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FINAL RECORD OF DECISION FOR OPERABLE UNIT 1 (OU 1) SITE 10 NSY PORTSMOUTH ME

9/1/2010

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RECORD OF DECISION

OPERABLE UNIT 1 - SITE 10

PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

NAVFAC
Naval Facilities Engineering Command

CONTRACT NUMBER N62472-03-D-0057

CONTRACT TASK ORDER 118

SEPTEMBER 2010

1.0 DECLARATION

1.1 SITE NAME AND LOCATION

Portsmouth Naval Shipyard (PNS)
USEPA ID No. ME7170022019
Operable Unit (OU) 1 – Site 10
Kittery, Maine

1.2 STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) presents the Selected Remedy for contamination at OU1 (see Figure 1-1), which was chosen by the Navy and United States Environmental Protection Agency (USEPA) in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 United States Code (USC) §9601 et seq., as amended by the Superfund Amendments and Reauthorization Act (SARA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 Code of Federal Regulations (CFR) Part 300 et seq., as amended. This decision is based on information contained in the Administrative Record for the site. The Maine Department of Environmental Protection (MEDEP) concurs with the Selected Remedy (see Appendix A).

FIGURE 1-1. SITE LOCATION MAP

1.3 ASSESSMENT OF SITE

The response action selected in this ROD is necessary to protect public health or welfare or the environment from actual or threatened releases of pollutants or contaminants from this site that may present an imminent and substantial endangerment to public health or welfare. A CERCLA action is required because concentrations of lead and antimony in soil pose unacceptable current and future risk to human receptors.

Groundwater at the site is brackish/saline and is not a potable source of water. Based on the risk evaluation in the OU1 Remedial Investigation (RI) Report, groundwater is not a medium of concern for OU1; however, the Navy agreed to include groundwater monitoring as a component of the Selected Remedy to provide a mechanism to address USEPA concerns on potential future risk.

The OU1 RI Report concluded that OU1 is not a current source of contamination to the offshore area; however, historical information for OU1 indicates that there were past releases of contamination from lead-acid battery operations to the offshore area. The offshore impact of these past releases is being addressed under OU4 (offshore area) through Monitoring Station 12.

1.4 DESCRIPTION OF SELECTED REMEDY

The major components of the Selected Remedy for OU1 include the following:

- Excavation of contaminated soil with lead concentrations greater than acceptable levels for construction workers and hypothetical future recreational users and occupational workers, around the drain lines within the crawl space of Building 238.
- Off-site disposal of excavated soil at an appropriate treatment, storage, and disposal (TSD) facility.
- Restoration of excavated areas to pre-existing elevations with clean soil.
- Implementation of land use controls (LUCs) through a LUC remedial design (LUC RD) to ensure maintenance of current site features to prevent future residential site use.
- Groundwater monitoring to confirm the lack of groundwater impacts from the soil removal action.
- Five-year site reviews to confirm that the remedy remains protective of human health and the environment.

The Selected Remedy eliminates unacceptable human health risks for construction workers, hypothetical future recreational users and occupational workers associated with contaminated soil in the crawl space of Building 238. There are no unacceptable risks to these receptors outside of Building 238. The Selected Remedy is expected to achieve substantial long-term risk reduction and allow the property to be used for the current and reasonably anticipated future industrial use of the site. This ROD documents the final remedial action for OU1 and does not include or affect any other sites at the facility. Implementation of this remedy is consistent with current use and the overall cleanup strategy for PNS to cleanup sites to support base operations.

1.5 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 and alternative treatment (or resource recovery) technologies to the maximum extent practicable. The Selected Remedy does not satisfy the statutory preference for remedies that use treatment as a principal element to reduce the toxicity, mobility, or volume of hazardous substances, pollutants, and contaminants. Based on the type of contamination at OU1 (lead and antimony), the location of the contamination within the crawl space beneath a building, and the small volume of contaminated soil to be removed from the site, the Navy concluded that it was impracticable to treat the chemicals of concern in a cost-effective manner.

Five-year site reviews would be required for OU1 because contamination would remain in excess of levels that allow for unrestricted use and unlimited exposure and would be conducted to confirm that the remedy remains protective of human health and the environment.

1.6 ROD Data Certification Checklist

The locations in Section 2.0, Decision Summary, of the information required to be included in the ROD are summarized in Table 1-1. Additional information can be found in the Administrative Record file for PNS.

Table 1-1. ROD Data Certification Checklist

Data	Location in ROD
Chemicals of concern (COCs) and their respective concentrations	Sections 2.5 and 2.7
Baseline risk represented by the COCs	Section 2.7
Cleanup levels established for COCs and the basis for these levels	Section 2.8
How source materials constituting principal threats are addressed	Section 2.11
Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the risk assessment	Section 2.6
Potential land and groundwater uses that will be available at the site as a result of the Selected Remedy	Section 2.12.3
Estimated capital, operating and maintenance, and total net present worth (NPW) costs; discount rate; and number of years over which the remedy costs are projected	Appendix F
Key factors that led to the selection of the remedy	Section 2.12.1

If contamination posing an unacceptable risk to human health or the environment is discovered after execution of this ROD and is shown to be a result of Navy activities, the Navy will undertake the necessary actions to ensure continued protection of human health and the environment.

1.7 Authorizing Signatures

The signatures provided on the following pages validate the selection by the Navy and USEPA of the final remedy for contamination at OU1. MEDEP concurs with the Selected Remedy.

L. Bryant Fuller III
Captain, United States Navy
Installation Commanding Officer
Portsmouth Naval Shipyard

9/20/10
Date

for [signature]

James T. Owens, III, Director
Office of Site Remediation and Restoration
USEPA Region 1

9-27-10

Date

2.0 DECISION SUMMARY

2.1 SITE NAME, LOCATION, AND BRIEF DESCRIPTION

PNS, USEPA ID number ME7170022019, is located on an island in the Piscataqua River, referred to on National Oceanic and Atmospheric Administration nautical charts as Seavey Island, with the eastern tip given the name Jamaica Island. PNS is located at the mouth to the Great Bay Estuary (commonly referred to as Portsmouth Harbor). PNS's ship-building history dates back to the 1800s, and PNS has been engaged in the construction, conversion, overhaul, and repair of submarines for the Navy since 1917.

OU1 is a small peninsula located in the Controlled Industrial Area (CIA) near the southern shore of PNS. Building 238 is located within OU1 on the southernmost extent of Floyd Street. The site is currently and has historically been located within an industrial area. The site is located on fill material that was placed prior to the 1920s to extend the previous shoreline in the area to its current limits. Building 238 was constructed in 1955 and was used for battery recharging operations that previously resulted in releases of hazardous materials. The primary chemical associated with CERCLA releases to soil and groundwater at OU1 is lead from releases (prior to approximately 1984) from lead-acid battery operations conducted in Building 238. The releases occurred under the crawl space of the building (by a former acid drain line) and from a former battery acid tank located outside the building. Currently, the building consists mostly of office space; some minor battery recharging work is still performed in the building, but the current recharging process does not generate chemical waste.

PNS is an active facility, and environmental investigations and remediation at the base are funded under the Environmental Restoration, Navy (ER, N) Program. The Navy is the lead agency for CERCLA activities at the facility, and USEPA and MEDEP are support agencies.

FIGURE 2-1. SITE FEATURES

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

Table 2-1 provides brief summaries of previous investigations at OU1. Results of these investigations indicated that elevated concentrations of lead and antimony are present in soil at the site.

TABLE 2-1. PREVIOUS INVESTIGATIONS AND SITE DOCUMENTATION

INVESTIGATION	DATE	ACTIVITIES
Tank Closure	1986	A leak was discovered in 1984 in an underground storage tank (UST) located outside of Building 238. The **tank and surrounding soil were removed** in 1986, and a 2-inch hole was discovered in the tank bottom. The drain lines to the tank are believed not to have been exhumed. Activities were performed under MEDEP supervision.
Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI)	1991	**Four soil samples** were collected from three separate soil borings locations around the former tank as part of the RFI.
Field Investigation of Site 10	1998	Two soil borings were installed and later converted to groundwater monitoring wells as part of the Site 10 Field Investigation. Two subsurface **soil samples** were collected from one of these borings. In addition, five surface soil samples were collected from the earthen floor beneath the overhead drain lines and from a depression in the earthen floor associated with the buried portion of the drain lines within the Building 238 crawl space. **Two groundwater monitoring** wells, one on-site and one upgradient, were installed, and one round of groundwater samples were collected.
Site 10 Additional Investigation Quality Assurance Project Plan	2001	The RFI data and 1998 Field Investigation data were evaluated as part of preparation of the Site 10 Additional Investigation Quality Assurance Project Plan to evaluate site-related chemicals. The evaluation indicated that further investigation was required to determine the nature and extent of residual inorganic (metals) contamination in soil and groundwater to evaluate associated site risks. **Organic contamination associated with the site was not found.**
Site 10 Additional Investigation Report	2003	Conducted to collect additional samples to determine the nature and extent of soil and groundwater metals contamination, to evaluate the risks to human receptors, and to evaluate whether contaminants in groundwater could migrate to the offshore to create current or future unacceptable impacts. **Soil and groundwater samples** were collected and analyzed for metals. Four surface and subsurface soil samples were collected in the area of the acid drain pipeline and at 12 randomly selected locations elsewhere at the site. Two groundwater samples were collected from each of three newly installed monitoring wells and two existing monitoring wells.
Site 10 Data Gap Investigation	2006	Conducted to collect data to determine the nature and extent of high-level lead contamination from past battery operations and to collect additional information to evaluate the potential for lead migration from onshore soil to the offshore area. Groundwater monitoring wells were sampled over three rounds at different tidal levels. **Soil samples** were collected at 35 locations on a grid-based plan and at an additional 22 locations under the building. Thirteen soil borings were installed and sampled outside of the building. Three new down-gradient monitoring wells were installed, and 17 soil samples were collected during installation.

TABLE 2-1. PREVIOUS INVESTIGATIONS AND SITE DOCUMENTATION

INVESTIGATION	DATE	ACTIVITIES
OU1 Remedial Investigation Report	2007	Prepared to assess the nature and extent of contamination and **risks associated with contamination at OU1** and concluded that the nature and extent of contamination in soil and groundwater was adequately defined. The risk assessment showed that under current site conditions, risks for construction worker exposure to lead in soil under Building 238 were unacceptable based on USEPA risk goals. Risks under future potential site conditions (if Building 238 was removed or modified, or if the site was developed for non-industrial uses) were unacceptable for exposure to soil under Building 238 for occupational workers, recreational users, and residential users and for soil outside Building 238 for residential users. Because the site is and has historically been in an industrial area of PNS, residential land use and recreational exposure are not considered likely future exposure pathways for OU1. Based on the evaluations of human health risk and migration potential, groundwater was determined not to be a medium of concern.
Feasibility Study (FS)	2010	Based on the nature and extent of soil contamination determined during the RI, an FS was conducted to develop and evaluate soil **remedial alternatives**.
Proposed Plan	2010	Presented the Navy's Preferred Alternative to address contamination.

On May 31, 1994, PNS was placed on the National Priorities List by the USEPA pursuant to CERCLA of 1980 and SARA of 1986. The National Priorities List is a list of uncontrolled or abandoned hazardous waste sites identified by USEPA as requiring priority remedial actions. The Navy and USEPA signed the **Federal Facility Agreement** (FFA) for PNS in 1999 (USEPA, 1999) to ensure that environmental impacts associated with past and present activities at PNS are thoroughly investigated and that the appropriate remedial action is pursued to protect human health and the environment. In addition, the FFA establishes a procedural framework and timetable for developing, implementing, and monitoring appropriate responses at PNS, in accordance with CERCLA (and SARA of 1986, Public Law 99-499), 42 USC §9620(e)(1); the NCP, 40 CFR 300; RCRA, 42 USC §6901 et seq., as amended by the Hazardous and Solid Waste Amendment of 1984, Executive Order 12580; and applicable state laws. There have been no cited violations under federal or state environmental law or any past or pending enforcement actions pertaining to the cleanup of OU1.

2.3 COMMUNITY PARTICIPATION

The Navy has been conducting community relations activities for the Installation Restoration (IR) Program at PNS since the program began. From 1988 to November 1994, Technical Review Committee meetings were held on a regular basis. In 1994, a Restoration Advisory Board (RAB) was established to increase public participation in the IR Program process. Many community relations activities for PNS involve the RAB, which historically met quarterly and recently has met two to four times a year. The RAB provides a forum for discussion and exchange of information on environmental restoration activities between the Navy, regulatory agencies, and the community, and it provides an opportunity for individual community members to review the progress and participate in the decision-making process for various IR Program sites including OU1.

The following community relations activities are conducted at PNS as part of the Community Relations Plan:

Information Repositories: The Public Library in Portsmouth, New Hampshire and the Kittery Town Hall in Kittery, Maine are the designated information repositories for the PNS IR Program.

Key Contact Persons: The Navy has designated information contacts related to PNS. Materials distributed to the public, including any fact sheets and press releases, will indicate these contacts. The Navy will maintain the site mailing list to ensure that all interested individuals receive pertinent information on the cleanup.

Mailing List: To ensure that information materials reach the individuals who are interested in or affected by the cleanup activities at PNS, the Navy maintains and regularly updates the site mailing list.

Regular Contact with Local Officials: The Navy arranges regular meetings to discuss the status of the IR Program with the RAB.

Press Releases and Public Notices: The Navy issues press releases and public notices as needed to local media sources to announce public meetings and comment periods and the availability of reports and to provide general information updates.

Public Meetings: The Navy conducts informal public meetings to keep residents and town officials informed about cleanup activities at PNS, and at significant milestones in the IR Program. Meetings are conducted to explain the findings of RIs; to explain the findings of FSs; and to present Proposed Plans, which explains the preferred alternatives for cleaning up individual sites.

Fact Sheets and Information Updates: The Navy develops fact sheets to mail to public officials and other interested individuals and/or to use as handouts at the public meetings. Fact sheets are used to explain certain actions or studies, to update readers on revised or new health risks, or to provide general information on the IR Program process.

Responsiveness Summary: The Responsiveness Summary for the Proposed Plan summarizes public concerns and issues raised during the public comment period and documents the Navy's formal responses. The Responsiveness Summary may also summarize community issues raised during the course of the FS.

Announcement of the ROD: The notice of the final ROD will be published by the Navy in a major local newspaper prior to commencement of the selected remedial action.

Public Comment Periods: Public comment periods allow the public an opportunity to submit oral and written comments on the proposed cleanup options. Citizens have at least 30 days to comment on the Navy's preferred alternatives for cleanup actions as indicated in the Proposed Plan.

Technical Assistance Grant: A Technical Assistance Grant from the USEPA can provide up to $50,000 to a community group to hire technical advisors to assist them in interpreting and commenting on site reports and proposed cleanup actions. Currently, a Technical Assistance Grant has been awarded for a community organization.

Site Tours: The Office of Public Affairs periodically conducts site tours for media representatives, local officials, and others.

A notice of availability of the Proposed Plan for OU1 (Navy, 2010) was published on June 17, 2010, in *Portsmouth Herald and Foster's Daily Democrat* newspapers. The Proposed Plan and other documents related to these sites are available to the public at the PNS Information Repositories located at the Portsmouth Public Library in Portsmouth, New Hampshire, and the Kittery Town Hall located in Kittery, Maine. The notice also announced the start of the 30-day comment period that ended on July 16, 2010. A copy of the notice and the Proposed Plan are included in Appendix B of this ROD.

The Proposed Plan notice of availability invited the public to attend a public meeting at the Kittery Town Hall in Kittery, Maine on June 30, 2010. The public meeting presented the proposed remedies and solicited oral and written comments. At the public meeting, personnel from the Navy, USEPA, and the MEDEP answered questions from the attendees during the informal portion of the meeting. In addition, public comments on the Proposed Plan were formally received and transcribed. The transcript from the public meeting is provided in Appendix C. Responses to the comments received during the public comment period are provided in the Responsiveness Summary in Section 3.0.

2.4 SCOPE AND ROLE OF OPERABLE UNIT

OU1 is part of a comprehensive environmental investigation and cleanup program currently being performed at PNS. In accordance with Section 120(e) of CERCLA, an FFA was entered into between the Navy and USEPA in 1999. Eleven IR Program sites within seven OUs are currently identified at PNS in the IR Program. Final decisions regarding remedial actions have been made for Sites 8, 9, 11, and OU3 as documented in RODs. Sites in the RI/FS stage include Sites 5, 6, 29, 31, 32, 34. A non-time-critical removal action is currently being conducted at Site 30. The Site Management Plan for PNS further details the schedule for IR Program activities and is updated annually.

Previously, Site 21 – Former Acid/Alkaline Drain Tank was included in OU1, but **No Further Action** (Navy, February 2008) was approved for this site because there was no residual contamination from the site that posed an unacceptable risk.

OU1 addresses past releases of contamination from historical battery recharging operations in Building 238. Investigations at OU1 indicated the presence of soil contamination that poses unacceptable risk to human health. Previous remedial actions at the site include the tank closure and removal of the UST and surrounding soil in 1986 under MEDEP supervision. The remedy documented in this ROD will achieve the Remedial Action Objectives (RAOs) for OU1, as listed in Section 2.8. Implementation of this remedy will allow continued use of the site to support base operations, which is consistent with current and reasonably anticipated future industrial use of the site.

2.5 SITE CHARACTERISTICS

2.5.1 Physical Characteristics

OU1 is located within the CIA of PNS, where much of the facility's submarine maintenance activities are conducted. The area is relatively flat, with elevations ranging from 104 feet along Berth 4 to 107 feet north of Building 238. The area of OU1 not occupied by Building 238 and the attached loading dock is covered by asphalt paving. The Piscataqua River forms the eastern, southern, and a portion of the western boundary of the site. The OU1 shoreline along the Piscataqua River from the west to the southeast is bounded by a quay wall of granite blocks. Buildings 303 and 178 are located west of the site, and additional operational buildings are located north of the site. Surface drainage is via storm drains that discharge to storm water outfalls into the Piscataqua River. The area south of Building 238 is within the 100-year flood zone (which is at an approximate elevation of 105 feet).

The crawl space beneath Building 238 has an earthen floor and is present beneath the majority of the building and the loading dock. Current and abandoned utility lines, piping, and building supports are present within the crawl space. Access to the crawl space for maintenance is through six openings (windows). Groundwater at the site is tidally influenced and is brackish or saline. The ground elevation of the earthen floor (approximately 100 feet) is 5 to 6 feet below the ground elevation outside the building, and groundwater completely covers the floor of the crawl space at tidal levels greater than mean high tide.

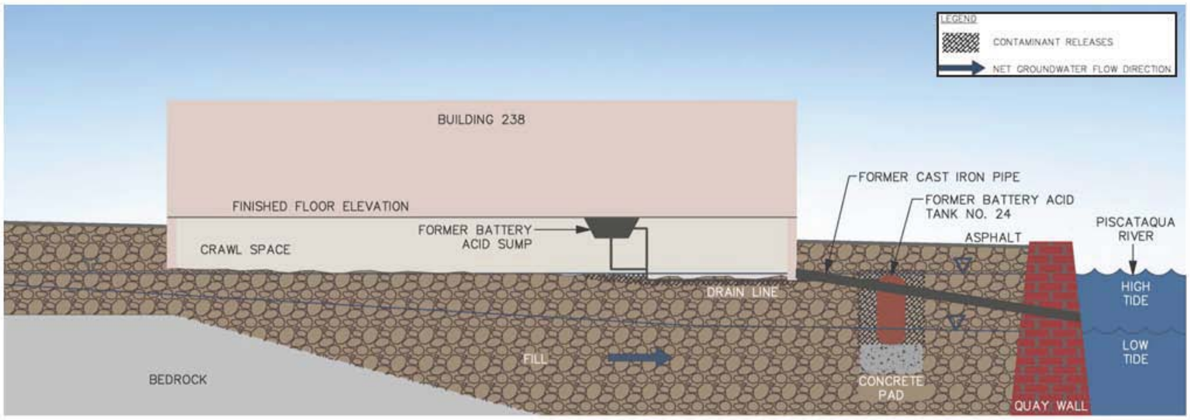
Located under Building 238, approximately 20 feet from the southern end, a large battery acid sump (approximately 16 by 20 feet) with slanted sides extends beneath the floor of Building 238 into the crawl space. A drain emerges from the center of the bottom of the sump, joins another drain emerging from the building floor outside the sump, and enters the earthen floor. The drain lines, previously connected to the former UST south of Building 238, enter the ground within a channel depression. The depression is approximately 5 feet wide and extends from the area of the sump to the southern wall of the crawl space.

