Unit 7, Sewage Treatment Plant, at the Former Naval Air Station South Weymouth, Massachusetts	4/28/2003	EPA	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	7

File No.	Vol.	Document No.	Document Type[a]	Document Title	Document Date	Document Author	Document Recipient	Document Location	Operable Unit
4.2 Feasibility Study (cont.)									
4.2		4.2-1	L	Responses to EPA Comments (dated 28 April 2003) on the Responses to Comments (dated 20 March 2003) on the Draft Final Feasibility Study (FS) and Response to Comment Document (dated December 2002) for Operable Unit 7, Sewage Treatment Plant (STP), at the Former Naval Air Station (NAS) South Weymouth, Massachusetts	5/23/2003	EA Engineering, Science, and Technology	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	7
4.2		4.2-1	L	STP Comments	9/28/2006	MassDEP	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	7
4.2		4.2-1	L	[Comments on the] Feasibility Study for Former Sewage Treatment Plant, South Weymouth Naval Air Station, Massachusetts	11/62006	EPA	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	7
4.2		4.2-1	L	Response to Comments on Final Feasibility Study, Sewage Treatment Plant, Former Naval Air Station South Weymouth, Weymouth, Massachusetts	2/14/2007	U.S. Department of the Navy	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	7
4.2		4.2-1	L	[Comments on the] STP FS Responses to Comments	2/22/2007	MassDEP	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	7
4.2		4.2-1	L	[Comments on the] Feasibility Study for Former Sewage Treatment Plant, South Weymouth Naval Air Station, Massachusetts	3/20/2007	EPA	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	7
4.2		4.2-1	R	Feasibility Study, Revision 1, for Former Sewage Treatment Plant, Naval Air Station South Weymouth, Weymouth, Massachusetts	4/17/2007	Tetra Tech NUS	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	7
4.9 Proposed Plans for Selected Remedial Action									
4.2		4.2-1	L	Responses to Comments, Draft Proposed Plan, Former Sewage Treatment Plant, Naval Air Station South Weymouth, Weymouth, Massachusetts	7/11/2007	Tetra Tech NUS	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	7
4.2		4.2-1	L	Responses to Comments, Draft Final Proposed Plan, Former Sewage Treatment Plant, Naval Air Station South Weymouth, Weymouth, Massachusetts	8/3/2007	Tetra Tech NUS	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	7
4.9		4.9-4	P	[Final] Proposed Plan, Operable Unit 7 – Former Sewage Treatment Plant, Naval Air Station South Weymouth, Weymouth, Massachusetts	8/2007	U.S. Department of the Navy	Public	NAVFAC MID-ATLANTIC	7

File No.	Vol.	Document No.	Document Type[a]	Document Title	Document Date	Document Author	Document Recipient	Document Location	Operable Unit
5.0 RECORD OF DECISION									
5.3 Responsiveness Summaries									
5.3		5.3-11	R	Transcript of the Public Hearing on the Proposed Plan for the Former Sewage Treatment Plant (included as Appendix E.2 of the Record of Decision)	9/13/2007	Public	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	7
5.3		5.3-12	R	Former Sewage Treatment Plant Responsiveness Summary (included as Part 3 of the Record of Decision)	[pending]	Tetra Tech NUS	Public	NAVFAC MID-ATLANTIC	7
5.4 Record of Decision									
5.4		5.4-6	R	Final Record of Decision, Operable Unit 7 Former Sewage Treatment Plant, Naval Air Station South Weymouth, Massachusetts	[pending]	Tetra Tech NUS	Public	NAVFAC MID-ATLANTIC	7
10.0 ENFORCEMENT/NEGOTIATION									
10.16 Federal Facility Agreements									
10.16		10.16-1	L	Federal Facility Agreement for South Weymouth Naval Air Station National Priorities List Site	4/2000	EPA	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9
13.0 COMMUNITY RELATIONS									
13.2 Community Relations Plan									
13.2		13.2-1	R	Community Relations Plan Naval Air Station South Weymouth, Massachusetts	7/1998	U.S. Department of the Navy	Public	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9
13.4 Public Meetings/Hearings									
13.4		13.4-1		Restoration Advisory Board Workshop Guidebook	7/1994	EPA	Public	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9
13.5		13.5-3		Environmental Update, NAS South Weymouth	3/1998	North and South Rivers Watershed Association	Public	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9
13.5		13.5-4		Groundwater Flow NAS South Weymouth, Massachusetts	10/1998	Tetra Tech NUS (ENSR)	Public	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9
13.5		13.5-6		Environmental Cleanup Activities NAS South Weymouth Fact Sheet	4/2000	Tetra Tech NUS (ENSR)	Public	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9
13.5		13.5-7		Arsenic Information from the Former Naval Air Station South Weymouth, Massachusetts Fact Sheet	11/2001	Tetra Tech NUS (ENSR)	Public	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9