The primary chemical associated with CERCLA releases at OU1 is lead. Prior to 1984, pipelines and the former battery acid UST associated with battery recharging operations within Building 238 apparently leaked, resulting in the release of battery acid containing lead to subsurface soil tidally saturated zone part of the site.

2.5.2 Conceptual Site Model

Figure 2-2 presents the OU1 conceptual site model, which identifies contaminant sources, contaminant release mechanisms, and transport routes. The primary source of contamination at OU1 was past releases from lead-battery operations to tidally saturated zone soil from pipes in the crawl space and to tidally saturated and saturated zone soil from the tank leak. These releases ended in the 1980s when use of the piping and tank was discontinued and site operations were only conducted within Building 238.

FIGURE 2-2. CONCEPTUAL SITE MODEL



Prior to 1974, waste acid was apparently discharged via an underground pipeline to an industrial waste outfall located in Berth 4, south/southwest of Building 238. The condition of this cast-iron pipeline during its operation and at the time it was abandoned is unknown. In 1974, acidic discharges from battery operations in Building 238 were directed into a lead-acid drain pipeline and temporarily stored in an underground storage tank outside the building. The acid flowed from the sump through a drain in the crawl space over a distance of approximately 20 feet, and exited the building foundation to a UST (Battery Acid Tank No. 24). A leak was discovered in the tank in 1984. The tank and surrounding soil were removed in 1986, and a 2-inch hole was discovered in the tank bottom. The drain lines to the tank are believed not to have been exhumed. MEDEP did not require a cleanup action at the time of the tank removal (Tetra Tech, March 2000).

The most significant migration of lead at OU1 occurred during the initial release of acid from the drain lines into the surrounding soil or from the tank into the tidally influence groundwater. During this time, dissolution of lead and/or migration of contaminated soil particles from the tidally saturated areas of contamination may have occurred.

Soil at the site is covered by asphalt or is within the crawl space under Building 238. Various utilities are in the crawl space, and construction workers conduct utility repair work at the site as needed. Therefore, occupational users and construction workers are considered current site users. Access to the crawl space is restricted to construction workers who need to repair utilities under the building, and entry to the crawl space requires approval from the PNS Environmental Department. Current occupational workers (production workers at Building 238) are not exposed to soil or groundwater because of the asphalt covering the soil outside Building 238 and because the crawl space under Building 238 is not accessible to anyone other than construction workers. There are no current recreational or residential uses of the site. Occupational, recreational, or residential exposure to site contamination could occur if current site features, including asphalt paving and Building 238, were removed or modified exposing soil.

2.5.3 Nature and Extent and Fate and Transport of Contamination

High-level lead contamination was detected around areas where piping and tank leaks occurred, lead concentrations decreased rapidly away from these areas. However, further away from these areas, soil at the site may have been impacted by site-related releases, or the lead concentrations in these areas could represent the general industrial nature of the site. The site boundary is shown on Figure 2-1.

Site conditions and groundwater concentrations support that there is limited mobilization of lead from soil to groundwater (in either particulate or dissolved form) and that site groundwater migrating to the offshore would not adversely impact the offshore. Therefore, no environmental impacts are expected to occur because of migration of groundwater from OU1 to the offshore.

2.6 CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

The current land use patterns at PNS are well established and are not expected to change in the foreseeable future. OU1 is currently and has historically been located within an industrial area. Building 238, located at OU1, consists of office space; some minor battery recharging work is still performed in the building, but the recharging process does not generate chemical waste. Future use of the site is expected to be consistent with the current use, as an industrial area.

PNS does not use groundwater for any purpose. Potable water is supplied to PNS from the Kittery Water District, which uses surface reservoirs located in the vicinity of York, Maine. Groundwater at the site is tidally influenced and is brackish or saline and considered **not suitable for human consumption.**

2.7 SUMMARY OF SITE RISKS

The baseline risk assessment estimates what risks the site poses if no action was taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. A human health risk assessment (HHRA) was conducted as part of the RI (TtNUS, July 2007) to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with the site. Ecological risks were not calculated for OU1 because the site is currently and has historically been located within an industrial area of PNS, and no ecological habitat has been identified at the site. Therefore, there are no onshore concerns for ecological risk for exposure to site contaminants.

2.7.1 Summary of Human Health Risk

The quantitative HHRA was conducted using inorganic chemical concentrations detected in soil and groundwater samples. Key steps in the risk assessment process included screening for contaminants of potential concern (COPCs), exposure assessment, toxicity assessment, and risk characterization. Tables summarizing data used in the HHRA and associated results are presented in Appendix D.

Identification of Contaminants of Potential Concern

Tables 3.1 through 3.3 from the 2007 RI (included in Appendix D of this document) present exposure point concentrations (EPCs) for the COPCs identified in soil outside and in the crawl space of Building 238. EPCs are the concentrations used in the risk assessment to estimate exposure and risk from each COPC. For each COPC, the table includes the range of detected concentrations, frequency of detection (i.e., the number of times the chemical was detected in samples collected at the site), EPC, and how the EPC was derived. Based on the statistical distributions of the data and the results of preliminary calculations, maximum detected concentrations or 95-percent upper confidence limits (UCLs) on the mean were used as the EPCs for OU1 COPCs, except for lead where the arithmetic average was used as the EPC.

For lead, the USEPA-recommended values of 400 mg/kg for lead-contaminated soil in a residential setting where children are frequently present (1994) and 800 mg/kg for commercial/industrial sites were used as the screening values for lead in soil for residential and industrial use, respectively. Lead screening values for other receptors were determined using a modeling program as discussed further in the Toxicity Assessment.

Exposure Assessment

During the exposure assessment, current and potential future exposure pathways through which humans might come into contact with the chemicals identified in the previous step were evaluated. The results of the exposure assessment for OU1 were used to refine the conceptual site model (Figure 2-2). Surface and subsurface soil was identified as the only medium of concern. The HHRA evaluated risks for exposure to surface soil [0 to 2 feet below ground surface (bgs)] and surface and subsurface soil above the water table (to a depth of 6 feet bgs outside the building and a depth of 1 to 2 feet bgs in the crawl space). The depth to the water table differs by approximately 5 feet because the ground surface outside the building is approximately 5 feet higher than the ground surface in the crawl space. Below approximately 6 feet bgs outside the building and 2 feet bgs in the crawl space there was little to no soil for exposure, is within the tidally saturated or saturated zone, and is not within a human health exposure area. The HHRA considered receptor exposure under industrial land use (construction and occupational workers) and future hypothetical residential or recreational land use (Table 2-2). Potential exposure routes for soil include incidental ingestion (swallowing small amounts of soil), dermal contact (skin exposure), and/or inhalation (breathing) of airborne soil particulates. Based on the site conditions, the HHRA evaluated OU1 risks based on two exposure units, soil within the crawl space under Building 238 and soil outside of Building 238.

Table 2-2. Receptors and Exposure Routes Evaluated in the HHRA

Receptor	Exposure Route
Construction Workers (current/future land use)	Soil dermal contact Soil ingestion Inhalation of air/dust/emissions Groundwater dermal contact (during excavation)
Occupational Workers (future land use)	Soil dermal contact (surface soil) Soil ingestion (surface soil) Inhalation of air/dust/emissions (surface soil)
Recreational Users - Child and Adult (future land use)	Soil dermal contact (surface soil) Soil ingestion (surface soil) Inhalation of air/dust/emissions (surface soil)
Residents - Adult/Children (future land use)	Soil dermal contact (surface soil) Soil ingestion (surface soil) Inhalation of air/dust/emissions (surface soil)

Toxicity Assessment

Toxicity assessment involves identifying the types of adverse health effects caused by exposure to site COPCs and determining the relationship between the magnitude of exposure and the severity of adverse effects (i.e., dose-response relationship) for each COPC. Based on the quantitative dose-response relationships determined, toxicity values for both cancer [cancer slope factor (CSF)] and non-cancer [reference dose (RfD)] effects were derived and used to estimate the potential for adverse cancer and non-cancer effects. No carcinogens were identified as COPCs for soil or groundwater at OU1.

Tables 5.1 and 5.2 in Appendix D (from the 2007 HHRA) provide non-carcinogenic hazard information relevant to the OU1 COPCs for oral/dermal and inhalation routes of exposure. At this time, CSFs are not available for the dermal route of exposure; therefore, dermal slope factors were extrapolated from oral values. An adjustment factor is sometimes applied to extrapolate the dermal values from oral values, dependent on how well the chemical is absorbed via the oral route. Adjustment factors used for OU1 ranged from 0.07 to 0.15

Because published toxicity criteria are not available for lead, **exposure to lead in soil** was evaluated using the Integrated Exposure Uptake Biokinetic (IEUBK) Model and Technical Review Workgroup (TRW) Adult Lead Model for residential and non-residential exposure scenarios, respectively, as recommended by USEPA. The blood-lead concentration of a receptor is considered a key indicator of the potential for adverse health effects from lead contamination. The IEUBK and TRW models calculate the probability of a receptor's blood-lead level exceeding 10 µg/dL, the minimum concentration considered to be a "concern." In addition, the USEPA goal is to limit the risk (i.e., probability) of exceeding a 10 µg/dL blood-lead concentration to 5 percent of the population. Average lead concentrations at OU1, as well as default parameters for some input parameters, were used in the evaluations. The IEUBK Model for lead is designed to estimate blood levels of lead in children (under 7 years of age), and using the TRW model, adult exposure to lead in soil is addressed by evaluating the relationship between site soil lead concentrations and blood-lead concentrations in the developing fetuses of adult women. No models are currently available to evaluate periodic exposure of adolescent trespassers/recreational users to lead; therefore, the results of the IEUBK Model for children were used to qualitatively assess exposure of this receptor because potential adverse effects from exposure to lead are expected to be of a lesser magnitude for adolescent trespassers than for children. **Results** of the IEUBK and TRW Adult Lead Model analyses are summarized in Table 2-3. Under current land use, risks for exposure of construction workers to soil outside Building 238 were acceptable, but risks associated with exposure to lead in soil under Building 238 were unacceptable. Under future land use, risks to hypothetical future child residents for exposure to lead in soil outside Building 238 (0 to 2 feet bgs) were unacceptable; risks for future occupational workers and adult recreational users were acceptable. Risks to all potential future receptors for exposure to lead in soil under Building 238 were unacceptable.

TABLE 2-3. IEUBK AND ADULT LEAD MODEL RESULTS

Exposure Unit	Average Lead Concentration (mg/kg) [1]	Predicted Geometric Mean Blood-Lead Level (µg/dL)	Probability of the Child Blood-Lead Exceeding 10 µg/dL (percent)	Risks Unacceptable?
IEUBK Model Results – Child Resident				
Surface Soil Outside Building 238 (0 - 2 feet bgs)	766	8	35	Yes
Surface/Subsurface Soil Outside Building 238 (0 - 6 feet bgs)	884	9	43	Yes
Surface/Subsurface Soil Under Building 238 (0 - 6 feet bgs)	34600	82	100	Yes
Surface Soil Outside Building 238 (0 - 2 feet bgs)	766	8	35	Yes
Adult Lead Model Results – Construction Worker				
Surface Soil Outside Building 238 (0 - 2 feet bgs)	766	3	5	No
Surface/Subsurface Soil Outside Building 238 (0 - 6 feet bgs)	884	4 or less [2]	5 or less [2]	No [2]
Surface/Subsurface Soil Under Building 238 (0 - 6 feet bgs)	34600	16	69	Yes
Adult Lead Model Results – Occupational Worker				
Surface Soil Outside Building 238 (0 - 2 feet bgs)	766	3	2	No
Surface/Subsurface Soil Outside Building 238 (0 - 6 feet bgs)	884	3	2	No
Surface/Subsurface Soil Under Building 238 (0 - 6 feet bgs)	34600	36	96	Yes
Adult Lead Model Results – Recreational User				
Surface Soil Outside Building 238 (0 - 2 feet bgs)	766	2	1	No
Surface/Subsurface Soil Outside Building 238 (0 - 6 feet bgs)	884	2	1	No
Surface/Subsurface Soil Under Building 238 (0 - 6 feet bgs)	34600	14	62	Yes

1. The average lead concentrations used in the risk assessment are based on laboratory data only. If laboratory and field lead (based on converted XRF concentrations) are used, the average concentrations in surface soil and surface/subsurface soil outside the building are 700 and 802 mg/kg, respectively. The average concentration under the building is approximately 9,500 mg/kg.
2. Based on the results of the uncertainty analysis provided in the RI, risks are not unacceptable for the construction worker.

Risk Characterization

During the risk characterization, the outputs of the exposure and toxicity assessments are combined to characterize the baseline risk at the site if no action was taken to address the contamination. No carcinogenic COPCs were identified at OU1. Potential non-cancer hazards were calculated based on reasonable maximum exposure (RME) scenario that assumes the maximum level of human exposure that could reasonably be expected to occur.

The potential for non-carcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., a lifetime) to an RfD derived for a similar exposure period. An RfD represents a level to which an individual may be exposed that is not expected to cause any deleterious effect. The ratio of the exposure dose to its RfD is called a Hazard Quotient (HQ). An HQ less than 1 indicates that a receptor's dose of a single contaminant is less than the RfD and that toxic non-carcinogenic effects from that chemical are unlikely. The hazard index (HI) is generated by adding the HQs for all chemicals that affect the same target organ (e.g., liver) or that act through the same mechanism of action within a medium or across all media to which a given individual may be reasonably exposed. An HI less than 1 indicates that, based on the sum of all HQs from different contaminants and exposure routes, toxic non-carcinogenic effects from all contaminants are unlikely. An HI greater than 1 indicates that site-related exposures may present a risk to human health. The HQ is calculated as follows:

$$\text{Non-cancer HQ} = \text{CDI} / \text{RfD}$$

where: CDI = chronic daily intake
RfD = reference dose

CDIs and RFDs are expressed in the same units and represent the same exposure period (i.e., chronic, sub-chronic, or short-term).

Tables 7.1 through 7.12 in Appendix D provide RME non-cancer HQs for the receptors and routes of exposure, and total HIs for these routes of exposures calculated in the HHRA. Total HIs for these routes ranged from 0.0008 for recreational adult users to 0.5 for construction workers. The cumulative HIs were less than unity (1.0) for these receptors indicating that adverse non-carcinogenic health effects are not anticipated for these receptors under the defined exposure conditions. Non-cancer HQs and HIs for hypothetical future receptors exposed to soil in the crawl space were also calculated. Only the HI for a hypothetical future resident exposed to soil in the crawl space had an HI greater than unity due to antimony concentrations in soil, indicating the potential for adverse non-carcinogenic health effects for this receptor.

Non-cancer risk estimates (total HIs) developed on a target organ/effect basis for all receptors evaluated were less than unity (1.0), except for antimony. Potential health risks were estimated for potential receptors under current and future land use at OU1. Under current land use, risks for exposure of construction workers to soil outside Building 238 were acceptable, but risks for exposure to lead in soil under Building 238 were unacceptable. Under future land use, risks to hypothetical future child residents for exposure to lead in soil outside Building 238 (0 to 2 feet bgs) were unacceptable; risks for future occupational workers and adult recreational users were acceptable. Risks to all potential receptors for exposure to lead in soil under Building 238 were unacceptable. In addition risks associated with residential (child) exposure to antimony in soil under Building 238 were unacceptable.

No major sources of **uncertainty**, other than those typically associated with risk assessment estimates, were identified for the OU1 HHRA

2.7.2 Basis for Action

Unacceptable risks due to levels of antimony and lead were estimated for human receptors at OU1. Because risks were identified under current and future potential land use scenarios for human receptors, a 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 that may present an imminent and substantial endangerment to public health or welfare.

2.8 REMEDIAL ACTION OBJECTIVES

RAOs are medium-specific goals that define the objective of conducting remedial actions to protect human health and the environment. RAOs specify the COCs, potential exposure routes and receptors, and acceptable concentrations (i.e., cleanup levels) for a site and provide a general description of what the cleanup will accomplish. RAOs typically serve as the design basis for the remedial alternatives described in Section 2.8. The RAOs developed for OU1 considering current and future land use at PNS are as follows:

- Prevent construction worker, and future potential recreational user and occupational worker exposure through ingestion, dust inhalation, and dermal contact to unacceptable levels of lead-contaminated soil under Building 238.
- Prevent future potential residential user exposure through ingestion, dust inhalation, and dermal contact to unacceptable levels of lead-contaminated soil under and outside Building 238.
- Prevent future potential residential user exposure through ingestion, dust inhalation, and dermal contact to unacceptable levels of antimony-contaminated soil under Building 238.

The lead remediation goals, for construction and occupational workers and recreational users and antimony remediation goal for resident, for exposure to soil within the crawl space were developed in the OU1 FS based on the risk assessment and established for lead and antimony in soil within the crawl space under Building 238. The remediation goal for future resident for exposure to lead within the crawl space and outside the building is based on the Office of Solid Waste and Emergency Response (OSWER) soil screening level of 400 mg/kg for residential land use (USEPA, July 1994).

The following remediation goals were established for lead in soil within the crawl space under Building 238:

- Construction Worker – 2,000 mg/kg
- Future Occupational Worker – 1,600 mg/kg
- Future Adult Recreational User – 4,600 mg/kg
- Future Resident – 400 mg/kg

The following remediation goals were established for antimony in soil within the crawl space under Building 238:

- Future Resident –73 mg/kg

The following remediation goal for lead was established for the soil outside Building 238 based on the OSWER soil screening level of 400 mg/kg for residential land use (USEPA, July 1994):

- Future Resident – 400 mg/kg

Risks to construction workers, occupational workers, and recreational users exposed to soil outside Building 238 are acceptable; therefore, remediation goals were not developed for these receptors for exposure to soil outside Building 238.

By remediating soil with concentrations greater than the remediation goals in the identified remediation areas, the resulting soil concentrations, or EPCs, would be less than remediation goals and would pose no unacceptable risks for the targeted receptors (construction workers, occupational workers, recreational users, and residential users). The depths of concern are based on the exposure depths evaluated in the

HHRA, surface soil from 0 to 2 feet bgs and subsurface soil to the water table (approximately 6 feet bgs outside Building 238 and 3 feet bgs in the crawl space).

2.9 DESCRIPTION OF ALTERNATIVES

To address potential unacceptable human health risks associated with contamination at OU1, a **preliminary technology screening** evaluation was conducted in the FS. The general response actions are presented in Table 2-4. In-situ treatment options were not considered based on the type and location of contamination at OU1.

TABLE 2-4. GENERAL RESPONSE ACTIONS

GENERAL RESPONSE ACTION	TECHNOLOGY	PROCESS OPTIONS
No Action	None	Not Applicable
Limited Action	LUCs	Active Controls: Physical Barriers/ Security Guards
		Passive Controls: Land Use Restrictions
	Monitoring	Sampling and Analysis
Containment	Surface Protection	Asphalt or Multimedia Cover
Removal	Bulk Excavation	Excavation
Ex-Situ Treatment	Physical/Chemical	Chemical Stabilization/Solidification
Disposal	Landfill/Recycling	Off-Site Landfilling

The technologies and process options retained after detailed screening were assembled into five **remedial alternatives**. Consistent with the NCP, the no action alternative was evaluated as a baseline for comparison with other alternatives during the comparative analysis. Table 2-5 describes the major components and provides estimated costs for each remedial alternative identified for OU1.

TABLE 2-5. SUMMARY OF REMEDIAL ALTERNATIVES EVALUATED

ALTERNATIVE	COMPONENTS	DETAILS	COST
Alternative 1: **No Action** *No action to address contamination and no use restrictions*	No action would be conducted	Five-year reviews would not be included under the No Action Alternative.	**Cost:** $0
Alternative 2: **LUCs and Monitoring** *Current and future land use restrictions and groundwater monitoring.*	LUCs	Implementation of access restrictions to the Building 238 crawl space and prohibition of future residential use of the site.	**Capital:** $171,000 **30-Year NPW:** $393,000 **Discount Rate:** 7% **Time Frame:** 1 month
		Maintenance of current site features including Building 238, asphalt pavement, and warning signs prohibiting unauthorized entrance to the crawl space.	
		Implementation of requirements for the management of excavated soil during potential future construction activities at OU1.	
	Monitoring	Monitoring of groundwater conducted annually for 30 years to confirm that lead in soil is not migrating to groundwater at unacceptable levels.	
Alternative 3: **Surface Protection with LUCs and Monitoring** *Surface protection for contaminated soil around the drain lines within the crawl space, LUCs, and monitoring.*	Surface Protection	Placement, inspection, and maintenance of a barrier composed of filter fabric and gravel over an area of approximately 3,500 square feet to prevent direct exposure to soil around the drain lines with lead concentrations greater than acceptable levels for construction workers conducting utility repairs.	**Capital:** $396,000 **30-Year NPW:** $618,000 **Discount Rate:** 7% **Time Frame:** 2 months
	LUCs	Implementation of access restrictions to the Building 238 crawl space and prohibiting future residential use of the site.	
		Maintenance of current site features including Building 238, asphalt pavement, and warning signs prohibiting unauthorized entrance to the crawl space.	
		Implementation of requirements for proper management of excavated soil during potential future construction activities at OU1.	
	Monitoring	Monitoring of groundwater conducted annually for 30 years to confirm that lead in soil is not migrating to groundwater at unacceptable levels.	
Alternative 4: **Limited Excavation and Disposal with LUCs and Monitoring** *Excavation of contaminated soil around the drain lines within the crawl space, LUCs, and monitoring.*	Excavation and Off-Yard Disposal	Excavation and off-yard disposal of 390 cubic yards (cy) of soil around the drain lines within the crawl space under Building 238 with lead concentrations greater than acceptable levels for construction workers, occupational workers, and hypothetical future recreational users.	**Capital:** $1,083,000 **30-Year NPW:** $1,212,000 **Discount Rate:** 7% **Time Frame:** 4 months
	LUCs	Maintenance of current site features including Building 238 and asphalt pavement.	

TABLE 2-5. SUMMARY OF REMEDIAL ALTERNATIVES EVALUATED			
ALTERNATIVE	COMPONENTS	DETAILS	COST
Alternative 4 (continued)	LUCs (continued)	Implementation of LUCs to prohibit future residential use of the site.	
		Implementation of requirements for proper management of excavated soil during potential future construction activities at OU1.	
	Monitoring	Monitoring of groundwater until it has been determined that migration of lead contamination in soil would not result in groundwater concentrations greater than acceptable levels for human health and the environment. It is assumed that two annual rounds of post-remedial monitoring would be necessary to make the determination.	
Alternative 5: Excavation and Disposal *Excavation and off-yard disposal of contaminated soil and site restoration*	Excavation and Off-yard Disposal	Excavation and off-yard disposal of 6,300 cy of soil within the crawl space and outside Building 238 (entire area within the site boundary) to prevent unacceptable exposure to contaminated soil for all current and future receptors.	**Capital:** $6,155,000 **30-Year NPW:** $6,155,000 **Time Frame:** 31 months
	Site Restoration	Backfilling of excavated areas with clean soil. Excavated areas outside the building would be graded and paved with asphalt pavement to restore the site to existing conditions.	

2.10 COMPARATIVE ANALYSIS OF ALTERNATIVES

Table 2-6 and subsequent text in this section summarize the comparison of the remedial alternatives with respect to the **nine CERCLA evaluation criteria** outlined in the NCP at 40 CFR 300.430 (e)(9)(iii) and categorized as threshold, primary balancing and modifying. Further information on the detailed comparison of remedial alternatives is presented in the OU1 FS.

TABLE 2-6. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

CERCLA CRITERION	ALTERNATIVE 1 NO ACTION	ALTERNATIVE 2 LUCS AND MONITORING	ALTERNATIVE 3 SURFACE PROTECTION WITH LUCS AND MONITORING	ALTERNATIVE 4 LIMITED EXCAVATION AND DISPOSAL WITH LUCS AND MONITORING	ALTERNATIVE 5 EXCAVATION AND DISPOSAL
Overall Protection of Human Health and the Environment	○	▣	▣	●	●
Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)	NA	●	●	●	●
Long-Term Effectiveness and Permanence	○	▣	▣	●	●
Reduction of Toxicity, Mobility, and Volume of Contaminants through Treatment	○	○	○	Only if treatment is required for transportation or disposal	Only if treatment is required for transportation or disposal
Short-Term Effectiveness	NA	●	▣	▣	○
Implementability	NA	●	▣	▣	○
<u>Estimated Costs</u>					
Capital Cost	$0	$171,798	$396,136	$1,083,306	$6,154,861
30-Year NPW	**$0**	**$393,000**	**$618,000**	**$1,212,000**	**$6,155,000**
State Acceptance	The MEDEP concurs with Alternative 4, and a letter of concurrence is included in Appendix A				
Community Acceptance	No opposition to Alternative 4 was received from the RAB members or community members.				

● - High ▣ - Medium ○ - Low NA – Not applicable

Threshold Criteria

Overall Protection of Human Health and the Environment. The no action alternative would not achieve RAOs and would not protect human health and the environment; therefore, it is not discussed further in this ROD. All of the other alternatives would be protective of human health and the environment.

Although Alternative 5, would be the most protective of human health because it would permanently remove all soil causing an unacceptable risk through excavation and off-site disposal, it is not consistent with current and reasonably anticipated future land use. Both Alternatives 3 and 4 are consistent with the current and reasonably anticipated industrial land use scenario and would be protective of human health and the environment. Both alternatives would prevent construction workers, and hypothetical future recreational users and occupational workers from exposure to unacceptable levels of lead-contaminated soil within the crawl space. LUCs would be required under these two alternatives to restrict future site use and soil disturbance. Groundwater monitoring would be conducted to confirm that lead in soil is not migrating to groundwater at unacceptable levels. Alternative 2 would be the least protective of human health because contamination would remain on-site and the remedy would rely on administrative controls.

Compliance with ARARs. ARARs include any federal or state standards, requirements, criteria, or limitations determined to be legally applicable or relevant and appropriate to the site or remedial action. Alternatives 2 through 5 would meet all chemical-, location-, and action-specific ARARs.

Primary Balancing Criteria

Long-Term Effectiveness and Permanence. Alternative 5 would be the most effective in the long term because there would be no residual contamination that requires site use restrictions. Alternative 4 would provide long-term effectiveness and permanence by removing contaminated soil so that residual concentrations are at acceptable levels for current and future planned industrial uses. LUCs would be implemented to restrict future hypothetical residential use and five-year reviews conducted to evaluate the continued adequacy of the remedy. Although soil contaminant concentrations at OU1 would not be reduced by Alternatives 2 and 3, risks to human health would be minimized through implementation and maintenance of LUCs and placement of surface protection over highly contaminated soil within the crawl space and implementation and maintenance of LUCs, respectively. Groundwater monitoring would be conducted under Alternatives 2, 3, and 4 to confirm that lead in soil is not migrating to groundwater at unacceptable levels. Soil contaminant concentrations at OU1 would be reduced by removal of the highly contaminated soil within the crawl space under Alternative 4 and removal of all contaminated soil throughout OU1 under Alternative 5. The soil would be disposed at an approved off-yard TSD facility. LUCs would be required for Alternative 4 to address residual risks to hypothetical future residential users. LUCs and monitoring would not be required for Alternative 5.

Reduction in Toxicity, Mobility, or Volume Through Treatment. Alternatives 2 and 3 would not reduce the toxicity, mobility, or volume of contaminants through treatment because treatment is not a component of these alternatives. Alternatives 4 and 5 might reduce the toxicity, mobility, or volume of contaminants if treatment is required to meet transportation or disposal requirements.

Short-Term Effectiveness. Alternative 2 would have minimal short-term effectiveness concerns. Implementation of LUCs and a monitoring plan would not adversely impact the surrounding community or the environment. Alternative 3 would have more short-term effectiveness concerns than Alternative 2 related to the placement of surface protection within the Building 238 crawl space. Alternative 4 would have more short-term effectiveness concerns than Alternative 3 related to excavation of soil, backfilling with clean soil within the Building 238 crawl space, disposal of contaminated soil, and groundwater monitoring. Alternative 5 would have the greatest short-term effectiveness concerns because it requires the largest volume of excavation and disposal and would take the longest amount of time to complete. Alternatives 2, 3, and 4 could be implemented within 1 year and would attain the RAOs upon implementation. Alternative 5 would achieve RAOs at completion within 3 to 4 years.

Implementability. Alternatives 2 through 5 are implementable. Alternative 2 would have relatively few implementation difficulties. Alternative 3 includes the construction of a cover and therefore would be more difficult to implement than Alternative 2. Alternative 4 requires the removal of contaminated soil from beneath Building 238 while maintaining normal operations in the building and would be more difficult to implement than Alternative 3. Alternative 5 requires the removal of all soil from beneath Building 238 and all soil outside Building 238 within the OU1 boundary, making it the most difficult alternative to implement.

Cost. Costs increase from Alternative 2 ($393,000) through Alternative 5 ($6,155,000), in numerical order. The costs for Alternatives 3 and 4 are $618,000 and $1,212,000, respectively.

Modifying Criteria

State Acceptance. State involvement has been solicited throughout the CERCLA process. MEDEP, as the designated support agency in Maine, concurs with the Selected Remedy.

Community Acceptance. One community group provided oral comments at the public meeting held on June 30, 2010 and written comments during the public comment period on the Proposed Plan. The group indicated support for the Navy's Selected Remedy. No adverse comments were received that changed the preferred remedial alternative.

2.11 PRINCIPAL THREAT WASTE

Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or that would present a significant risk to human health or the environment should exposure occur. A source material is a material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to groundwater, surface water, or air, or acts as a source for direct exposure. The NCP at 40 CFR 300.430(a)(1)(iii)(A) establishes an expectation that treatment will be used to address the principal threats posed by a site wherever practicable. At OU1, contaminant concentrations are not highly toxic or highly mobile; therefore, principal threat wastes are not present at the site.

2.12 SELECTED REMEDY

2.12.1 Rationale for Selected Remedy

The Selected Remedy for OU1 is Alternative 4: Limited Excavation and Off-Site Disposal with LUCs and Monitoring, which was selected because it provides the best balance of tradeoffs with respect to the nine evaluation criteria. In addition, the Selected Remedy was selected over other alternatives because it provides the greatest long-term effectiveness for current and planned future industrial use of the site by removing soil contamination that could pose a risk to current or future potential construction workers or future potential occupational workers at the site. Alternative 4 will provide this protection with the least disruption of current facility operations. The Navy recommends Alternative 4 because it meets the RAOs by removing surface and shallow subsurface soil with contaminant concentrations greater than acceptable levels based on industrial site uses and implementing LUCs to prohibit residential site use. Groundwater monitoring will be conducted to confirm the lack of groundwater impacts from the soil removal action.

The principal factors in the selection of this remedy included the following:

- Excavation based on construction worker exposure would also address unacceptable risks for hypothetical occupational worker and recreational exposure to lead-contaminated soil and hypothetical residential exposure to antimony-contaminated soil within the crawl space in a relatively short time frame (estimated construction period of 4 months) with minimal disturbance of current facility operations.
- The remedy is consistent with the reasonably anticipated future industrial use of the site.

- Removal of lead contamination in soil in the crawl space to reduce lead concentrations to acceptable levels for industrial land use would also eliminate potential future migration of soil contaminants to groundwater at levels that could adversely impact human health and the environment.
- The remedy achieves similar protection at a significantly lower cost than full-scale removal ($1,212,000 compared to $6,155,000).

2.12.2 Description of Selected Remedy

The Selected Remedy includes three major components: (1) excavation and off-yard disposal of 390 cy of soil around the drain lines within the crawl space under Building 238, (2) LUCs to prohibit residential use of the site and for management of excavated soil, (3) and groundwater monitoring.

Excavation will consist of removal of an estimated 390 cy of soil around the drain lines within the crawl space under Building 238 with lead concentrations greater than acceptable levels for construction workers, occupational workers, and hypothetical future recreational users. Soil will be excavated to a maximum depth of 3 feet bgs over an area of approximately 3,500 square feet, as shown on Figure 2-4. Confirmation samples will be collected from the exposed ground surface following excavation and used to determine whether excavation activities removed the required contamination in the vertical and horizontal directions. If contaminant concentrations in the confirmation samples are less than remediation goals excavation is complete. If contaminant concentrations in the confirmation samples are greater than remediation goals additional excavation would be considered. The excavated areas will be backfilled with clean soil to pre-excavation elevations. The Navy will prepare a remedial action work plan that will specify the appropriate measures for excavation, confirmation sampling, and backfilling.

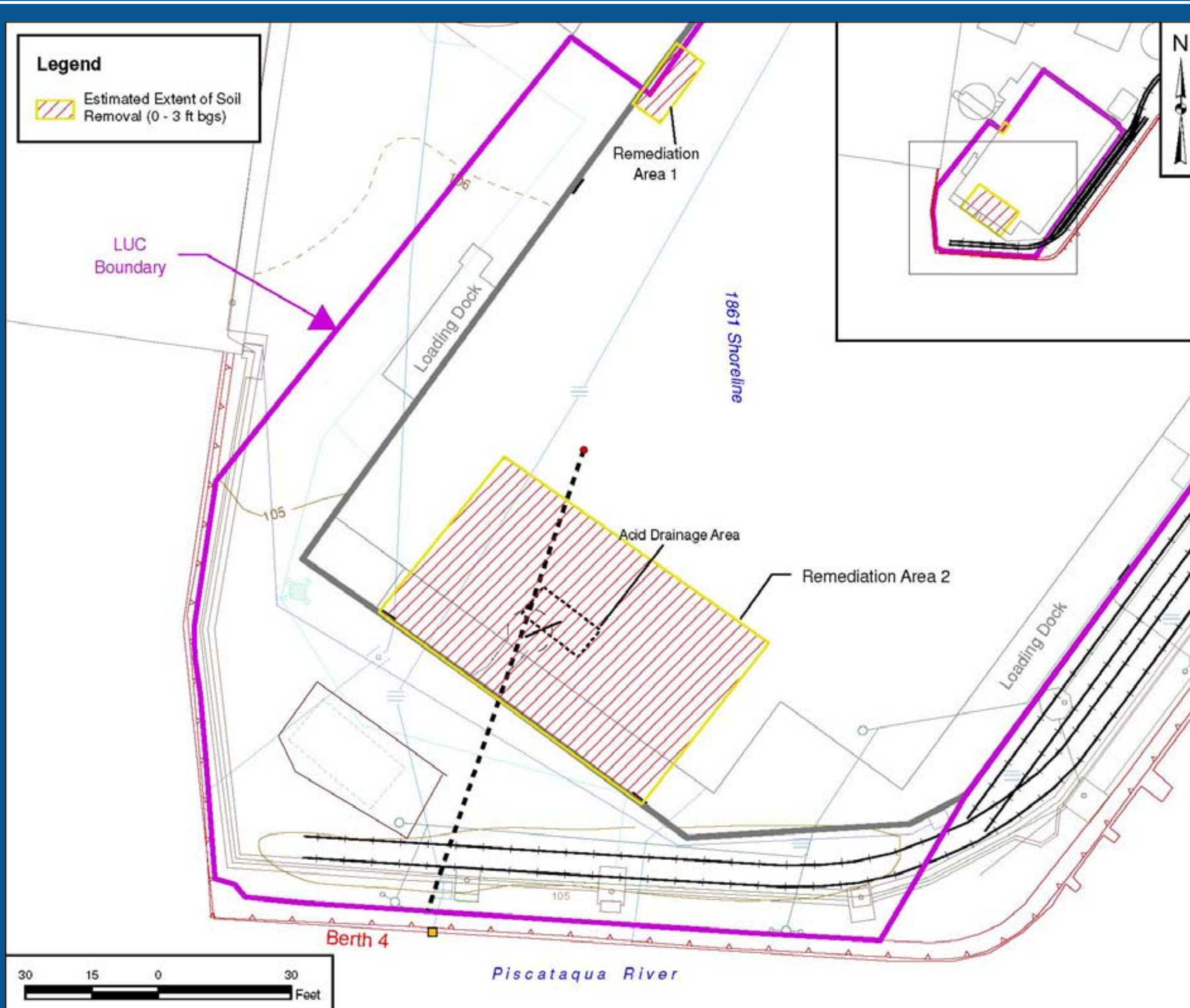
LUCs will be implemented within the OU1 boundary through a LUC RD. The OU1 LUC boundary is shown on Figure 2-3. Consistent with the RAOs developed for the site, the specific performance objectives for the LUCs to be implemented at OU1 are as follows:

- To prohibit residential reuse of the site unless additional action is undertaken to prevent residential exposure to lead-contaminated soil throughout OU1. Prohibited residential uses shall include, but are not limited to, any form of housing, child-care facilities, pre-schools, elementary schools, secondary schools, playgrounds, convalescent, or nursing care facilities.
- To maintain current site features including Building 238 and asphalt pavement to prevent exposure to underlying contaminated soil.
- To institute requirements for proper management of excavated soil as part of any future construction and maintenance activities at OU1.

The LUCs will be implemented and maintained by the Navy until concentrations of hazardous substances in soil are at levels that allow for unrestricted use and unlimited exposure. Within 90 days of ROD signature, the Navy shall develop a LUCRD that shall contain LUC implementation actions, including maintenance, monitoring and enforcement requirements that are consistent with the requirements under this ROD. The Navy is responsible for implementing, maintaining, reporting on, and enforcing the LUCs described in this ROD. Although the Navy may later transfer these procedural responsibilities to another party by contract, property transfer agreement, or through other means, the Navy shall retain ultimate responsibility for the remedy integrity.

Groundwater monitoring will be conducted to confirm the lack of groundwater impacts from the soil removal action. Monitoring will be conducted until the Navy, as lead agency, and USEPA, as support agency, determine that migration of lead-contaminated soil will not result in groundwater concentrations greater than acceptable levels for human health and the environment. A groundwater monitoring plan will be prepared that will provide the requirements for monitoring including the sampling frequency, location of wells, action levels, and monitoring exit strategy.