File No.	Vol.	Document No.	Document Type[a]	Document Title	Document Date	Document Author	Document Recipient	Document Location	Operable Unit
13.4 Public Meetings/Hearings (cont.)									
13.4		13.4-6		Public Notice: Notification of Restoration Advisory Board Meetings (Monthly)	1995-2004	U.S. Department of the Navy	Public	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9, 10, 11
13.4		13.4-7		Restoration Advisory Board Meeting Minutes (Monthly)	1995-2007	U.S. Department of the Navy	Public	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9, 10, 11
13.4		13.4-8		Public Notice: Availability of the Proposed Plan, and Notification of Public Meeting and Comment Period	8/2007	Tetra Tech NUS	Public	NAVFAC MID-ATLANTIC	7
13.5 Fact Sheets/Information Updates									
13.5		13.5-1		U.S. Navy Fact Sheet No. 1, NAS South Weymouth	12/1996	Tetra Tech NUS (ENSR)	Public	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9
13.5		13.5-2		The Former Naval Air Station South Weymouth	2/1998	U.S. Department of the Navy	Public	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9
13.6 Mailing List									
13.6		13.6-1		Community Relations Mailing List: State, Federal and Local Agencies (including Media and Public Libraries)	N/A	U.S. Department of the Navy	N/A	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9, 10, 11
13.6		13.6-2		Community Relations Mailing List: Other Parties (e.g., general public) – CONFIDENTIAL (due to potential Privacy Act violations)	N/A	U.S. Department of the Navy	N/A	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9, 10, 11
17.0 SITE MANAGEMENT RECORDS									
17.6 Site Management Plans and Reviews									
17.6		17.6-1	R	Site Management Plan Naval Air Station South Weymouth, Massachusetts	10/99	EA Engineering, Science, and Technology	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9
17.6		17.6-2	R	Site Management Plan Revision 1.0 Naval Air Station South Weymouth, Massachusetts	10/00	EA Engineering, Science, and Technology	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9
17.6		17.6-3	R	Site Management Plan Revision 2.0 Naval Air Station Weymouth, Massachusetts	11/01	EA Engineering, Science, and Technology	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9, 10
17.6		17.6-4	R	Site Management Plan Revision 3.0 Naval Air Station South Weymouth, Massachusetts	4/03	EA Engineering, Science, and Technology	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9, 10
17.6		17.6-5	R	Site Management Plan Revision 4.0 Naval Air Station South Weymouth, Massachusetts	12/04	EA Engineering, Science, and Technology	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9, 10

File No.	Vol.	Document No.	Document Type[a]	Document Title	Document Date	Document Author	Document Recipient	Document Location	Operable Unit
17.6 Site Management Plans and Reviews									
17.6		17.6-6	R	Draft Site Management Plan Revision 5.0 Naval Air Station South Weymouth, Massachusetts	8/05	Tetra Tech NUS	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9, 10, 11
17.6		17.6-7	R	Site Management Plan Revision 6.0 Naval Air Station South Weymouth, Massachusetts	10/06	Tetra Tech NUS	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9, 10, 11
17.6		17.6-8	R	Site Management Plan Revision 7.0 Naval Air Station South Weymouth, Massachusetts	9/07	Tetra Tech NUS	U.S. Department of the Navy	NAVFAC MID-ATLANTIC	1, 2, 3, 4, 5, 7, 8, 9, 10, 11

(a) R = Report; L = Letter; P = Proposed Plan.