FIGURE 2-3. IMPACTED AREA CONSIDERED IN THE FS



2.12.3 Expected Outcomes of Selected Remedy

The current plan is to continue to use OU1 for industrial purposes because it is located within the CIA of PNS. Under current site conditions, access to the crawl space under Building 238 and loading docks is limited because it is a confined space (based on limited ingress and egress). Entrance to the crawl space is restricted; therefore, current worker exposures to soil in the crawl space are limited to construction workers who need to access utilities within the crawl space. Currently, the surface outside of the building is covered with asphalt. Current and reasonably anticipated future potential exposure pathways are for a construction worker exposed to contaminants in surface soil under the building and surface/subsurface soil outside the building. The Selected Remedy will remediate this area to mitigate risks to construction workers, and future potential recreational users and occupational workers, and provide protection to potential future residential users through LUCs.

Groundwater at the site is not used and is not expected to be used in the future, and the Selected Remedy will have no impact on current or future groundwater uses available at the site. There are no socio-economic, community revitalization, or economic impacts or benefits associated with implementation of the Selected Remedy. It is estimated that the RAOs for OU1 will be achieved within approximately 4 months of implementation of the remedy. Table 2-7 describes how the Selected Remedy mitigates risk and achieves RAOs for OU1.

TABLE 2-7. HOW SELECTED REMEDY MITIGATES RISK AND ACHIEVES RAOS

RISK	RAO	COMMENTS
Unacceptable risks to human health from exposure to lead- and antimony-contaminated soil.	Prevent construction worker, and future potential recreational user and occupational worker exposure through ingestion, dust inhalation, and dermal contact to unacceptable levels of lead-contaminated soil under Building 238.	Excavation of soil in the crawl space under Building 238 based on construction worker exposure will address unacceptable risks for hypothetical occupational worker and recreational exposure to unacceptable levels of lead-contaminated soil under Building 238.
	Prevent hypothetical future residential exposure through ingestion, dust inhalation, and dermal contact to unacceptable levels of lead-contaminated soil under and outside Building 238.	Implementation of LUCs to prevent future residential use of OU1 will eliminate residential exposure to unacceptable levels of lead-contaminated soil under and outside of Building 238.
	Prevent hypothetical future residential exposure through ingestion, dust inhalation, and dermal contact to unacceptable levels of antimony-contaminated soil under Building 238.	Excavation of soil in the crawl space under Building 238 based on construction worker exposure will address unacceptable risks for future residential user exposure to unacceptable levels of antimony-contaminated soil under Building 238.

Because the current industrial use of the site is expected to continue for the foreseeable future, it is not expected that modification or removal of the LUCs will be required. However, if proposed land use changes in the future and uses other than industrial/commercial-type activities are expected, additional excavation or other remedial approaches may be required. Any modifications to LUCs will be conducted in accordance with provisions in the OU1 LUC RD.

2.13 STATUTORY DETERMINATIONS

In accordance with the NCP, the Selected Remedy meets the following statutory determinations:

- **Protection of Human Health and the Environment** – The Selected Remedy is needed to prevent current and future risks to construction workers, and future risks to occupational, residential, and recreational users at the site. Excavation of soil in the crawl space with lead concentrations greater than acceptable levels for construction workers, and hypothetical future recreational users and occupational workers will be conducted. LUCs will be implemented to prohibit future residential site use.
- **Compliance with ARARs** – The Selected Remedy will attain all identified federal and state ARARs, as presented in Appendix E.
- **Cost-Effectiveness** –The Selected Remedy is the most cost-effective alternative that allows for the least disruption of current facility operations, with the greatest protection of human health. The costs are proportional to overall effectiveness by achieving an adequate amount of long-term effectiveness and permanence within a reasonable time frame. Detailed costs for the Selected Remedy are presented in Appendix F.
- **Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable** – The Selected Remedy represents the maximum extent to which permanent solutions and alternative treatment technologies can be used in a practical manner at OU1. Based on the type of contamination at OU1 (lead and antimony), the location of the contamination within the crawl space beneath a building, and the small volume of contaminated soil being removed, the Navy concluded that it was impracticable to treat the COCs in a

cost effective manner. Limited excavation and off-site disposal provides the best balance of tradeoffs for long-term effectiveness and permanence with ease of implementation for reasonable cost.

- **Preference for Treatment as a Principal Element** – Treatment is not a principal element of the Selected Remedy for soil at OU1 because there are no principal threat wastes at the site. The Selected Remedy may reduce the toxicity, mobility, or volume of contaminants through treatment depending on the requirements for transportation of the excavated material for off-yard disposal.
- **Five-Year Review Requirement** – Five-year site reviews are required because contamination will remain in excess of levels that allow for unrestricted use and unlimited exposure and will be conducted to confirm that the remedy remains protective of human health and the environment.

2.14 DOCUMENTATION OF SIGNIFICANT CHANGES

CERCLA Section 117(b) requires an explanation of significant changes from the selected remedy presented in the Proposed Plan that was published for public comment. The Navy in consultation with the USEPA determined modifications to the Selected Remedy based on comments received during the public comment period were not required. Comments received during the public comment period are discussed in Section 3.0, Responsiveness Summary.

3.0 RESPONSIVENESS SUMMARY

3.1 STAKEHOLDER COMMENTS AND LEAD AGENCY RESPONSES

Based on the results of the public comment period no changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate. Participants in the **public meeting** held June 30, 2010, included community and RAB members and representatives of the Navy, USEPA, and MEDEP. One community group provided oral and written comments during the public comment period. The community group indicated their support for the Proposed Remedy. Comments related to the nature and extent of contamination and risks from migration of contamination were addressed in the RI and FS Reports for OU1. The Navy will prepare a remedial action work plan, LUC RD, and groundwater monitoring plan that will address comments made on the implementability of the Selected Remedy. Comments received during the public comment period and Navy responses to these comments are provided in Appendix C.

3.2 TECHNICAL AND LEGAL ISSUES

No technical or legal issues associated with the OU1 ROD were identified.

Administrative Record Reference Table

DETAILED ADMINISTRATIVE RECORD REFERENCE TABLE

ITEM	REFERENCE PHRASE IN ROD	LOCATION IN ROD	LOCATION OF INFORMATION IN ADMINISTRATIVE RECORD
1	**Tank and surrounding soil were removed**	Table 2-1	Tetra Tech, March 2000. Field Investigation Report, Site 10 (Building 238) and Site 29 (Teepee Incinerator) for Portsmouth Naval Shipyard, Kittery, Maine. TtNUS, King of Prussia, Pennsylvania. Section 1.4.1
2	**Four soil samples**	Table 2-1	McLaren/Hart, July 1992. Draft RCRA Facilities Investigation Report for Portsmouth Naval Shipyard, Kittery, Maine. McLaren/Hart Engineering Corporation, Albany, New York. Section 3.5
3	**Soil samples; groundwater monitoring**	Table 2-1	Tetra Tech, March 2000. Section 3.0
4	**Organic contamination associated with the site was not found.**	Table 2-1	Tetra Tech, October 2001. Quality Assurance Project Plan, Site 10 Additional Investigation for Portsmouth Naval Shipyard, Kittery, Maine. TtNUS, King of Prussia, Pennsylvania. Section 5.3.2
5	**Soil and groundwater samples**	Table 2-1	Tetra Tech, March 2003. Site 10 Additional Investigation Report for Portsmouth Naval Shipyard, Kittery, Maine. TtNUS, King of Prussia, Pennsylvania. Section 2.0 and Table 2-1
6	**Soil samples**	Table 2-1	Tetra Tech, December 2006. Site 10 Data Gap Investigation Data Package for Portsmouth Naval Shipyard, Kittery, Maine. TtNUS, King of Prussia, Pennsylvania. Section 2.0 and Tables 2-1 through 2-3.
7	**Risks associated with the contamination at OU1**	Table 2-1	Tetra Tech, July 2007. Remedial Investigation Report for Operable Unit 1, Portsmouth Naval Shipyard, Kittery, Maine. Section 5.0.
8	**Remedial alternatives**	Table 2-1	Tetra Tech, June 2010. Feasibility Study Report for Operable Unit 1, Portsmouth Naval Shipyard, Kittery, Maine. Section 4.2.
9	**Federal Facility Agreement**	Section 2.2	USEPA, September 1999. Federal Facility Agreement for Portsmouth Naval Shipyard.
10	**No Further Action**	Section 2.4	Navy, February 2008. No Further Action Decision Document for Site 21 – Former Acid/Alkaline Drain Tank, Portsmouth Naval Shipyard, Kittery, Maine.
11	**Not suitable for human consumption.**	Section 2.6	Tetra Tech, July 2007. Section 5.2.1.2.
12	**COCs**	Section 2.7.1	Tetra Tech, July 2007. Section 5.1.2.
13	**Cancer risks and non-cancer hazards**	Section 2.7.1	Tetra Tech, July 2007. Section 5.3.
14	**Exposure to lead in soil**	Section 2.7.1	Tetra Tech, July 2007. Section 5.3.
15	**Results**	Section 2.7.1	Tetra Tech, July 2007. Section 5.3.
16	**Uncertainty**	Section 2.7.1	Tetra Tech, July 2007. Section 5.5.
17	**Preliminary technology screening**	Section 2.9	Tetra Tech, June 2010. Section 3.2.
18	**Remedial alternatives**	Section 2.9	Tetra Tech, June 2010. Section 4.2.
19	**Nine CERCLA evaluation criteria**	Section 2.10	Tetra Tech, June 2010. Section 4.1.

DETAILED ADMINISTRATIVE RECORD REFERENCE TABLE

ITEM	REFERENCE PHRASE IN ROD	LOCATION IN ROD	LOCATION OF INFORMATION IN ADMINISTRATIVE RECORD
20	**Chemical-, location-, and action-specific ARARs**	Section 2.10	Tetra Tech, June 2010. Section 2.1.
21	**Public meeting**	Section 3.1	The public meeting for the Proposed Plan for OU1 was held on June 30, 2010.

Appendix A
State of Maine Concurrence Letter

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JOHN ELIAS BALDACCI
GOVERNOR

BETH NAGUSKY
ACTING COMMISSIONER

September 21,2010

James T. Owens, III
Director, Office of Site Remediation & Restoration EPA New England, Region I
5 Post Office Sq. Suite 100
Mail Code **OSRR07-5**
Boston, MA 02109-3912

Re: Letter of Concurrence, Record of Decision for Operable Unit 1, Portsmouth Naval Shipyard, **Kittery,** Maine

Dear Mr. Owens:

The Maine Department of Environmental Protection (MEDEP) has reviewed the **Draft** Final Record of Decision (ROD) for Operable Unit 1, Site 10, dated September 2010. The primary chemical associated with CERCLA releases to soil and groundwater at **OU1** is lead **from** releases (prior to approximately 1984) **from** lead-acid battery operations conducted in Building 238. The releases occurred under the crawl space of the building (by a former acid drain line) and from the former battery acid tank located outside the building.

Based on our review the Maine Department of Environmental Protection concurs with the selected remedial action which consists of excavation and disposal, institutional controls, and monitoring. The remedial action is outlined below:

- Excavation of contaminated soil with lead concentrations greater than acceptable levels for construction workers and hypothetical future recreational users and occupational workers, around the drain lines within the crawl space of Building 238.
- Off-site disposal of excavated soil at an appropriate treatment, storage, and disposal (TSD) facility.
- Restoration of excavated areas to pre-existing elevations with clean soil.
- Implementation of land use controls **(LUCs)** through a LUC remedial design (LUC RD) to ensure maintenance of current site features to prevent future residential site use.
- Groundwater monitoring to confirm the lack of groundwater impacts **from** the soil removal action.
- Five-year site reviews to confirm that the remedial action objectives (RAO) are being achieved and the remedy remains protective.

The MEDEP looks forward to working with EPA and Navy to resolve the environmental problems posed by the Shipyard. If you need additional information do not hesitate to call myself or members of my staff.

Sincerely,

Mark Hyland
Bureau Director
Bureau of Rernediation and Waste Management
Maine Department of Environmental Protection

Electronic pc:

- D. Wright, MEDEP
- T. Wolfe, MEDEP
- G. Lipfert, MEDEP
- M. Audet, USEPA
- L. Cole, NAVFAC
- M. Thyng, PNS
- L. Joy, US Navy
- D. Cohen, TtNUS
- P. Britz, RAB
- D. Bogen, RAB
- M. Dionne, RAB
- M. Marshall, RAB
- J. McKenna, RAB
- D. McNabb, RAB
- O. Roy, RAB
- R. Wells, RAB
- J. Carter, RAB
- D. Grout, NH Fish & Game
- C. Lepage, for SAPL
- File

Appendix B
PRAP

PROPOSED PLAN FOR OPERABLE UNIT 1
PORTSMOUTH NAVAL SHIPYARD
KITTERY, MAINE

Introduction

This Proposed Plan summarizes the Navy's proposed remedial action for contaminated soil at Operable Unit (OU) 1 at Portsmouth Naval Shipyard (PNS) National Priorities List site in Kittery, Maine. OU1, also known as Site 10, is one of seven OUs at PNS. OU1 includes a former battery acid tank. This Proposed Plan recommends removal of soil in a portion of OU1 that is contaminated with lead at concentrations greater than the selected cleanup levels, establishment of land use controls (LUCs) to ensure that the site is restricted to industrial use, and groundwater monitoring to confirm that groundwater has not been adversely impacted.

This Proposed Plan presents key information from the Remedial Investigation (RI) Report and Feasibility Study (FS) Report for OU1. These documents are available in the Information Repositories at the locations identified on page 14. This Proposed Plan provides basic background information on OU1, describes the remedial options that were considered, identifies the Navy's preferred alternative for remedial action, and explains the rationale for proposing the preferred alternative. The Proposed Plan also provides information supporting the proposed remedial action at OU1 and provides an opportunity for public review and comment on the proposed remedial action. OU1 is currently being addressed at PNS as part of the Navy's Installation Restoration Program (IRP). The goal of the IRP is to identify, assess, characterize, and cleanup or control contamination from past hazardous waste disposal operations at CERCLA/Superfund sites. The Navy is the lead agency at PNS, and the United States Environmental Protection Agency (USEPA) provides primary regulatory oversight. The Maine Department of Environmental Protection (MEDEP) provides regulatory support. The Proposed Plan was developed with support from USEPA and MEDEP and with input from the PNS Restoration Advisory Board.

Learn More about the Proposed Plan

The Navy invites you to attend an Informational Open House to find out about the proposed cleanup plan and how it compares with other cleanup options for the site. The Navy will respond to your questions and concerns about the proposed cleanup and how it may affect you. However, if you want to make a formal comment for the record, you must either submit it in writing or attend the formal Public Hearing.

<u>Informational Open House</u>
Meeting: 6:00 to 8:00 pm
Date: June 30, 2010
Location: Kittery Town Hall, Kittery, Maine

What Do You Think?

The Navy is accepting public comments on this Proposed Plan from June 17 to July 16, 2010. You do not have to be a technical expert to comment. If you have a comment or concern, the Navy wants to hear from you before making a final decision on the proposed remedial action.

To provide formal comments, you may:

1. Offer oral comments during the Public Hearing on June 30, 2010 (see page 14 for details about providing formal comments).

2. Provide written comments at the Informational Open House, Public Hearing, or by fax or mail. Comments must be postmarked no later than July 16, 2010. Address comments to:

Ms. Danna Eddy
Public Affairs Office (Code 100PAO)
Portsmouth Naval Shipyard
Portsmouth, NH 03804-5000

Fax: (207) 438-1266

<u>Public Hearing</u>
Meeting: 8:00 pm
Date: June 30, 2010
Location: Kittery Town Hall, Kittery, Maine

For further information regarding the Informational Open House, and Public Hearing, contact Ms. Danna Eddy at (207) 438-1140

Site Background

PNS is located on an island in the Piscataqua River, referred to on National Oceanic and Atmospheric Administration nautical charts as Seavey Island, with the eastern tip given the name Jamaica Island. PNS is located at the mouth to the Great Bay Estuary (commonly referred to as Portsmouth Harbor). PNS's ship-building history dates back to the 1800s, and PNS has been engaged in the construction, conversion, overhaul, and repair of submarines for the Navy since 1917. Figure 1 shows the layout of PNS.

Figure 1. Site Location Map

OU1 is a small peninsula located in the Controlled Industrial Area near the southern shore of PNS. Building 238 is located within OU1 on the southernmost extent of Floyd Street. The site is currently and has historically been located within an industrial area. The site is located on fill material that was placed prior to the 1920s. This fill material extended the previous shoreline in the area to its current limits. Building 238 was constructed in 1955 and was used for battery recharging operations that previously resulted in releases of hazardous materials. Currently, the building consists mostly of office space; some minor battery recharging work is still performed in the building, but the current recharging process does not generate chemical waste. Figure 1 shows the general location of OU1 at PNS, and Figure 2 shows the layout of the OU1 area.

As part of historical battery recharging operations in Building 238, large lead-acid batteries were drained inside the building. Until 1974, waste sulfuric acid and lead-bearing sludge were discharged via an underground 15-inch-diameter cast iron pipe (see Figure 2) directly to the Piscataqua River through an industrial waste outfall located in the western portion of Berth 4. From 1974 to 1984, the acidic discharges from battery operations in Building 238 were directed into a lead-acid drain pipeline and temporarily stored in an underground storage tank (UST) (Battery Acid Tank No. 24) outside the building. The acid flowed from a sump through a drain in the crawl space under Building 238, under the earthen floor, and exited the building foundation through a polyvinyl chloride pipe connected to the UST. A leak was discovered in the UST in 1984 and use of the tank, sump and drain was discontinued. The UST and surrounding soil were removed as part of the MEDEP-supervised tank closure in 1986. In 1998 it was found that the drain in the crawl space also leaked while in use.

Site investigations at OU1 were conducted in 1991, 1998, 2001, and 2006 to determine whether residual contamination from site operations was present in soil and groundwater. The data from these environmental investigations were used in the OU1 RI Report to determine the nature and extent of contamination and to evaluate potential risks posed by contaminants at the site to humans. Details of these investigations are included in the OU1 RI Report (TtNUS, July 2007).

OU1 was initially investigated in 1991 as part of the Resource Conservation and Recovery Act Facility Investigation and again in 1998 as part of the Field Investigation of Site 10. Evaluation of the results of these investigations indicated that further investigation was required to determine the nature and extent of residual inorganic (metals) contamination in soil and groundwater so that associated site risks could be evaluated. No organic contamination associated with the site was found.

An additional investigation of OU1 was conducted in 2001 and the risk evaluation showed that lead was the primary site contaminant. Elevated concentrations of lead in the soil were detected in the crawl space under Building 238 and near the drain line to the UST. Further investigation of the extent of high-level lead contamination was recommended before completing the RI Report. Additional investigation of lead concentrations in groundwater was also recommended to confirm that migration of lead in groundwater to the offshore was not a concern for the site.

The focus of the 2006 Data Gap Investigation was to better delineate the nature and extent of high-level lead contamination in soil from past battery operations and to collect additional information to evaluate the potential for lead migration from onshore soil to the offshore area.

Site Characteristics

OU1 is located within the Controlled Industrial Area of PNS, where much of the facility's submarine maintenance activities are conducted. The area is relatively flat, with elevations ranging from 104 feet along Berth 4 to 107 feet north of Building 238. The area of OU1 not occupied by Building 238, including the battery acid tank, is covered by asphalt paving. A loading dock is located on the southern and eastern sides of Building 238. The Piscataqua River forms the eastern, southern, and a portion of the western boundary of the site. The OU1 shoreline along the Piscataqua River from the west to the southeast is bounded by a quay wall of granite blocks. Berths 4 and 5 are located south and east of Building 238, respectively. Barges are commonly docked at these berths. Buildings 303 and 178 are located west of the site, and additional operational buildings are located north of the site. Surface drainage is via storm drains that discharge to storm water outfalls into the Piscataqua River. The area south of Building 238 is within the 100-year flood zone (which is at an approximate elevation of 105 feet).