NOTES: NAVFAC MID-ATLANTIC = Naval Facilities Engineering Command Mid-Atlantic.
EPA = (U.S.) Environmental Protection Agency.
MassDEP (or MADEP) = Massachusetts Department of Environmental Protection.
NAS = Naval Air Station.

APPENDIX E.1: PUBLIC COMMENTS ON THE PROPOSED PLAN

Refer to the attached copy.

COMMENT SHEET – Proposed Plan for OU-7, Former Sewage Treatment Plant

Use this space to write your comments or to be added to the mailing list.

The Navy encourages your written comments on the Proposed Plan for OU-7 – Former Sewage Treatment Plant, Naval Air Station South Weymouth, Weymouth, Massachusetts. You can use the form below to send written comments. If you have questions about how to comment, please call Mr. Brian Helland at (215) 897-4912. This form is provided for your convenience.

Please mail this form or additional sheets of written comments, postmarked no later than September 28, 2007, to the address shown below:

Mr. Brian Helland
Remedial Project Manager
BRAC PMO, Northeast
4911 South Broad Street
Philadelphia, PA 19112

DEAR SIRS,

I LIKE ALTERNATIVE #3 FOR CLEAN UP OF THE SITE. THE LONGER WE WAIT THE MORE TAX DOLLARS IT WILL COST. WE SPEND MILLIONS OF $$ FOR STUDIES THAT ALMOST ALWAYS SAY'S THE SAME THING.

IF THE CLEAN-UP HAD BEEN DONE AT THE TIME OF THE BASE CLOSING IT WOULD HAVE SAVED MILLIONS & BEEN FINISHED MONTH'S AGO.

"LESS STUDIES MORE ACTION".

THANK YOU,

Waldo W. Bainter

Mr. Waldo Bainter
114 Bald Eagle Rd
Weymouth, MA 02190

Comment Submitted by: _____

Address: _____

APPENDIX E.2: TRANSCRIPT OF THE PUBLIC HEARING ON THE PROPOSED PLAN

Refer to attached copy.

PUBLIC HEARING

NAVAL AIR STATION SOUTH WEYMOUTH

WEYMOUTH, MASSACHUSETTS

SEPTEMBER 13, 2007

8:09 P.M.

NAS SOUTH WEYMOUTH, MASSACHUSETTS

P R O C E E D I N G S

00:00:04 MR. BARNEY: What I would like to do
00:00:06 is start the public hearing portion of tonight. My
00:00:18 name is Dave Barney. I am the BRAC Environmental
00:00:20 Coordinator for the base. We are now in the public
00:00:22 hearing portion of the evening's events. Comments
00:00:30 and questions can be provided to the Navy via the
00:00:34 recorder, and we will be required to respond to
00:00:36 those.

00:00:38 We will not be providing any
00:00:40 interactive responses during the hearing portion of
00:00:44 this, but I encourage you -- the Navy's plan for this
00:00:48 sewage treatment plant facility is for excavation and
00:00:52 off-site disposal of contaminated sediments and
00:00:56 surface soil.

00:00:58 With that I encourage anybody who would
00:01:02 like to make a comment or statement to go ahead and
00:01:06 do so.

00:01:16 MS. PARSONS: I don't know about
00:01:18 anybody else, but I'm glad you're digging out
00:01:22 something and removing it off the base. I'm Mary
00:01:24 Parsons from Rockland. I'm glad you're going to dig
00:01:28 something out and remove it off site. I wish that

00:01:30 you would do the same with the Small Landfill and a
00:01:34 few other places, but at least we are getting one of
00:01:36 them done.
00:01:36 MR. BARNEY: Thank you, Mary.
00:01:42 MR. CUNNINGHAM: I'm Jim Cunningham
00:01:44 from Weymouth. I can see your map with the red and
00:01:48 yellow areas that will be remediated. My only
00:01:52 concern is this is so close to the wetlands that I
00:01:54 would hope that a very thorough investigation has
00:01:56 been done of the tile field and other areas to make
00:02:00 sure that all the contaminants have been removed.
00:02:04 I agree with Mary that it's a good
00:02:06 thing we are removing them and depositing them off
00:02:10 site, although I don't know what the people off site
00:02:14 are going to think about that. It's a good thing,
00:02:18 and the contaminated area in this base I think should
00:02:22 be taken of site and done something else with.
00:02:26 My only other concern with that is with
00:02:28 so many places being polluted and so many things
00:02:32 being trucked off site, at what point do we have no
00:02:36 more off site to truck things to? Then when you make
00:02:40 tar and so forth out of these contaminated soils,
00:02:44 that is to say, road tar, I wonder how stable that is

00:02:50 for the future too, whether or not if that gets
00:02:52 broken up, so forth, it may also lead to
00:02:56 contaminants.
00:02:58 I suppose I will have to leave that to
00:03:00 the engineers and hope for the future. Thank you.
00:03:04 MR. BARNEY: Thank you, Jim.
00:03:04 MR. PUNCHARD: I'm Dan Punchard of
00:03:22 Rockland. I am not so concerned with the past on the
00:03:26 base, but what I am concerned with is the future. I
00:03:30 am thinking of 11,000 people on the base and the
00:03:38 disposal, their disposal of materials and all that
00:03:42 coming in to Rockland proper.
00:03:50 For the last 50 years or so the Navy
00:03:52 has been in operation, and we have sort of overlooked
00:03:56 in a patriotic sense the operations of the base. But
00:04:00 now with L & R coming in to focus and before the Navy
00:04:06 transfers land to LNR, I think we ought to take a
00:04:12 look, a close look at all the waters that are coming
00:04:16 down French's Stream.
00:04:18 Now, in the year 2006 my land had at
00:04:24 least a quarter of a million gallons of water on it.
00:04:28 French's Stream goes through my land, and Rockland is
00:04:32 facing this problem of all new waters coming down

00:04:38 French's Stream with a new sewer plant proposed.

00:04:42 We know that sewer plants fail. They

00:04:46 fail in daily operations. They fail when a major

00:04:50 rainstorm of 10 inches occurs. I don't know how many

00:04:56 homes in Rockland have been flooded in their

00:05:00 backyard. I cannot really have my children safely

00:05:06 play in the backyard, my grandchildren. What I have

00:05:08 done to make it more safe is I put 10 yards of sand

00:05:14 down in my lower yard because I don't trust all the

00:05:16 contaminants that that stream has overflowed on my

00:05:22 land through the years.

00:05:24 I don't think necessarily that people

00:05:26 have died from the contaminants of the base because I

00:05:30 think a lot of it has been leached out, but I do see

00:05:34 a lot of problems in the future with all the

00:05:38 materials that might be coming from a sewer plant and

00:05:42 it failing or being poorly operated on a particular

00:05:46 day.

00:05:48 I just don't like that for Rockland. I

00:05:50 don't think it's right for LNR to go ahead and

00:05:54 without adequate piping using French's Stream as a

00:06:02 conveyor of the water from this area. It's just not

00:06:06 right, and I would like to see something done about

00:06:12 it.

00:06:12 What I would like to see is a
00:06:14 containment pond and probably spending about $20
00:06:18 million to build one similar to Reed's Pond. I would
00:06:22 like to see the Army Corps of Engineers come down and
00:06:28 take a look at the situation and see what can be done
00:06:30 in containing the water from this watershed, this
00:06:36 vast watershed which not only includes the former
00:06:40 base but areas outside Route 18 and so forth. They
00:06:44 are all fed in by pipes to French's Stream. As I
00:06:50 say, it really, really floods the area. Many, many
00:06:54 homes in Rockland are affected.