The crawl space beneath Building 238 has an earthen floor and is present beneath the majority of the building and the loading dock. Current and abandoned utility lines, piping, and building supports are

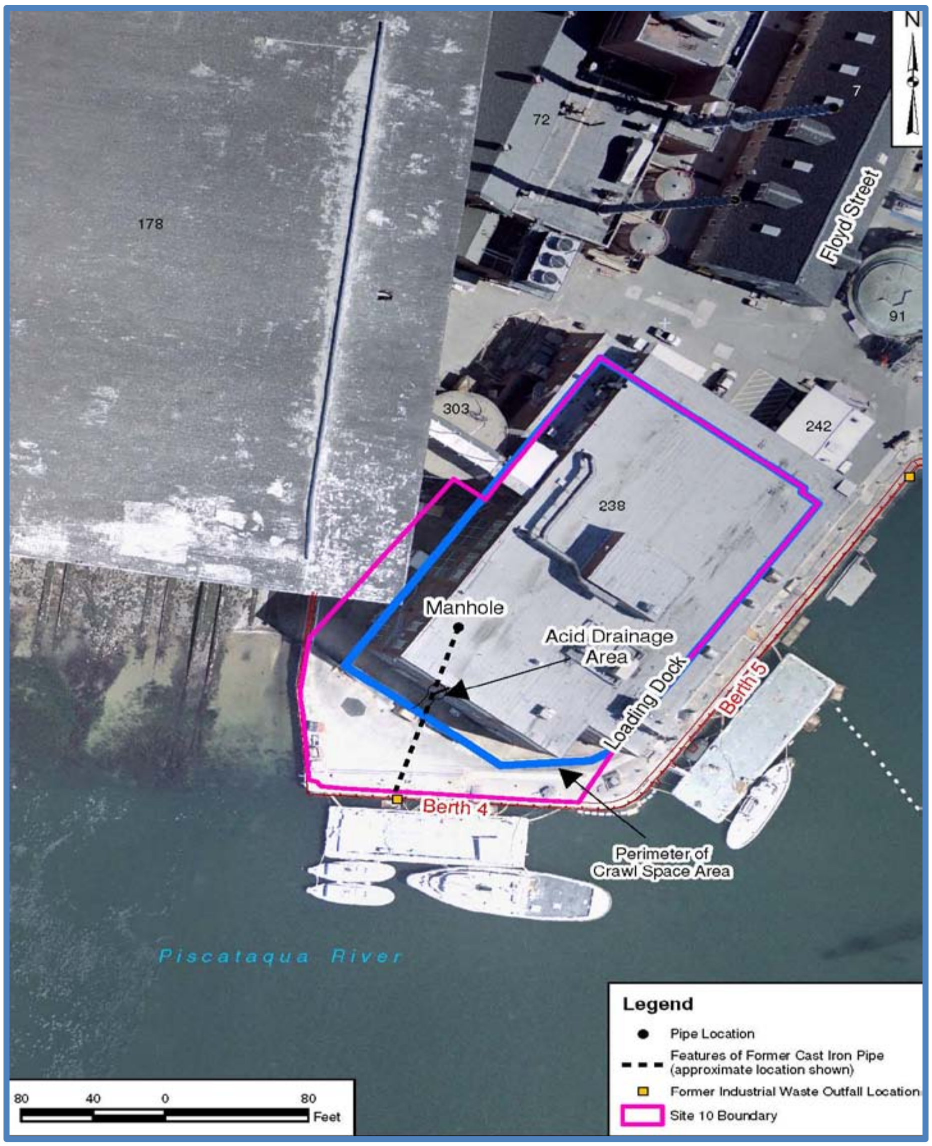


Figure 2. Site Features

present within the crawl space. Access to the crawl space for construction or utility repair is through six openings (windows) installed for ventilation (two on southern wall, two on eastern wall, and one each on the northern and western walls). The walls and roof of the crawl space consist of poured concrete with large support beams (building foundations and footers). The headroom beneath the loading dock varies from approximately 8 feet to approximately 4 feet. The headroom beneath the support structures (building foundations and footers) that traverse the underside of the Building 238 floor is less than 3 feet.

Figure 3 shows the layout of features associated with the site. Approximately 20 feet from the southern end of the building, a large sump (with a rectangular cross section of approximately 16 feet by 20 feet) with slanted sides extends beneath the floor of Building 238 into the crawl space. A drain emerges from the center of the bottom of the sump, joins another drain emerging from the building floor outside the sump, and enters the earthen floor. The drain line, previously connected to the former UST south of Building 238, enters the ground within a channel depression. The depression is approximately 5 feet wide and extends from the area of the sump to the southern wall of the crawl space. The acid sump and drain lines within the crawl space of Building 238 and the former UST south of Building 238 were part of past battery operations at the site.

The fill material beneath OU1 (under the asphalt outside Building 238 and within the crawl space under Building 238) ranges in thickness from less than 10 feet in the northern portion of the OU to over 45 feet near the river. The fill consists of sandy and/or silty soil with gravel, rocks ranging from several inches to over 2 feet in length, and building materials (e.g., fragments of red bricks, wood, metal, etc.). The fill outside Building 238 consists of loose soil and rocks at the surface and highly compacted soil and rock to 6 to 8 feet below ground surface (bgs) (at an elevation of 97 to 99 feet). Below 6 to 8 feet bgs, the fill outside Building 238 consisted of rock with little to no soil. Because of the confined entry to and limited space within the crawl space under Building 238, borings were not drilled under the building and soil sampling was conducted using hand tools. The top 3 to 6 inches bgs in the crawl space consisted of loose soil and rocks. Beneath this, the fill material consisted of highly compacted soil and rocks. Deeper than 2 to 3 feet bgs (below an elevation of 97 to 98 feet) in the crawl space, the fill material consisted of rocks with little to no soil.

Groundwater at the site is tidally influenced and is brackish or saline. The ground surface elevation within the crawl space under Building 238 is approximately 100 feet, which is at the high tide level. During soil sampling in the crawl space beneath Building 238, it was observed that at tide levels greater than mean high tide, groundwater completely saturates and covers the earthen floor of the crawl space. Based on staining on the walls of the crawl space, water can reach approximately 1 to 2 feet above the earthen floor at high-high tide levels.

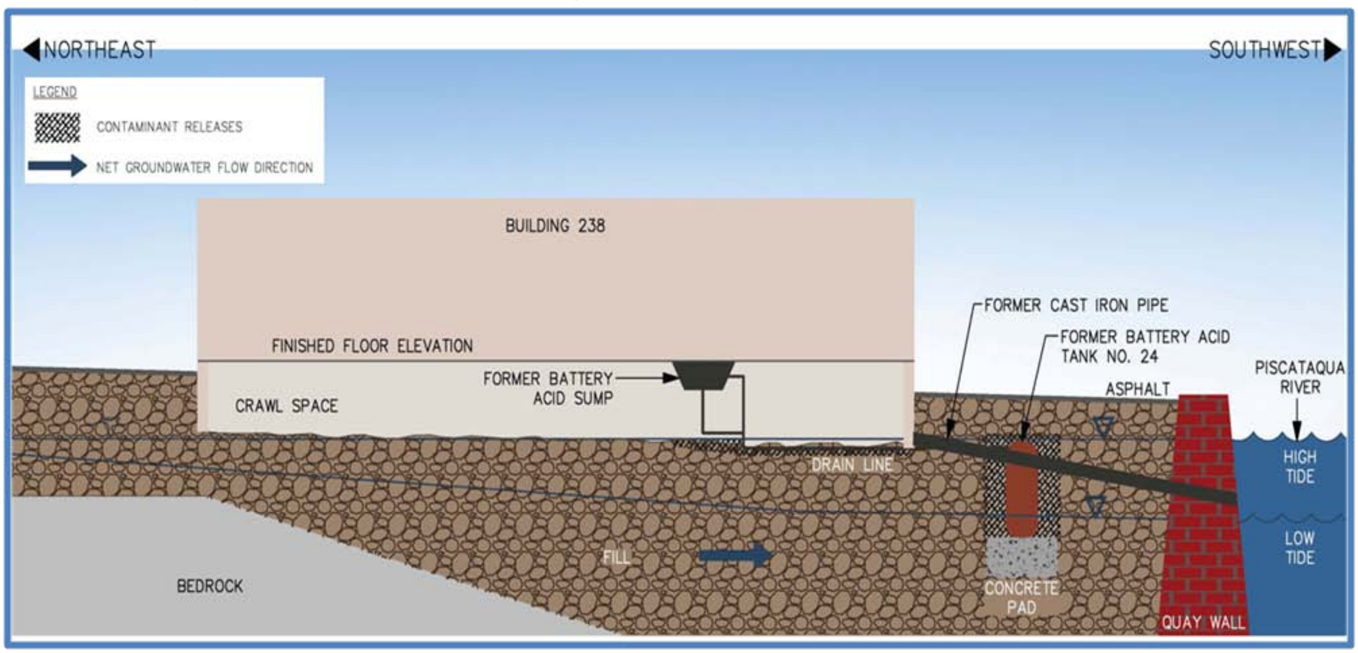


Figure 3. Conceptual Site Model

Nature and Extent of Contamination

As determined in the OU1 RI Report, the primary chemical associated with CERCLA releases at OU1 is lead. Prior to 1984, pipelines and the former UST associated with battery recharging operations within Building 238 apparently leaked, resulting in the release of battery acid containing lead to the subsurface soil (tidally saturated zone) of the site.

Based on the distribution of lead concentrations in soil, the highest lead concentrations [greater than 8,000 parts per million (ppm)] occur in soil in the tidally saturated zone near the former drain line within the Building 238 crawl space) and in one location near the former UST south of Building 238. Lead concentrations between 2,000 and 8,000 ppm were generally found near these release areas in the tidally saturated zone. Away from these release areas, lead concentrations typically range from 0 to 2,000 ppm. In addition, lead concentrations less than 2,000 ppm were detected in the unsaturated zone, which would not have been impacted by site releases. Historical filling of the area (from approximately 1826 to 1915) and the long history of industrial use of the area are possible sources of the lead in the unsaturated zone

Lead concentrations in groundwater (total and dissolved) are low (generally less than 40 parts per billion) and do not indicate that lead from soil is leaching from the soil to the groundwater at the site at concentrations that would adversely impact human health or the environment. In addition, the RI Report indicated that groundwater migration to the offshore areas would not have any environmental impacts on these offshore areas.

Scope and Role of Response Action

The Proposed Plan discusses four possible alternatives for addressing soil contaminated with lead within OU1. OU1 does not include the adjacent offshore area, which is part of OU4. Contaminated sediment in the Piscataqua River resulting from past releases of hazardous materials from battery recharging operations is being addressed as part of remedial activities for OU4.

This Proposed Plan presents alternatives from which the Navy and USEPA, with MEDEP concurrence and after considering public input, will select a final remedy to prevent unacceptable risks to human health and the environment.

Summary of Site Risks

Risks for human health were calculated in the OU1 RI Report. Ecological risks were not calculated because the site is currently and has historically been located within an industrial area of PNS, and no ecological habitat has been identified at the site. Therefore, there are no onshore concerns for ecological risks from exposure to site contaminants. The potential for migration of site contaminants to adversely impact the offshore also was evaluated in the OU1 RI Report. Contaminated sediment in the Piscataqua River resulting from past releases of hazardous materials from battery recharging operations is being addressed as part of remedial activities for OU4.

A Human Health Risk Assessment (HHRA) was conducted for OU1 to determine the current and future effects of contaminants on human health. The HHRA provides an estimate of the likelihood of health problems occurring if cleanup action is not taken at the site. Under current land use conditions (industrial use), it was assumed that only construction workers (utility workers, maintenance workers, etc.) conducting periodic utility or building repair would be exposed to soil beneath the asphalt surrounding the building, to soil under the building, and to groundwater under the site during construction activities. Current occupational workers (production workers at Building 238) are not exposed to the soil or groundwater because of the asphalt covering the soil outside Building 238 and because the crawl space under Building 238 is not accessible to anyone other than construction workers.

The Navy also evaluated a hypothetical future scenario where the asphalt covering the soil outside Building 238 and/or Building 238 itself were removed or modified. Under these hypothetical future land use conditions, the Navy evaluated the risks of exposure of occupational workers, recreational users, and onsite residents to soil was evaluated. Even under these hypothetical conditions, however, it was not necessary to evaluate exposure to groundwater, because site groundwater is brackish/saline and not considered a potable water source.

The HHRA evaluated risks for exposure to surface soil (0 to 2 feet bgs) and subsurface soil above the water table (to a maximum depth of 6 feet bgs) outside the building and within the crawl space. Below 6 feet bgs outside the building there was little to no soil for exposure and is within the tidally saturated zone so that typical construction work would not be conducted at this depth. Therefore, data for soil samples collected deeper than 6 feet bgs were not included in the human health risk calculations. In addition, the ground surface in the crawl space is approximately 5 feet lower than the ground surface outside the building; therefore, the depth to where little to no soil was found and the depth to the tidally saturated zone in the crawl space is actually shallower (to a depth of 2 to 3 feet bgs).

The HHRA provided the following results:

- Cancer risk estimates for current and reasonably anticipated future land use conditions were less than the CERCLA target risk range (one in a million to one in ten thousand incremental chance of developing cancer) and MEDEP guidelines (one in a hundred thousand incremental chance of developing cancer) because no carcinogenic chemicals exceeded risk-based screening levels.
- Noncancer risk estimates indicate that adverse noncarcinogenic health effects are possible only for the hypothetical future residential scenario for a child exposed to antimony in soil within the crawl space under Building 238.
- A quantitative evaluation of exposure to lead in soil indicated that under current and reasonably anticipated future site conditions, risks for construction worker exposure to lead in soil under Building 238 were unacceptable based on USEPA risk goals. However, risks under hypothetical future site conditions (in which the asphalt and/or Building 238 itself are removed or modified) were unacceptable for exposure to lead in soil under Building 238 for occupational workers, recreational users, and residential users, and for exposure to soil outside Building 238 for residential users.
- Exposure to groundwater and the migration of groundwater off-site (to the offshore area) did not pose unacceptable risks.

The Preferred Alternative identified in this Proposed Plan, or one of the other active measures considered in the Proposed Plan, is necessary to protect public health and welfare or the environmental from actual or threatened releases of hazardous substances into the environment.

Remedial Action Objectives

Remedial Action Objectives (RAOs) provide a general description of what the remedial action will accomplish and typically serve as the design basis for the cleanup alternatives. Based on the potential exposure pathways, receptors of concern, and potential future land use scenarios, the RAOs for OU1 are as follows:

- Prevent construction worker, occupational worker, and future potential recreational exposure through ingestion, dust inhalation, and dermal contact to unacceptable levels of lead-contaminated soil under Building 238.
- Prevent hypothetical future residential exposure through ingestion, dust inhalation, and dermal contact to unacceptable levels of lead-contaminated soil under and outside Building 238.
- Prevent hypothetical future residential exposure through ingestion, dust inhalation, and dermal contact to unacceptable levels of antimony-contaminated soil under Building 238.

Unacceptable levels are based on preliminary remediation goals (PRGs) established for the contaminants of concern and receptors. By cleaning up soil with concentrations greater than the PRGs in the identified remediation areas, the resulting soil concentrations, or exposure point concentrations, would be less than PRGs and would not pose unacceptable risks for construction workers, occupational workers, recreational users, or residential users. The depths of concern are based on the exposure depths evaluated in the HHRA; surface soil from 0 to 2 feet bgs and subsurface soil to the water table (approximately 6 feet bgs outside Building 238 and 3 feet bgs in the crawl space). The following PRGs were established for lead in soil within the crawl space under Building 238:

- Construction Worker – 2,000 ppm
- Occupational Worker – 1,600 ppm
- Adult Recreational User – 4,600 ppm
- Child or Adult Resident – 400 ppm (a PRG for antimony of 73 ppm was also established for future residents)

The following PRG for lead was established for the soil outside Building 238:

- Child or Adult Resident – 400 ppm

Risks to construction workers, occupational workers, and recreational users exposed to soil outside Building 238 are already acceptable; therefore, PRGs were not developed for these receptors for exposure to soil outside Building 238.

Summary of Remedial Alternatives

A summary of the remedial alternatives evaluated in the OU1 FS Report is presented below. With the exception of Alternative 1 (No Action), all alternatives would attain the RAOs.

Alternative 1 – No Action

Regulations governing the Superfund program require that the no-action alternative be evaluated to establish a baseline for comparison to other alternatives. Under this alternative, the Navy would take no action at the site to prevent exposure to contaminated soil.

Alternative 2 – LUCs and Monitoring

LUCs, implemented and maintained in accordance with a LUC Remedial Design (LUCRD), would be used to prevent unacceptable exposure to contaminated soil at OU1 by:

- Maintaining access restrictions and warning signs at the entrances to the crawl space under Building 238 to prevent unauthorized access by occupational or construction workers and to prevent hypothetical future recreational user access to the crawl space.
- Maintaining current site features including Building 238 and asphalt pavement and implementing restrictions to prevent hypothetical future residential site use unless additional action is conducted to prevent residential exposure to lead-contaminated soil at OU1 and antimony-contaminated soil within the crawl space under Building 238 at OU1.
- Maintaining requirements for management of excavated soil as part of any future construction activities at OU1.

The Navy would prepare and implement a LUCRD that would include the necessary LUCs, operation, maintenance and monitoring requirements, inspection requirements, and people and organizations responsible for implementation of LUCs. Groundwater monitoring would be conducted to provide additional confidence that lead contamination in the crawl space is not migrating to groundwater at unacceptable levels. A groundwater monitoring plan would be prepared that would provide the requirements for monitoring including sampling frequency, location of wells, action levels, and monitoring exit strategy. For cost estimating purposes in the FS, it was assumed that groundwater monitoring would be conducted annually for 30 years. Because contamination would remain in excess of levels that allow for unrestricted use and unlimited exposure, five-year reviews would be required under this alternative.

Alternative 3 – Surface Protection with LUCs and Monitoring

Alternative 3 consists of surface protection within an area of the crawl space, LUCs, and monitoring. Placement, inspection, and maintenance of a barrier composed of filter fabric and gravel over an area of approximately 400 square yards would be used to prevent direct exposure to soil around the drain line with lead concentrations greater than acceptable levels for construction workers who may access the crawl space for utility repairs under Building 238. If any activities need to be conducted within the covered area such that there is a potential for exposure to the lead-contaminated soil, appropriate health and safety requirements and replacement of the cover would be required. LUCs for recreational and residential users and management of excavated soil, groundwater monitoring, and five-year review requirements are the same as Alternative 2. LUCs for occupational and construction workers would include maintaining access restrictions and warning signs at the entrances to the crawl space under Building 238 to prevent unauthorized access that could disturb the barrier.

Alternative 4 – Limited Excavation and Disposal with LUCs

Alternative 4 consists of excavation and off-yard disposal of approximately 390 cubic yards of soil within an area of the crawl space, LUCs, and monitoring. Excavation and off-yard disposal of soil around the drain line within the crawl space under Building 238 with lead concentrations greater than acceptable levels for construction workers, occupational workers, and hypothetical future recreational users would be conducted. The excavated area would be backfilled with clean soil. Treatment of the excavated soil would be conduct as needed to meet disposal requirements.

Confirmation sampling would be conducted to determine whether excavation activities removed contaminated soil to meet PRGs for current land use. A remedial action design and work plan for soil excavation and backfill and for treatment and disposal of excavated soil would be prepared. Groundwater monitoring would be conducted to provide additional confidence that lead has not migrated to groundwater at unacceptable levels. Monitoring would be conducted until it has been decided that migration of lead contamination from soil would not result in groundwater concentrations greater than acceptable levels for human health and the environment. For costing for the FS, it was assumed that two annual rounds of post-remedial monitoring would be necessary to make the determination. A groundwater monitoring plan would be prepared that would provide the requirements for monitoring including frequency, location of wells, action levels, and monitoring exit strategy.