00:06:56 I am surprised at Rockland's
00:06:58 Conservation Commission in that they have not spoken
00:07:02 to this issue about that idea. What I mean by
00:07:06 containment pond is one that will hold a lot of water
00:07:10 like Reed's Pond and less water will be flowing down
00:07:16 French's Stream so it does not overflow, and I would
00:07:20 like that situation to be looked into. That's
00:07:24 basically my idea about the future of the base and
00:07:30 its water flow.

00:07:34 MR. BARNEY: Thank you.

00:07:50 MR. ACCIOLA: My name is Michael

00:07:54 Acciola from Weymouth. A quick question for you
00:07:56 would be LNR is supposed to be the major developer
00:08:00 for the plan. What type of people do they have that
00:08:02 are experts in moving all this material and how
00:08:08 cleanly can they do it, safely without any hazard to
00:08:12 the general public that live around this area, the
00:08:16 base? I would like that question answered.
00:08:18 I would like the question answered how
00:08:20 long do they think it would take to actually take the
00:08:24 contaminated soil out and replace it. Are they going
00:08:26 to use the contaminated soil again right here on the
00:08:30 spot without sending it out to have it cleaned and
00:08:32 bring back in or which way will they do that?
00:08:36 MR. BARNEY: Thank you. Does anybody
00:09:08 have any further comments or statements to make?
00:09:16 MR. WELCH: I'm Harvey Welch from
00:09:18 Weymouth. I was wondering if they have done any
00:09:22 studies on not just one particular chemical but on
00:09:32 all these chemicals combined and how they affect
00:09:36 people when it's in a particular area, not just
00:09:40 when -- they will say PCB, we have this much PCB and
00:09:46 we can deal with that and we can deal with this much
00:09:50 arsenic. What about when it's all combined, how does

00:09:54 it affect people? I mean it has to have some kind of
00:09:56 accumulating effect. That is what my question is.
00:10:02 MR. BARNEY: Thank you, Harvey. I will
00:10:20 make a last call for comments or questions. There
00:10:24 not being any, I will recommend that we close the
00:10:28 hearing. Thank you, everybody.

(Whereupon, the hearing was adjourned at 8:20 P.M.)

C E R T I F I C A T E

COMMONWEALTH OF MASSACHUSETTS:
PLYMOUTH, SS.:

I, ELAINE M. BUCKLEY, a Notary Public in and for the Commonwealth Massachusetts, do hereby certify:

That the said proceeding was taken before me as a Notary Public at the said time and place and was taken down in shorthand writing by me;

That I am a Registered Professional Reporter, that the said proceeding was thereafter under my direction transcribed into computer-assisted transcription, and that the foregoing transcript constitutes a full, true, and correct report of the proceedings which then and there took place;

IN WITNESS WHEREOF, I have hereunto subscribed my hand and affixed my official seal this 18th day of September 2007.