LUCs for residential users and management of excavated soil and five-year review requirements are the same as Alternative 2. LUCs for occupational and construction workers and recreational users would not be required.

Alternative 5 – Excavation and Disposal

Excavation and off-yard disposal of 6,300 cubic yards of soil within the crawl space and outside Building 238 (entire area within the site boundary) would be used to prevent unacceptable exposure to contaminated soil for all current and future receptors. Soil with lead concentrations greater than acceptable levels for a hypothetical future residential user at OU1 would be excavated. Confirmation samples would be collected to determine whether excavation activities removed the required contamination. The excavated areas would be backfilled with clean soil and the site restored. Treatment of the excavated soil would be conduct as

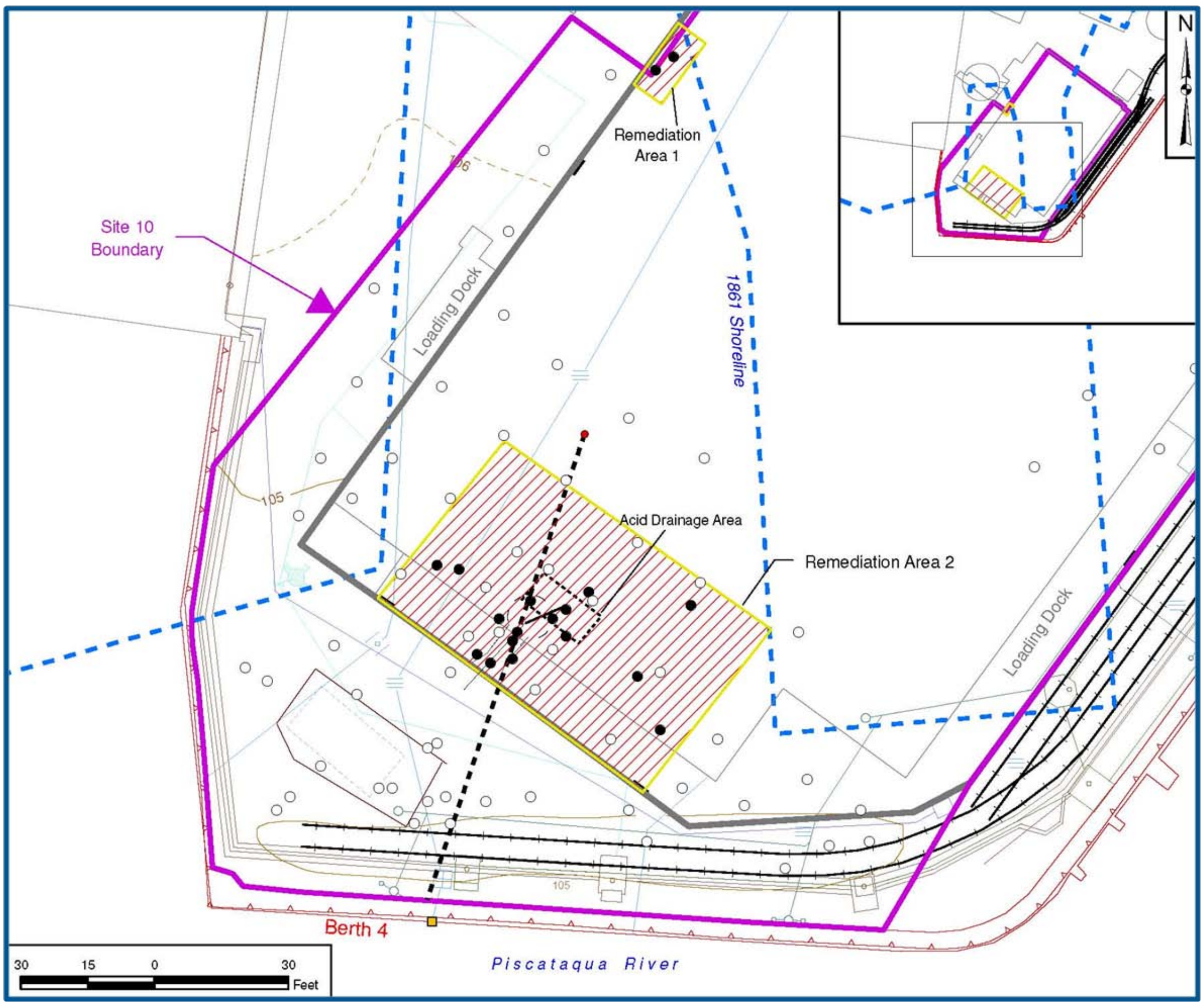


Figure 4. Impacted Area Considered in the Feasibility Study

needed to meet disposal requirements. After excavation and backfill, there would be no access restrictions at OU1; therefore, no LUCs would be required because all unacceptable risks would be addressed through removal and disposal of contaminated soil. Because no contamination would remain in excess of levels that allow for unrestricted use and unlimited exposure, five-year reviews would not be required under this alternative.

Evaluation of Alternatives

The following is a summary of the nine CERCLA-mandated criteria used to evaluate the remedial alternatives. The first two criteria are considered threshold criteria, and any alternative selected must meet them. The next five criteria are the balancing criteria. The Navy has already evaluated how well each of the cleanup alternatives meets these seven criteria as part of the OU1 FS Report. State (MEDEP) and community acceptance criteria (the last two of the nine CERCLA criteria) will be addressed after the public comment period on this Proposed Plan.

1. ***Overall Protection of Human Health and the Environment*** determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment. The alternative's protection of human health as well as plant and animal life on and near the site is considered.

2. ***Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)*** evaluates whether the alternative meets Federal and State environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.

3. ***Long-term Effectiveness and Permanence*** considers the ability of an alternative to maintain protection of human health and the environment over time.

4. ***Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment*** evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.

5. ***Short-term Effectiveness*** considers the technical and administrative feasibility of implementing the alternative and the risks the alternative poses to workers, residents, and the environment during implementation.

6. ***Implementability*** considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.

7. ***Cost*** includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over the time in terms of today's dollar value. The alternative should provide the necessary protection for a reasonable cost. Cost estimates are expected to be accurate within a range of +50 to -30 percent.

8. ***State/Support Agency Acceptance*** considers whether the State agrees with the USEPA's analyses and recommendations, as described in the RI/FS and Proposed Plan.

9. ***Community Acceptance*** considers whether the local community agrees with the USEPA's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

The remedial alternatives in the OU1 FS Report were compared in detail using the criteria noted above, as summarized in Table 1. The following is a summary of this analysis:

Overall Protection of Human Health and the Environment:

All of the alternatives, with the exception of Alternative 1: No Action, would be protective of human health and the environment.

Compliance with ARARs:

All of the alternatives, with the exception of Alternative 1: No Action, would comply with ARARs.

Long-term Effectiveness and Permanence:

Alternatives 2 and 3, which do not involve any excavation of contaminated soil, have the least long-term effectiveness and permanence because they do not remove contaminated soil above industrial and non-industrial cleanup standards, and these alternatives rely on LUCs or surface barrier with LUCs to prevent exposure to contaminated soil. Alternative 4, which provides removal of

Summary of Comparative Analysis of Alternatives

CERCLA Criterion	Alternative 1 No Action	Alternative 2 LUCs and Monitoring	Alternative 3 Surface Protection with LUCs and Monitoring	Alternative 4 Limited Excavation and Disposal with LUCs and Monitoring	Alternative 5 Excavation and Disposal
Overall Protection of Human Health and the Environment	○	◘	◘	●	●
Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)	NA	●	●	●	●
Long-Term Effectiveness and Performance	○	◘	◘	●	●
Reduction of Toxicity, Mobility, and Volume of Contaminants through Treatment	○	○	○	Only if treatment is required for transportation or disposal	Only if treatment is required for transportation or disposal
Short-Term Effectiveness	NA	●	◘	◘	○
Implementability	NA	●	◘	◘	○
State Acceptance	TBD	TBD	TBD	TBD	TBD
Community Acceptance	TBD	TBD	TBD	TBD	TBD
<u>Estimated Costs</u>					
Capital Cost	$0	$171,798	$396,136	$1,083,306	$6,154,861
Annual					
(Years 1 - 2)	$0	$11,457	$11,457	$11,457	$0
(Years 3 - 30)	$0	$11,457	$11,457	$2,750	$0
(Years 5, 15, 25)	$0	$25,575	$25,575	$25,575	$0
(Years 10, 20, 30)	$0	$52,855	$52,855	$52,855	$0
30-Year NPW	**$0**	**$393,000**	**$618,000**	**$1,212,000**	**$6,155,000**

● - High ◘ - Medium ○ - Low TBD – To be determined NA – Not applicable contaminated soil above industrial standards, but leaves some contaminated soil in place above non-industrial standards and relies on maintenance of LUCs to prevent non-industrial site use, has greater long-term effectiveness and permanence than Alternatives 2 or 3. Alternative 5, which provides removal of contaminated soil above industrial and non-industrial cleanup standards and does not require any containment systems or LUCs, has the greatest long-term effectiveness and permanence.

Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment:

Alternatives 2 and 3 would not reduce toxicity, mobility, or volume through treatment because treatment is not a component of these alternatives. Alternatives 4 and 5 do not necessarily involve treatment, but would reduce toxicity, mobility, or volume if any of the excavated soil (390 cubic yards under Alternative 4, or 6,300 cubic yards under Alternative 5) must be treated to meet transportation or disposal requirements.

Short-term Effectiveness:

Alternative 2 would have minimal short-term effectiveness concerns. Implementation of LUCs and a monitoring plan would not adversely impact the surrounding community or the environment. Alternative 3 would have more short-term effectiveness concerns than Alternative 2 related to the placement of surface protection within the Building 238 crawl space. Alternative 4 would have more short-term effectiveness concerns than Alternative 3 related to excavation activities within a portion of the crawl space. Alternative 5 would have the greatest short-term effectiveness concerns because it requires the largest volume of excavation within the crawl space and includes excavation outside the building. Alternatives 2, 3, and 4 could be implemented within 1 year and would attain the RAOs upon implementation. Alternative 5 would achieve RAOs at completion within 3 to 4 years.

Implementability:

All of the alternatives are implementable. Alternative 2 would have relatively few difficulties in implementation. Alternative 3 includes the construction of a cover and therefore is more difficult to implement than Alternative 2. Alternative 4 requires the removal of contaminated soil from beneath Building 238 while maintaining normal operations in the building and would be more difficult to implement than Alternative 3. Alternative 5 requires the removal of all soil from beneath Building 238 and all soil outside Building 238 within the OU1 boundary, making it the most difficult alternative to implement. Maintenance of LUCs and groundwater monitoring as part of Alternatives 2, 3, and 4 are equally implementable between the three alternatives.

Cost:

Costs were estimated over a 30-year period and then converted to net present worth. Costs increase from Alternative 1 through Alternative 5, in that order. The total costs (converted to net present worth) for Alternative 5 ($6,150,000) are significantly higher than the costs of Alternative 4 ($1,210,000).

Preferred Alternative

The Navy considered four different cleanup alternatives for OU1. The Navy proposes Alternative 4, Limited Excavation and Disposal with Land Use Controls and Monitoring, to address contaminated soil at OU1. You can learn more about the four alternatives considered for OU1 in the FS which is available in the Information Repositories.

The Navy proposes the following to prevent unacceptable exposure to contaminated soil at OU1:

- Excavate contaminated soil in a portion of the site and dispose soil off yard. The Navy proposes to excavate soil around the drain lines within the crawl space of Building 238 with lead concentrations greater than acceptable levels for construction workers, occupational workers, and hypothetical future recreational users (excavation areas 1 and 2 on Figure 4), conduct confirmation sampling, and backfill the area with clean soil. Soil excavation would be conducted to a depth of 2 to 3 feet bgs in the crawl space with the final depth determined based on the results of confirmation sampling. If necessary to meet disposal requirements, the excavated soil would be treated either off-yard or on-site for transportation to an off-yard treatment, storage, and disposal facility. After excavation and backfill, there would be no access restrictions to the crawl space for construction workers, occupational workers, or hypothetical future recreational users because the soil would not be contaminated by unacceptable levels of lead. Excavation based on lead concentrations also would address antimony-contaminated soil within the crawl space.

Confirmation samples would be collected from the exposed ground surface following excavation to determine whether excavation activities removed the required contamination in the vertical and horizontal directions. Confirmation samples would be analyzed for lead and the results of the samples compared to the selected cleanup levels to make this determination. If the confirmation samples showed that there was still soil with contamination above cleanup levels, the Navy would evaluate whether further excavation was necessary. The Navy would prepare a remedial action document for soil excavation, backfill and treatment and disposal of excavated soil.

Groundwater monitoring would be conducted to verify that lead has not migrated to groundwater at unacceptable levels. Monitoring would be conducted until the Navy can confirm that migration of lead contamination from soil would not result in groundwater concentrations greater than acceptable levels for human health and the environment. A groundwater monitoring plan would be prepared that would provide the requirements for monitoring including the sampling frequency, location of wells, action levels, and monitoring exit strategy.

- Implement LUCs for OU1. LUCs would prevent future residential site use unless additional action is conducted to prevent residential exposure to lead-contaminated soil within the OU1 boundary (i.e., the Site 10 boundary as shown on Figure 4). These LUCs would include maintaining current site features, including Building 238 and asphalt pavement, which prevent exposure to contaminated soil. LUCs would also include maintaining requirements for management of excavated soil as part of any future construction activities at OU1. These LUCs would become applicable to any new owner if the Navy someday transfers the property to another federal agency or non-federal ownership. The Navy would prepare and implement a LUCRD that would include the necessary LUCs, inspection and maintenance requirements, and people and organizations responsible for implementing the LUCs for OU1.

- Conduct five-year site reviews. Every five years, the Navy would be required to review the protectiveness of the cleanup, because contamination would remain in excess of levels that allow for unrestricted use and unlimited exposure. The five-year reviews would need to confirm that the remedy remains protective of human health and the environment.

The preferred alternative was selected over other alternatives because it provides the Navy's preferred balance between long-term effectiveness for current and planned future industrial use of the site (by removing soil contamination that could pose a risk to construction or occupational workers at the site), implementability, and cost. The Navy preferred Alternative 4 over Alternative 5: Excavation and Disposal, which involves complete excavation of all OU1 soil above cleanup levels for hypothetical future residential users. Alternative 5 was not selected because current and future planned use is not likely residential therefore does not warrant the higher costs, and implementability and short-term effectiveness concerns associated with complete excavation. The risk assessment for OU1 shows that lead concentrations in groundwater do not adversely impact human health and the environment, and removal of lead contamination in soil in the crawl space to reduce lead concentrations to acceptable levels for industrial land use would also eliminate potential future migration of soil contaminants to groundwater at levels that could adversely impact human health and the environment.

Based on the information available at this time, the Navy believes that the Preferred Alternative meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria (see page 9). The Navy expects the Preferred Alternative: (1) be protective of human health and the environment; (2) comply with ARARs; (3) be cost-effective; and (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The Navy may decide to change its Preferred Alternative in response to public comment or new information. After the end of the public comment period on this Proposed Plan, the Navy, with the concurrence of USEPA and after consultation with MEDEP, will document its selected remedy in a Record of Decision (ROD).

GLOSSARY OF TECHNICAL TERMS

Applicable or Relevant and Appropriate Requirements (ARARs): The federal and state environmental rules, regulations, and criteria that must be met by the selected remedy under CERCLA.

Chemicals of Concern: Site-related chemicals that are found to be risk drivers in the baseline risk assessment. Chemicals of concern may pose unacceptable human health or ecological risks.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): A federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA). The act created a special tax that goes into a trust fund to investigate and clean up abandoned or uncontrolled hazardous waste sites.

Exposure Point Concentrations: The exposure point concentrations are estimates of the average chemical concentrations in an environmental medium to which that a receptor may be exposed.

Feasibility Study (FS): A report that summarizes the development and analysis of remedial alternatives.

Five-Year Reviews: Five-year reviews are used to evaluate the implementation and performance of a remedial action in order to determine if the action continues to be protective of human health and the environment. In general, five-year reviews are required whenever a remedial action results in hazardous substances, pollutants, or contaminants remaining on site at concentrations that do not allow for "unlimited use and unrestricted exposure."

Human Health Risk Assessment (HHRA): Evaluation and estimation of current and future potential for adverse human health effects from exposure to chemicals.

Land Use Controls (LUCs): LUCs are legal, administrative, and/or physical measures designed to protect human health from unacceptable risks at sites where residual contamination remains on site. LUCs limit human exposure by restricting activity, use, and access to properties with residual contamination.

Net Present Worth (NPW): A present-worth analysis is used to evaluate costs that occur over different time periods by discounting future costs to a common base year. It represents the amount of money that, if invested in the base year and dispersed as needed, would be sufficient to cover all costs associated with the remedial action over its planned life. Net present worth considers both capital (construction) costs and costs for annual O&M.

Operable Unit (OU): Term for each of a number of separate remedial activities undertaken as part of a Superfund site cleanup. Sites with similar characteristics or in near proximity may also be grouped as one OU.

Organic Compounds: These are naturally occurring or man-made chemicals containing carbon, such as solvents, oils, and pesticides. Some organic compounds may cause cancer; however, their strength as a cancer-causing agent can vary widely. Other organics may not cause cancer but may be toxic. The concentrations that can cause harmful effects can also vary widely.

Preliminary Remediation Goals (PRGs): Chemical-specific goals for site contaminants that when achieved will result in site concentrations that pose an acceptable risk for the targeted receptor.

Record of Decision (ROD): An official document that describes the selected remedial action for a site under CERCLA. The ROD for OU1 will describe the factors that were considered in selecting the remedy and will be issued by the Navy and USEPA following consideration of public comments on the Proposed Plan.

Remedial Action: The actual construction or implementation phase of site cleanup.

Remedial Investigation (RI): An in-depth study designed to gather data needed to determine the nature and extent of contamination at a site; establish site cleanup criteria; identify preliminary alternatives for remedial action; and support technical and cost analyses of alternatives.

Treatment, Storage, and Disposal Facility: A facility that treats, stores, or disposes of hazardous wastes.

The Public's Role in Remedy Selection and Providing Formal Comments

Community input is integral to the remedy selection process. The Navy and USEPA will consider all significant comments received on the Proposed Plan in selecting the remedial action before signing the ROD for OU1 and MEDEP will consider comments before providing a concurrence letter for the ROD. The public is encouraged to participate in the decision-making process by reviewing documents, commenting on this Proposed Plan, and attending the Informational Open House and Public Hearing. To make a formal comment, you only need to speak when formal comments are being recorded at the Public Hearing on June 30, 2010, or submit a written comment(s) during the comment period.

Federal regulations require the Navy to distinguish between "formal" and "informal" comments. Although the Navy considers your comments throughout the site investigation and cleanup, the Navy is required to respond only to formal comments in writing. The Navy will not respond to your formal comments during the Public Hearing.

The Navy will review the transcript of all formal comments received at the Public Hearing and all written comments received during the public comment period before making a final remedial decision. The Navy will then prepare a written response to the formal written and oral comments received. Your formal comment will become part of the official public record. The transcript of comments and the Navy's written responses will be issued in the Responsiveness Summary of the ROD.

Navy and USEPA personnel will be available throughout the Informational Open House to discuss any questions or informal comments you have about the site and cleanup proposal.

Availability of Documents for Portsmouth Naval Shipyard

This Proposed Plan as well as documents used to support the development of the Proposed Plan are available in the Portsmouth Naval Shipyard Information Repositories located at Kittery Town Hall and Portsmouth Public Library.