ELAINE M. BUCKLEY

My commission expires:
00:10:30 November 14, 2008

APPENDIX F: ARAR TABLES

Media	Requirement	Requirement Synopsis	Action to be Taken to Attain Requirement	Status
Federal – Chemical Specific				
All	Risk Assessment Guidance – Cancer Slope Factors	Guidance used in human health risk assessments as guidance values to evaluate the potential carcinogenic hazard caused by exposure to chemicals of concern.	This alternative will meet these guidance values since potential carcinogenic hazards associated with exposure to contaminants will be addressed through removal and off-site disposal of all contaminated material that poses a carcinogenic risk.	To Be Considered
All	EPA Reference Dose (RfD) Guidance	Guidance used to characterize human health risks associated with non-carcinogens in site media.	This alternative will meet these guidance values since potential non-carcinogenic hazards associated with exposure to contaminants will be addressed through removal and off-site disposal of all contaminated material that poses a non-carcinogenic risk.	To Be Considered
All	EPA Guidelines for Carcinogen Risk Assessment, EPA/630/P-03/001F (March 2005)	Guidance for assessing cancer risk.	This alternative will meet these guidance values since potential carcinogenic hazards associated with exposure to contaminants will be addressed through removal and off-site disposal of all contaminated material that poses a carcinogenic risk.	To Be Considered
All	EPA Supplemental Guidance for Assessing Susceptibility from Early Life Exposure to Carcinogens, EPA/630/R03/003F (March 2005)	Guidance for assessing cancer risks to children.	This alternative will meet these guidance values since potential carcinogenic risks to children associated with exposure to contaminants will be addressed through removal and off-site disposal of all contaminated material that poses a carcinogenic risk.	To Be Considered

Federal – Location Specific				
Wetlands	Clean Water Act § 404, 33 U.S.C. § 1344; § 404(b)(1). Guidelines for Specification of Disposal Sites for Dredged or Fill Material, 40 C.F.R. Parts 230, 231 and 33 C.F.R. Parts 320-323.	Controls discharges of dredged or fill material to protect aquatic ecosystem. This alternative includes work to be performed in or near a wetland. Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent.	This is the least damaging practicable alternative to addressing site contamination and protecting wetland resources because contamination exists in wetlands and waterways, and it is the least costly method and uses technologies most certain to achieve PRGs. Mitigation of altered wetlands will follow applicable standards.	Applicable
Wetlands	Wetlands Protection, 40 C.F.R. § 6.302(a), Appendix A	This regulation codifies standards established under Executive Order 11990. Requires action to avoid (whenever possible) the long- and short-term impacts associated with the destruction of wetlands whenever there is a practical alternative that promotes preservation and restoration of the benefits and value of wetlands. If no alternative exists, impacts from implementation must be mitigated.	This is the least damaging practicable alternative to addressing site contamination and protecting wetland resources resources because contamination exists in wetlands and waterways, and it is the least costly and uses technologies most certain to achieve PRGs. Potential impacts to wetlands from the excavation or site restoration actions will be avoided to the extent possible, in accordance with this Order. Unavoidable impacts to wetlands from remedial actions will be mitigated.	Applicable
Wetlands	Fish and Wildlife Coordination Act of 1958, 16 U.S.C. § 661; Protection of Wildlife Habitats	Requires consultation with federal and state conservation agencies during planning and decision-making processes that may impact water bodies, including wetlands.	The Navy will consult with U.S. Fish and Wildlife Service should remedial activities involve the modification of wetlands or waterways.	Applicable
Floodplains	Floodplain Management, 40 C.F.R. § 6.302(b), Appendix A	This regulation codifies standards established under Executive Order 11988. EO 11988 requires that a cleanup in a floodplain not be performed unless a determination is made that no practicable alternative exists, potential harm must be minimized and action taken to restore and preserve the natural and beneficial values of the floodplain.	This alternative includes excavation within a wetland, which may be within the 100-year floodplain. No practicable alternative to this excavation exists. If the site is within the 100-year floodplain, (1) appropriate federal agencies would be contacted and allowed to review the proposed work plan for the remedial action prior to implementation of the action and (2) remedial activities would be scheduled and designed to minimize harm to the floodplains and prevent downstream flooding. Even If it is determined that the wetland is not within the 100-year floodplain, however, excavation work will be conducted in a manner that prevents downstream flooding within a downstream 100 year floodplain.	Applicable