Kittery Town Hall
200 Rogers Road, Ext.
Kittery, Maine 03904
Telephone: (207) 439-1633

Hours:
Monday – Friday: 9:00 – 5:00

Portsmouth Public Library
175 Parrott Avenue
Portsmouth, New Hampshire 03801
Telephone: (603) 427-1540

Hours:

Monday – Thursday:	9:00 – 9:00
Friday:	9:00 – 5:30
Saturday:	9:00 – 5:00
Sunday:	9:00 – 1:00

Further detail on the background of PNS and OU1 is provided in the OU1 RI and OU1 FS Reports, which are available for review at the Information Repositories.

Use This Space to Write Your Comments

Your input on the Proposed Plan for contamination at OU1 Portsmouth Naval Shipyard is important to the Navy, USEPA, and MEDEP. Comments provided by the public are valuable in helping to select the remedy for this site.

You may use the space below to write your comments, then fold and mail. Comments must be postmarked by July 16, 2010. Comments can be submitted via mail or fax and should be sent to the following address:

Ms. Danna Eddy
Public Affairs Office (Code 100PAO)
Portsmouth Naval Shipyard
Portsmouth, NH 03804-5000

Fax: (207) 438-1266

Name:	
Address:	
City:	
State:	Zip Code:
Telephone	

FOLD HERE

PLACE
STAMP
HERE

Ms. Danna Eddy
Public Affairs Office (Code 100PAO)
Portsmouth Naval Shipyard
Portsmouth, NH 03804-5000

Portland Press Herald June 17, 2010

Not-guilty plea entered in church rape case in N.H.

CONCORD (AP) — A man accused of raping and impregnating a teenage fellow church member more than a decade ago was denied a public defender Wednesday because he owns too much property to qualify.

Ernest Willis of Gilford appeared in court alone. Judge Gerard Boyle entered not guilty pleas on his behalf to multiple counts of rape in the 1997 case and strongly advised Willis to get a lawyer before a July 6 hearing.

"These are very serious charges," Boyle told Willis, who stood before him in a dark suit and tie.

The 51-year-old Willis declined to answer questions from reporters. He remains free on a $100,000 personal recognizance bond on two charges each of felonious sexual assault and aggravated sexual assault.

N.H. urges towns not to plan for insurance refunds

CONCORD (AP) — Municipal officials in New Hampshire are being cautioned not to budget for refunds they could receive from three public employee health insurance pools just because state officials have stepped up oversight of the funds.

State Senate majority leader Maggie Hassan, of Exeter, a sponsor of the oversight legislation, says contributing towns and cities might see refunds next year if audits show they have amassed large reserve funds.

The state firefighters union sued the Local Government Center to gain access to the nonprofit organization's books, which showed net assets in 2008 of $132 million.

Hassan said it's possible for risk pools to grow fat at the expense of contributing municipalities.

Cranmore sold; improvements are planned

NORTH CONWAY (AP) — New Hampshire's Cranmore Mountain Resort has been sold to the principals of Jiminy Peak in western Massachusetts, who plan major upgrades at the ski area in the White Mountains.

The California-based Booth Creek Resorts announced the sale Wednesday. Cranmore's general manager, Ben Wilcox, and his management team will remain at the resort.

The longtime operators of Jiminy Peak, including chief executive officer Brian Fairbank, said they plan major improvements at the North Conway ski area.

WMWV-FM reports that CNL Lifestyle Properties, a Florida-based real estate investment trust, is providing capital for the purchase and improvements.

OBITUARY NOTICES

In order to better serve you, Seacoast Media Group has established an address where both your obituary and death notice can be sent.

Please email them to:

obits@seacoastonline.com

In Loving Memory

William A. Thomson

July 28, 1932 - June 17, 1995

Forever in our hearts,
Wife, Kathleen
Daughters, Heidi & Kerry

Legal Notice

AMENDMENT TO FY 2009-2010 CDBG PROGRAM
PORTSMOUTH, NEW HAMPSHIRE

In accordance with Community Development Block Grant (CDBG) Program Entitlement Regulations, the City hereby provides notice that it is amending its FY 2009-2010 CDBG program to reflect two changes in its use of funds as follows: 1) to reprogram up to $40,000 from the existing Contingency line item to a new activity titled Manufactured Home Water Meter Upgrade Assistance. 2) to reprogram $7,000 from the existing Contingency line item to a an existing activity titled Betty's Dream Emergency Power Source.

The CDBG Citizens Advisory Committee will hold a public hearing on the amendment on Wednesday, June 23, 2010 at 6:00 p.m. in the Planning and Community Development Conference Room at Portsmouth City Hall, 1 Junkins Avenue. If the amendment is approved at that time, it will be considered to be accepted as part of the FY 2009-2010 CDBG Program. The public may comment on this amendment any time between now and the close of the public hearing. Further information regarding the proposed amendment is available at the Portsmouth Community Development Department, 1 Junkins Avenue, 610-7226.

Cindy Hayden, Deputy City Manager
#10199bp 1t P 6/17

Legal Notice

PUBLIC NOTICE

The Department of the Navy announces the availability of the Proposed Plan for public comment on the cleanup of contamination at Operable Unit (OU) 1 -Site 10 at Portsmouth Naval Shipyard (PNS). This plan was prepared under the Comprehensive Environmental Response, Compensation and liability Act (also known as Superfund). The public comment period for this Proposed Plan begins June 17, 2010 and ends July 16, 2010.

OU1 is a small peninsula located within the Controlled Industrial Area of PNS. Soil at OU1 was contaminated when piping and an underground storage tank associated with the disposal system for waste battery acid leaked. Use of the system was then discontinued. The leaks resulted in contamination in saturated soil (below the high tide water level) at concentrations that could pose a potentially unacceptable risk to human health. Therefore, site-specific cleanup levels were developed as part of a human health risk assessment.

Four alternatives were evaluated to address contamination at the site: 1) land use controls (LUCs) and monitoring, 2) surface protection with LUCs and monitoring, 3) limited excavation and disposal with LUCs and monitoring, and 4) excavation and disposal. The Navy considered the effectiveness, implementability, and cost of these alternatives. Based on the results of this evaluation, excavation and disposal of approximately 390 cubic yards of contaminated soil with LUCs and monitoring is the Navy's preferred method for addressing contamination at OU1.

Community input is integral to the remedial action selection process. The public is encouraged to review the Proposed Plan for OU1 at the following Information Repositories during normal hours of operation:

Kittery Town Hall	Portsmouth Public library
200 Rogers Road, Ext.	175 Parrott Avenue
Kittery, Maine 03904	Portsmouth, New Hampshire 03801
207-439-1633	603-427-1540

On June 30, 2010, the Navy will hold a public meeting at the Kittery Town Hall in Kittery, Maine, consisting of an informational session to be held from 6 to 8 pm where Navy personnel will be on hand to provide information and answer questions regarding the OU1 proposed cleanup. Following this informational session, the Navy will accept oral and written comments from the public from 8:00 to 8:30 pm. Written comments can also be submitted during the public comment period by mail or fax to the Navy contact listed below, and must be postmarked no later than July. 16, 2010.

Ms. Danna Eddy, Public Affairs Office (Code 100PAO)
Portsmouth Naval Shipyard,
Portsmouth, NH 03804-5000
Telephone: 207-438-1140
Fax: 207-438-1266

#21344bp 1t P 6/17

Foster's Daily Democrat June 17, 201

: Library. The meeting is regarding
) for an expanded Excavation Permit
3 Kings Highway Road, (Tax Map
rham.

our website at www.dover.nh.gov. The City of Dover reserves the right to accept any and all bids, to award the bid to other than the low bidder if deemed "bid most advantageous to the City" and to waive any defects in bids.

The Milton School District reserves the right to accept, reject, modify or negotiate any and/or all bids, or any portion thereof, in the best interest of the Milton School District.

ids | 18 Request for Bids | 17 Public Notice | 17 Public Notice | 17 Public Notice | 17 Public Notice

ATIVE UNIT FORTY FOUR
School District
Mountain Avenue
rwood, NH 03261
90 o Fax (603) 942-1295

for Qualifications

THE WORKS SERVICES
OF ADDITIONS & RENOVATIONS
TRAFFORD SCHOOL

ited to submit a Qualifications State-the-Works Services for the Construc-vations to the Strafford School, Cen-

n requirements packet for the Clerk-an be obtained by calling 603-942-hsau44.org. Prospective submitters FQ information over carefully prior to tions Statement.

alifications Statement must be sub-pe, plainly marked:

nt - Clerk-of-the-Works Services for itions To The Strafford School"

d delivered to:

The Superintendent
SAU#44
rd School District
Mountain Avenue
rwood, NH 03261

ents must be received no later than

10 at 2:00 p.m. prevailing time.

INVITATION TO BID
PLACE GARAGE DOORS –
EER TECHNICAL CENTER
hool District – SAU #11

seeking qualified bidders to provide rage Doors in the Career Technical hool.

obtained from the Office of the 603-516-6800 or by going online at: 2.nh.us/education/components/ ectiondetailid=1050& ewed between Friday, June 18, 2010 2010 during the hours of 9:00 a.m.- ntractors need to contact the Career 516-6978 to gain access to the job

pted until 1:00 p.m. on Wednesday, will be accepted after that time and itted by postal mail or hand-carried endent, McConnell Center, 61 Locust NH 03820.

bid documents should be directed to the Career Technical Center, at (603) i.amara@dover.k12.nh.us

EQUEST FOR PROPOSALS
ver School District - SAU #11
n/Build - Photovoltaic System

nd Joint Building Committee are seeking rs to provide proposals for the Design/ em at the Horne Street Elementary School over, NH.

ned from the Office of the Superintendent by going online at: us/education/components/scrapbook/ id=1050&

will be held on Thursday, June 24, 2010 te. Prospective bidders who attend the be allowed to submit a proposal. Sealed 1:00 am on Friday, July 2, 2010. No bids ime and date. Bids must be submitted by o: Office of the Superintendent, McConnell 409, Dover, NH 03820.

l documents should be directed to Michael 503) 817-0917.

PUBLIC NOTICE

The Department of the Navy announces the availability of the Proposed Plan for public comment on the cleanup of contamination at Operable Unit (OU) 1 – Site 10 at Portsmouth Naval Shipyard (PNS). This plan was prepared under the Comprehensive Environmental Response, Compensation and Liability Act (also known as Superfund). The public comment period for this Proposed Plan begins June 17, 2010 and ends July 16, 2010.

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Kittery, Maine 03904	Portsmouth, New Hampshire 03801
207-439-1633	603-427-1540

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Ms. Danna Eddy, Public Affairs Office (Code 100PAO)
Portsmouth Naval Shipyard, Portsmouth, NH 03804-5000
Telephone: 207-438-1140
Fax: 207-438-1266

KITTERY SCHOOL DEPAR
2010-2011 Vacanc

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R.W. Traip Acaden
Grades 9-12
BSN required. Experience

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Applicants must be certified or eligi appropriate certification.

Applications available at
www.kitteryschools.

CLOSING DATE: July 12,

Superintendent of Scho
Kittery School Departm
200 Rogers Road, Kittery, M

E.O.E.

GOVERNOR WENTWORTH REGIONAL SCH
Brookfield, Effingham, New D
ssipee, Tuftonboro & Wolfe

PROFESSIONAL OPENINGS FOR

Crescent Lake School
Part-time Guidance Counselor for G

Effingham Elementary Sch
Reading Specialist

Kingswood Regional Middle S
Anticipated Middle School Math Tea
Application Deadline: 6/11/10
Anticipated Special Education T
NH Certified and HQT in Math & E

Anticipated Full time 1 Year District W
Reading Coach for Grades K
Math Coach for Grades K-
Reading Coach for Grades 7
Math Coach for Grades 7-1

All positions require NH Certifi

Print your application from our w
www.govwentworth.k12.nh.
or call us at (603) 569-165

EOE

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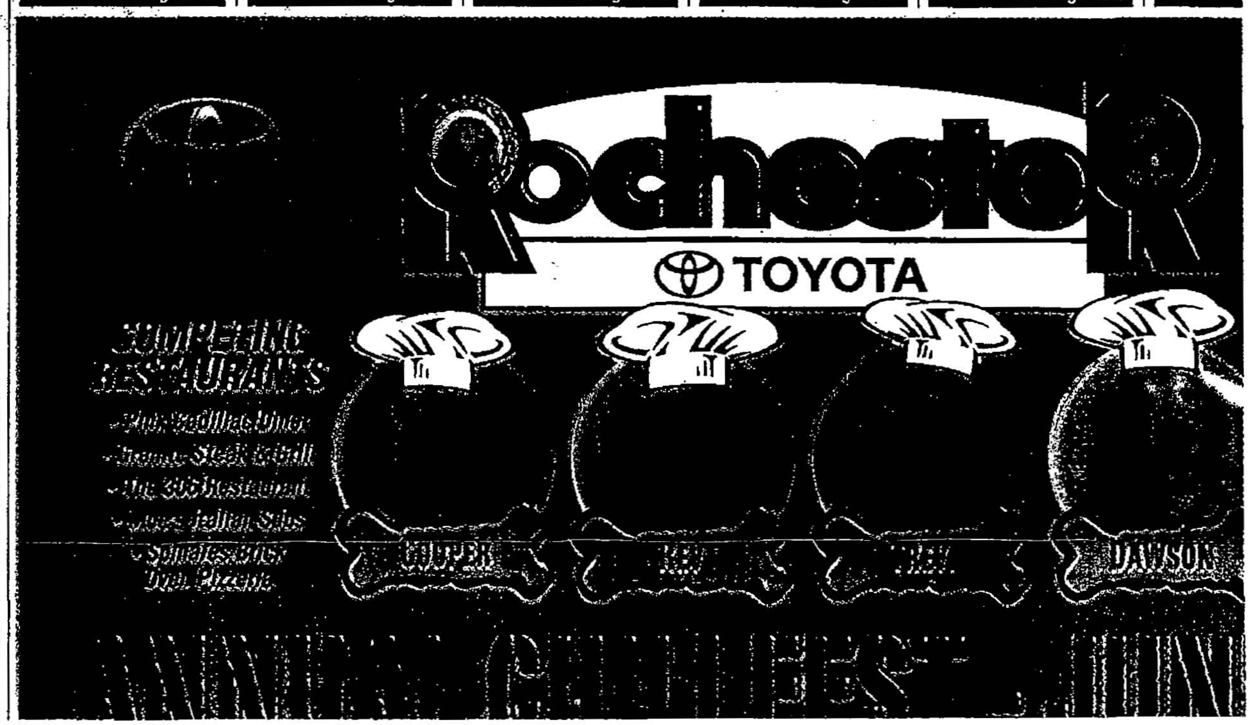


Appendix C
Comments Received During the Public Comment Period and Navy Responses

ORIGINAL

PUBLIC HEARING

Re:

Proposed Plan for Operable Unit 1

Portsmouth Naval Shipyard

Kittery, Maine

Held at:

Kittery Town Hall

200 Rogers Road

Kittery, Maine

On:

Wednesday, June 30, 2010

8:00 p.m.

Before:

Karen D. Pomeroy, RDR, CRR

MS. COLE: My name is Linda Cole from Norfolk, Virginia; and I am the remedial project manager for the cleanup work at the Portsmouth Naval Shipyard.

It's my pleasure to welcome everybody to our public hearing this evening.

We will be accepting oral comments on the proposed plan for a remedial action at Operable Unit 1 at the shipyard; and if anyone has any oral comments they'd like to make, we'll be happy to record those for the administrative record.

If you have any written comments, we will be accepting written comments until July the 16th.

If you have your written comments this evening, we can accept those this evening as well.

And right now, we'll open the meeting. The meeting will adjourn at 8:30, and we will be accepting public comments orally.

(Pause in the proceedings.)

MS. COLE: Mrs. Lepage, I understand that you have some comments that you would like to present.

MRS. LEPAGE: Yes, I have some brief remarks.

MS. COLE: Thank you. You have the floor.

MRS. LEPAGE: Where would you like me to stand for this?

MS. COLE: Wherever you're comfortable.

MRS. LEPAGE: Oh, over there.

Good evening. My name is Carolyn Lepage. I'm president of Lepage Environmental Services in Auburn, Maine.

I'm a geologist, and I'm licensed to practice in Maine and New Hampshire.

I've been the technical advisor to the Seacoast Anti-Pollution League, also known as SAPL, that's S-A-P-L, since 1996.

I have some brief remarks tonight that includes comments from Doug Bogen who's the executive director of SAPL, and I anticipate following up with written comments before the end of the public comment period.

The first point is that SAPL supports removing the contaminated soil from under Building 238 at Site 10, which has been an ongoing source of lead leaching into the environment.

Second point, which is in the form of a question, are there hot spots outside the building, for instance, adjacent to the former underground storage tank, that could or should also be removed?

The current proposal only proposes removing soil from underneath the building.

The third point: While the reported concentrations of lead in groundwater are considered low, it is significant that it is detected at all given that lead is relatively immobile, there are vast quantities of water flushing the site two times a day, and that it's been 25 years since the underground tank has been removed and the leaking pipes were no longer filled with acid.

SAPL supports the calculation of the amount of lead that has entered the offshore environment to determine the ecological effect.

Fourth point: SAPL reiterates its concern with the effect of rising sea level on shipyard sites, especially the potential to leach additional contaminants into the environment and to destabilize existing structures.

The fifth point: SAPL believes that two rounds of groundwater monitoring is insufficient to determine the effectiveness of the remedy.

Sixth point: What happens if the shipyard closes and the Navy is no longer on site to control access?

And that concludes my remarks. Thank you.

MS. COLE: Thank you.

(Pause in the proceedings.)

MS. COLE: We'll be ending the public hearing in just a minute or two.

If anyone else has any further oral comments that they would like to present, please step forward now.

(No response.)

MS. COLE: I would like to thank everyone for coming this evening and for participating in the public hearing, and we appreciate your interest and your time.

Thank you.

(Conclusion of proceedings at 8:30 p.m. this date.)

CERTIFICATE

I, Karen D. Pomeroy, a Registered Diplomate Reporter and Certified Realtime Reporter, do hereby certify that the foregoing is a true and accurate record, to the best of my knowledge, skills and ability, of the proceedings.

I further certify that I am not related to any of the parties in this matter by blood or marriage and that I am in no way interested in the outcome of this matter.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my seal of office this 2nd day of July, 2010.

Karen D. Pomeroy

Karen D. Pomeroy, RDR, CRR

My Commission expires:
July 7, 2011

Lepage Environmental Services, Inc.

P. O. Box 1195 • Auburn, Maine 04211-1195 • 207-777-1049

FAX TRANSMISSION

TO: Ms. Danna Eddy

FAX NO.: (207) 438-1266

FROM: Carolyn Lepage, C.G.

DATE & TIME: July 16, 2010 ; 2 pm

TOTAL PAGES (INCLUDING THIS ONE): 4

SUBJECT:

The following comments regarding the June 2010 "Proposed Plan for Operable Unit 1" are submitted on behalf of the Seacoast Anti-Pollution League. A hard copy is also being mailed to you.

Lepage Environmental Services, Inc.

P. O. Box 1195 • Auburn, Maine • 04211-1195 • 207-777-1049

July 15, 2010

Ms. Danna Eddy
Public Affairs Office (Code 100PAO)
Portsmouth Naval Shipyard
Portsmouth, NH 03804-5000

Subject: June 2010 *Proposed Plan for Operable Unit 1*

Dear Ms. Eddy:

This letter is submitted as requested by and on behalf of the Seacoast Anti-Pollution League (SAPL) regarding the June 2010 *Proposed Plan for Operable Unit 1, Portsmouth Naval Shipyard, Kittery, Maine* (the Proposed Plan for OU1, aka Site 10). Most of the comments below reflect oral comments presented on behalf of SAPL at the June 30, 2010, Public Hearing held at the Kittery Town Hall.