State – Location Specific				
Wetlands	Wetlands Protection Act, 310 Chapters 10.51 – 10.60, specifically: § 10.54: Banks, § 10.55: Bordering Vegetated Wetlands, § 10.57: Land Subject to Flooding.	These regulations set performance standards for work within state-regulated wetland resources and their buffer zones (including within 100 feet of a bordering vegetated wetland and within 200 feet of a waterway).	Potential impacts to state-regulated wetland resources from the excavation or site restoration actions will be avoided to the extent possible. Unavoidable impacts to wetlands from remedial actions will be mitigated. Impacts to banks, bordering vegetated wetlands and land subject to flooding will be managed in accordance with these regulations.	Applicable
Wetlands	Massachusetts Endangered Species Act, 321 C.M.R. § 10.00	Prohibits the "taking" of any rare plants or animals listed as Endangered, Threatened, or Special Concern by the Massachusetts Division of Fisheries and Wildlife. This also protects designated endangered/threatened species populations.	No state-listed endangered species have been identified at the site. However, appropriate measures must be taken during remedial actions to ensure that a state-listed "species of special concern" identified in other areas of the base (eastern box turtle,) and habitat are not adversely affected by the remedial action.	Applicable
Federal – Action Specific				
All	Resource Conservation and Recovery Act ("RCRA"), 42 U.S.C. § 6901 *et seq.*	Federal standards used to identify, manage, and dispose of hazardous waste. Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions have been adopted by the Commonwealth of Massachusetts.	Waste generated as part of excavation or monitoring activities will be characterized as hazardous or non-hazardous. If determined to be hazardous waste, then it will be stored, transported, and disposed in accordance with these standards. Please refer to enforceable state standards below under Massachusetts' Hazardous Waste Management Rules.	Applicable
Soil, sediment	Toxic Substances Control Act, 40 C.F.R. § 761.61(c), PCB Remediation Waste	Risk-based standards for the sampling, cleanup and disposal of PCB remediation waste. Requires a decision by the Regional Administrator, EPA-New England, that activities to address PCB remediation waste will not pose an unreasonable risk of injury to health or the environment.	PCBs were not identified as a Contaminant of Concern at the Site. However, if the Pre-design Investigation reveals presence of PCB contamination in soils/sediment that poses a risk to human health or the environment, these standards will be used. As such, a written decision would be required by the Regional Administrator, EPA-New England, that activities to address PCB remediation waste will not pose an unreasonable risk of injury to health or the environment.	Applicable
Air	Clean Air Act, 42 U.S.C. § 112(b)(1), National Emission Standards for Hazardous Air Pollutants (NESHAPS), 40 C.F.R. Part 61	The regulations establish emission standards for 189 hazardous air pollutants. Standards set for dust control and other release sources.	Emissions of fugitive dust will be managed through engineering and other controls during remedial activities.	Applicable

Sediment/ Surface Water	National Recommended Water Quality Criteria), 33 U.S.C. § 1314(a), 40 C.F.R. Part 122.44)	NRWQC include (1) criteria for protection of human health from toxic properties of contaminants ingested through consumption of water and aquatic organisms, and (2) criteria for protection of aquatic life.	Contaminant concentrations in the wetlands will be measured during short-term monitoring to determine whether or not water quality is being impacted by site activities, and to ensure that water quality criteria are being met. Any discharge to surface waters during remedial activities will be designed and operated so that it will not cause or contribute to an exceedance of the NRWQC. Engineering controls would be used during excavation in and near drainage ditches to limit migration/runoff of sediment into surface water. Dewatering is not anticipated to be necessary since soils are to be excavated to a depth of 1 foot, and discharge of collected water to surface water is not anticipated. Post excavation sampling will determine that all contaminated sediments have been removed from the Site.	Relevant and Appropriate
Water	Clean Water Act, (33 U.S.C.. § 1251 *et seq.*); National Pollution Discharge Elimination System (NPDES) (40 C.F.R. §§ 122-125, 131)	These standards address water discharges that may be directed to surface water. Federal standards that are health-based and ecologically-based criteria developed for numerous carcinogenic and non-carcinogenic compounds. Used by State to establish water quality standards for protection of human health and aquatic life.	The disposal of any water waste generated in the remedial action (including dewatering of excavations) that is discharged to surface waters must be conducted consistent with this section, including discharge limitations, monitoring requirements and best management practices, as necessary. Dewatering, however, is not anticipated because maximum depth of the excavation is expected to be 1 foot and drainage ditches typically contain little water.	Applicable
State – Action Specific				
All	Hazardous Waste Regulations, 310 C.M.R. § 30.100	These regulations establish requirements for determining whether wastes are hazardous.	The determination of whether wastes generated as a part of this remedial action are hazardous will be done according to these regulations.	Applicable
All	Hazardous Waste Management Rules; Requirements for Generators, 310 C.M.R. § 30.300	These regulations contain requirements for generators of hazardous waste. The regulations apply to generators of sampling waste and also apply to the accumulation of waste prior to offsite disposal.	Wastes generated during remedial actions that are determined to be hazardous would be managed in accordance with these requirements.	Applicable
All	Hazardous Waste Management Rules - General standards for hazardous waste facilities (310 C.M.R. 30.500)	General facility requirements for waste analysis, security measures, inspections, personnel training, and closure/post-closure.	Remedial activities to address hazardous wastes will be conducted in accordance with this requirement. Specifically, storage of wastes on site will be conducted in accordance with this regulation. All workers will be properly trained. Closure/post-closure standards will be met since all wastes will be excavated and removed from the site.	Relevant and Appropriate
All	Hazardous Waste Regulations – Groundwater Protection, 310 C.M.R. 660	Facility standards for the protection of groundwater. Groundwater standards must be met beyond a point of compliance (310 C.M.R. § 669)	The protection of groundwater, as necessary, will be achieved by compliance with these standards.	Applicable
All	Hazardous Waste Regulations – Use of Containers 310 C.M.R. § 30.680	Establishes requirements for the management of containers, such as drums, that would hold field-generated hazardous wastes.	Any hazardous waste containers used during the remedial action would comply with these requirements.	Applicable

All	Hazardous Waste Management Rules, Management, Storage, and Treatment in Tanks, 310 C.M.R. § 30.690	These regulations establish requirements for the use and management of tanks at hazardous waste facilities.	It is anticipated that storage of hazardous waste will be done in a portable roll-off container. However, if the remedial action requires storage of hazardous waste in tanks, then management procedure requirements will be followed.	Applicable
Soil, sediment	Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas	Massachusetts Guidance that sets standards for preventing erosion and sedimentation.	Remedial actions will be managed to prevent erosion and sedimentation.	To Be Considered
Water	Massachusetts Clean Water Act (MGL Ch 21 §§ 26-53); Surface Water Discharge Permit Regulations (314 C.M.R. 3.04)	These regulations limit or prohibit discharges of pollutants to surface waters to ensure that the surface water quality standards of the receiving waters are protected and maintained or attained. Discharges to waters of the Commonwealth shall not result in exceedances of MA Surface Water Quality Standards (MSWQS).	Contaminant concentrations in the wetlands will be measured during short-term monitoring to determine whether or not water quality is being impacted by site activities, and to ensure that state water quality standards are being met. Any discharge to surface waters during remedial activities will be designed and operated so that it will not cause or contribute to an exceedance of the MSWQS. Engineering controls would be used during excavation in and near drainage ditches to limit migration/runoff of sediment into surface water. Dewatering is not anticipated to be necessary since soils are to be excavated to a depth of 1 foot, and discharge of collected water to surface water is not anticipated.	Applicable
Air	Massachusetts Ambient Air Quality Standards, 310 C.M.R. § 6.00	These regulations set primary and secondary standards for emissions of certain contaminants, including particulate matter.	Emissions of fugitive dust will be managed through engineering and other controls during remedial activities.	Applicable
Air	Massachusetts Air Pollution Control Regulations, 310 C.M.R. § 7.00	These regulations set emission limits necessary to attain ambient air quality standards, including standards for visible emissions (310 C.M.R. § 7.06), dust, odor and demolition (310 C.M.R. § 7.09 0, and noise (310 C.M.R. § 7.10).	Emissions of fugitive dust will be managed through engineering and other controls during remedial activities.	Applicable