1. **Conditional Support for the Preferred Alternative.** SAPL supports removing contaminated soil from under Building 238 at Site 10, which has been an on-going source of lead leaching into the environment, subject to the caveats described below.

2. **Soil Removal Outside Building 238.** The Navy is proposing to remove soil from the crawl space under Building 238 where lead concentrations are greater than 2,000 parts per million. Are there any "hot spots" outside the building that could also be removed when contaminated soil from under Building 238 is excavated? Figure C-2 in the 2007 Remedial Investigation Report for Operable Unit 1 shows exceedances of the Navy's proposed target cleanup standard in soils at two locations outside Building 238.

Short of full-site soil removal presented as Alternative 5, SAPL would like to propose a limited removal of lead "hot spot" soil outside Building 238 identified from previous sampling, including discrete areas adjacent to the former waste acid tank. It would be unfortunate to miss an opportunity to remove additional significant lead contamination at the site if it could be accomplished with relatively little additional cost and effort.

3. Potential Offshore Impacts. SAPL has long been concerned with the potential impact on offshore ecological receptors from lead and other metals migrating from OU1, and has commented on previous Site 10/OU1 documents to this effect (see comment letters addressed to Ms. Marty Raymond dated September 14, 2004, February 4, 2003, and December 12, 2002, for example).

While the reported concentrations of lead in groundwater are considered low and not a threat to human health, SAPL believes it is significant that lead is detected in groundwater at all. Lead is relatively immobile. The fill emplaced at OU1 is highly permeable, and large quantities of water flush the site with each tide cycle. In addition, it has been over 25 years since the underground storage tank was last used to store waste battery acid, so there has presumably been no new source material added to the site for at least 25 years.

SAPL understands that the potential offshore impacts of contaminants migrating from OU1 will be evaluated and addressed, as needed, as part of OU4, which encompasses areas offshore of the shipyard. SAPL supports calculating the amount of lead that has migrated from OU1 over the years to the offshore environment, in an effort to better understand the potential and cumulative impacts of this constant low-level source of lead.

4. Affects of Rising Sea Level. SAPL reiterates its concern with the effect of rising sea level on both the contamination found at various Shipyard sites and on the remedial actions to clean up the sites. Of particular concern is the potential to leach additional contaminants into the environment and the destabilization of existing structures. How was rising sea level considered in the development and selection of the Navy's preferred alternative for OU1? What range of sea-level change was considered? What are the potential future impacts on the selected remedy as sea level rises?

5. Groundwater Monitoring. The Proposed Plan states that, for costing purposes, only two annual rounds of groundwater monitoring will be conducted to determine if the proposed contaminated fill removal will reduce concentrations of lead in groundwater. SAPL understands that a groundwater monitoring plan will be developed at a later date that will specify the location, frequency, and duration of groundwater sampling. However, for the record, SAPL believes that two rounds of data collection, one year apart, are insufficient to determine the long-term effectiveness of the selected remedy.

6. Land Use Controls and Future Site Disturbance. OU1 is currently located within the "Controlled Industrial Area", the secure industrial portion of the shipyard. But what will happen if the Shipyard closes and the Navy is no longer on-site to control access to the site?

According to the Proposed Plan, the Navy will rely on Land Use Controls (LUCs) to prevent disturbance of the features of OU1, including Building 238 and the asphalt paving surrounding the building. However, experience at other Naval facilities suggests that it may become desirable to remove Building 238, or repair the nearby quay wall (which would require disturbing pavement and contaminated fill) at some point in the future. How will the Navy allow for this contingency?

7. **Confirmation Sampling**. Page 12 of the Proposed Plan states that confirmation samples will be collected after excavation to determine if all the required contamination has been removed. However, the Plan goes on to state that if the confirmation sampling shows that there is still soil with contamination above cleanup goals, the Navy will evaluate whether further excavation was necessary.

SAPL finds this confusing. The point of the remedial action at OU1 is to remove all soil under Building 238 that exceeds the Navy's proposed cleanup standard. What would prevent the Navy from completing this goal? What are the criteria and the process for determining that soil that exceeds the cleanup standard can be left in place? How will the regulatory agencies and Restoration Advisory Board be involved in the process? How will this affect the other components of the remedy, such as LUCs?

8. **Lead Versus Antimony Contamination**. Throughout much of the Proposed Plan, the only contaminant mentioned is lead. However, as described on page 6, the risk driver under the hypothetical future residential scenario is antimony, not lead. Only someone already well acquainted with the site characterization of Site 10/OU1 would know that the removal of the lead-contaminated soil should also address the risk posed by co-located antimony. This is not clear in the Proposed Plan. If it is too late to revise the Proposed Plan, the Navy should elaborate on this point in the up-coming *Record of Decision for OU1*. Furthermore, any confirmation sampling and monitoring conducted during or after the contaminated soil removal should report the range of metals on the laboratory method analyte list, not just lead.

Please do not hesitate to contact me if you have any questions.

Sincerely,

Carolyn A. Lepage

Carolyn A. Lepage, C.G. & P.G.

cc: Doug Bogen, SAPL
Linda Cole, NAVFAC MIDLANT
Iver McLeod, MEDEP
Matthew Audet, EPA
Deborah Cohen, TetraTech

10SOU1ProposedPlan15JL0

TABLE C-1
RESPONSES TO COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD ON THE PROPOSED PLAN FOR OPERABLE UNIT 1, PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Oral comments during the June 30, 2010 public hearing and written comments dated July 15, 2010 were received from one community group, Seacoast Anti-Pollution League (SAPL), on the June 2010 Proposed Plan for OU1. No changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate based on comments received during the public comment period. A summary of the comments received and the Navy's responses to these comments are provided in the table herein.

Summary of Comments Received during the Public Comment Period and Navy Responses	
Question/Comment	**Navy Response**
SAPL indicated support for removing contaminated soil from under Building 238 at Site 10.	Comment noted.
SAPL provided a question whether there are hot spots outside the building, for instance, adjacent to the former underground storage tank that could or should be removed.	The Navy believes the location referred to is boring BA-3C, sampled in 2001, by the former tank. The soil sample collected from this boring from 6 to 10 feet below ground surface had a lead concentration of 11,300 mg/kg. The 2006 Data Gap Investigation was conducted to better delineate the nature and extent of potential hot spot areas, including around BA-3C. The soil samples collected outside Building 238 as part of the 2006 Data Gap Investigation had lead concentrations much lower than the one elevated result at BA-3C, and it was determined that there were no hot spot areas outside of Building 238. The nature and extent of contamination at OU1 is defined in the Remedial Investigation (RI) Report for OU1 (TtNUS, July 2007) based on the environmental investigations conducted at OU1. The Navy's remedy for OU1 removes contaminated soil in the crawl space of Building 238 that could pose an unacceptable risk to current site users (construction and occupational workers). There are no unacceptable risks to current site users outside the building. Therefore, there are no areas for soil removal outside Building 238 that should be included in the selected remedy for OU1.
SAPL indicated concern with potential impact to offshore ecological receptors from OU1 contaminants migrating to the offshore. Although lead was detected at low concentrations in groundwater, there is concern that it was even detected given that lead is relatively immobile, there are vast quantities of water flushing the site two times a day, and that it has been 25 years since the underground tank has been removed and the leaking pipes were no longer filled with acid. The community group supports the calculation of the amount of lead from OU1 that has entered the offshore environment to determine the ecological effect.	Because of the age of the release (1984 and earlier), sufficient information is not available to calculate loading from past releases. However, potential ecological impacts from these past releases are being evaluated as part of OU4 through the Interim Offshore Monitoring Program and Feasibility Study (FS) for OU4. Current and future potential impacts to the offshore area from migration of contaminants from OU1 were evaluated in the RI for OU1 and FS for OU1 (TtNUS, June 2010). Actual and estimated maximum potential groundwater concentrations were used as part of this evaluation, which showed that migration of soil-contamination through groundwater to the offshore would not adversely impact offshore ecological receptors.

Summary of Comments Received during the Public Comment Period and Navy Responses	
Question/Comment	**Navy Response**
SAPL indicated concern with the effect of rising sea level on the remedy for OU1, especially the potential to leach additional contaminants into the environment and to destabilize existing structures.	Contaminated soil at OU1 is already in contact with groundwater; therefore, changes in sea level would not affect the potential for contaminant migration at OU1. The Navy will conduct five-year reviews of OU1 because contamination remains in excess of levels that allow for unrestricted use and unlimited exposure. The reviews will be conducted to confirm that the remedy remains protective of human health and the environment, and include evaluation of changes in site conditions that could impact the effectiveness of the remedy.
SAPL provided a comment that two rounds of groundwater monitoring are insufficient to determine the long-term effectiveness of the remedy.	Comment noted. The Navy will prepare a groundwater monitoring plan that will provide the requirements for groundwater monitoring including the sampling frequency, locations of wells, action levels, and monitoring exit strategy. Actual sample numbers, locations, and analytical lists will be established in accordance with the USEPA Data Quality Objective process, with regulatory and RAB input, and will be provided in the monitoring plan.
SAPL asked what happens if the shipyard closes and the Navy is no longer on site to control access and if site features (e.g., Building 238 or quay wall) need to be repaired, modified, or removed.	Land Use Controls (LUCs) will be implemented within the OU1 boundary through a LUC Remedial Design (LUC RD). The LUC RD will indicate LUC-related procedures pertaining to ground-disturbing activity and changes in land use, including property transfer. The Navy is responsible for implementing, maintaining, reporting on, and enforcing the LUCs. Although the Navy may later transfer these procedural responsibilities to another party by contract, property transfer agreement, or through other means, the Navy shall retain ultimate responsibility for the remedy integrity.
SAPL asked what the decisions process will be to determine whether contamination remains after soil removal, how the regulators and RAB will be involved in the decision process, and what impacts there may be to other components of the remedy, such as LUCs.	The Navy will prepare a remedial action work plan that will specify the requirements for excavation, confirmation sampling, and decisions based on the results of the confirmation sampling. After construction activities are complete, the Navy will prepare a remedial action construction completion report that will provide the results of confirmation sampling and decisions based on the results. The remedial action work plan and construction completion report are primary documents that will be provided for regulatory and RAB review in accordance with the project schedule.
SAPL indicated that the Proposed Plan is not clear that removal of lead-contaminated soil in the crawl space of Building 238 would also address risk (to residents) posed by collocated antimony contamination and this information should be included in the ROD. In addition, confirmation sampling should report the range of metals on the laboratory method analyte list and not just lead.	Information is included in the ROD for OU1 to indicate that the removal of contaminated soil as part of the selected remedy will address unacceptable risks for hypothetical residential exposure to antimony-contaminated soil within the crawl space. The Navy will prepare a remedial action work plan with regulatory and RAB input that will provide the requirements for confirmation sampling for contaminants of concern (COC) for OU1.

Appendix D
Human Health Risk Tables

TABLE 3.1
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY - SOIL OUTSIDE BUILDING 238 (0 - 2 FT BGS)
SITE 10
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Outside Buillding 238 (0-2 ft)

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
BARIUM	mg/kg	104	125	193		mg/kg	125	Student-t	PROUCL (1)	125	Student-t	PROUCL (1)
LEAD	mg/kg	766	970	1640		mg/kg	766	Average	(2)	766	Average	(2)
MERCURY	mg/kg	1	1.3	1.9		mg/kg	1.3	Student-t	PROUCL (2)	1.3	Student-t	PROUCL (2)
THALLIUM	mg/kg	0.19	0.26	0.58	J	mg/kg	0.26	95% UCL	PROUCL (3)	0.26	95% UCL	PROUCL (3)

Footnotes:

1 - ProUCL indicates data are normally distributed.

2 - The EPC for lead is the arithmetic average, as recommended by USEPA guidance (USEPA, October 2006).

3 - Gamma distribution. ProUCL recommends Approximate Gamma 95% UCL as the EPC.

TABLE 3.2
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY - SOIL OUTSIDE BUILDING 238 (0 - 6 FT BGS)
SITE 10
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Outside Buillding 238 (0-6 ft)

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
BARIUM	mg/kg	109	132	448		mg/kg	168	95% UCL	PROUCL (1)	168	95% UCL	PROUCL (1)
LEAD	mg/kg	884	1040	2200		mg/kg	884	Average	(2)	884	Average	(2)
MERCURY	mg/kg	1.2	1.5	6.7		mg/kg	3.3	99% UCL	PROUCL (3)	3.3	99% UCL	PROUCL (3)
THALLIUM	mg/kg	0.22	0.29	0.58	J	mg/kg	0.28	95% UCL	PROUCL (4)	0.28	95% UCL	PROUCL (4)

Footnotes:

1 - Non-parametric distribution. ProUCL recommends 95% Chebyshev (Mean, Std) UCL as the EPC.
2 - The EPC for lead is the arithmetic average, as recommended by USEPA guidance (USEPA, October 2006).
3 - Non-parametric distribution. ProUCL recommends 99% Chebyshev (Mean, Std) UCL as the EPC.
4 - Lognormal distribution. ProUCL recommends H-UCL as the EPC.

TABLE 3.3
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY - SOIL UNDER BUILDING 238 (0 - 6 FT BGS)
SITE 10
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Under Buillding 238 (0-6 ft)

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
ANTIMONY	mg/kg	120	265	1580	J	mg/kg	536	99% UCL	PROUCL (1)	536	99% UCL	PROUCL (1)
BARIUM	mg/kg	180	250	887		mg/kg	357	95% UCL	PROUCL (2)	357	95% UCL	PROUCL (2)
LEAD	mg/kg	34600	53300	175000		mg/kg	34600	Average	(3)	34600	Average	(3)
MERCURY	mg/kg	3.2	5.8	30	J	mg/kg	9.8	95% UCL	PROUCL (2)	9.8	95% UCL	PROUCL (2)
THALLIUM	mg/kg	0.64	0.96	2.8	J	mg/kg	1.1	95% UCL	PROUCL (4)	1.1	95% UCL	PROUCL (4)

Footnotes:

1 - Lognormal distribution. ProUCL recommends 99% Chebyshev (MVUE) UCL as the EPC.
2 - Non-parametric distribution. ProUCL recommends 95% Chebyshev (Mean, Std) UCL as the EPC.
3 - The EPC for lead is the arithmetic average, as recommended by USEPA guidance (USEPA, October 2006).
4 - Gamma distribution. ProUCL recommends Approximate Gamma 95% UCL as the EPC.

TABLE 5.1
NON-CANCER TOXICITY DATA -- ORAL/DERMAL
SITE 10
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal[1]	Absorbed RfD for Dermal[2]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s)
Inorganics										
Antimony	Chronic	4.0E-04	mg/kg/day	0.15	6.0E-05	mg/kg/day	Blood	1000/1	IRIS	11/2006
Barium	Chronic	2.0E-01	mg/kg/day	0.07	1.4E-02	mg/kg/day	Kidney	300/1	IRIS	11/2006
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury[3]	Chronic	3.0E-04	mg/kg/day	0.07	2.1E-05	mg/kg/day	CNS	1000/1	IRIS	11/2006
Thallium	chronic	7.0E-05	mg/kg-day	1	7.00E-05	mg/kg-day	Liver	3000	EPA 3	10/31//2006

Notes:
1 - USEPA, 2004: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.
2 - Adjusted dermal RfD = Oral RfD x Oral Absorption Efficiency for Dermal.
3 - Values are for mercuric chloride.

Definitions:
CNS = Central Nervous System
EPA 3 = USEPA Region 3 RBC Table, October 31, 2006.
IRIS = Integrated Risk Information System
NA = Not Applicable

TABLE 5.2
NON-CANCER TOXICITY DATA -- INHALATION
SITE 10
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Extrapolated RfD[1]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s)
Metals									
Barium	Chronic	5.0E-04	mg/m^3	1.4E-04	(mg/kg/day)	Fetus	1000/1	HEAST	7/1997

Notes:

1 - Extrapolated RfD = RfC *$20m^3$/day / 70 kg

Definitions:

HEAST= Health Effects Assessment Summary Tables

TABLE 7.1 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CONSTRUCTION/EXCAVATION WORKERS TO SOIL OUTSIDE BUILDING 238
SITE 10
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil Outside Building 238 (0- 2 ft)
Receptor Population: Construction/Excavation Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	LEAD	7.66E+02	mg/kg	7.66E+02	mg/kg	M	1.5E-03	mg/kg-day		mg/kg-day	NA	NA	
	MERCURY	1.30E+00	mg/kg	1.30E+00	mg/kg	M	2.5E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	8.4E-03
	THALLIUM	2.60E-01	mg/kg	2.60E-01	mg/kg	M	5.0E-07	mg/kg-day	7.0E-05	mg/kg-day	NA	NA	7.2E-03
	(total)												**1.6E-02**
Dermal	LEAD	7.66E+02	mg/kg	7.66E+02	mg/kg	M		mg/kg-day		mg/kg-day	NA	NA	
	MERCURY	1.30E+00	mg/kg	1.30E+00	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	THALLIUM	2.60E-01	mg/kg	2.60E-01	mg/kg	M		mg/kg-day	7.0E-05	mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	**1.6E-02**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

Metals (other than arsenic and cadmium) - not evaluated for dermal contact with soil.

TABLE 7.2 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CONSTRUCTION/EXCAVATION WORKERS TO SOIL OUTSIDE BUILDING 238
SITE 10
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil Outside Building 238 (0- 6 ft)
Receptor Population: Construction/Excavation Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	LEAD	8.84E+02	mg/kg	8.84E+02	mg/kg	M	1.7E-03	mg/kg-day		mg/kg-day	NA	NA	
	MERCURY	3.30E+00	mg/kg	3.30E+00	mg/kg	M	6.4E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.1E-02
	THALLIUM	2.80E-01	mg/kg	2.80E-01	mg/kg	M	5.4E-07	mg/kg-day	7.0E-05	mg/kg-day	NA	NA	7.7E-03
	(total)												2.9E-02
Dermal	LEAD	8.84E+02	mg/kg	8.84E+02	mg/kg	M		mg/kg-day		mg/kg-day	NA	NA	
	MERCURY	3.30E+00	mg/kg	3.30E+00	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	THALLIUM	2.80E-01	mg/kg	2.80E-01	mg/kg	M		mg/kg-day	7.0E-05	mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	**2.9E-02**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

Metals (other than arsenic and cadmium) - not evaluated for dermal contact with soil.

TABLE 7.3 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF CONSTRUCTION/EXCAVATION WORKERS TO SOIL UNDER BUILDING 238
SITE 10
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil Under Building 238 (0- 6 ft)
Receptor Population: Construction/Excavation Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	ANTIMONY	5.36E+02	mg/kg	5.36E+02	mg/kg	M	2.1E-04	mg/kg-day	4.0E-04	mg/kg-day	NA	NA	5.2E-01
	BARIUM	3.57E+02	mg/kg	3.57E+02	mg/kg	M	1.4E-04	mg/kg-day	2.0E-01	mg/kg-day	NA	NA	6.9E-04
	LEAD	3.81E+04	mg/kg	3.81E+04	mg/kg	M	1.5E-02	mg/kg-day		mg/kg-day	NA	NA	
	MERCURY	9.80E+00	mg/kg	9.80E+00	mg/kg	M	3.8E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	1.3E-02
	THALLIUM	1.10E+00	mg/kg	1.10E+00	mg/kg	M	4.3E-07	mg/kg-day	7.0E-05	mg/kg-day	NA	NA	6.1E-03
	(total)												**5.4E-01**
Dermal	ANTIMONY	5.36E+02	mg/kg	5.36E+02	mg/kg	M		mg/kg-day	6.0E-05	mg/kg-day	NA	NA	
	BARIUM	3.57E+02	mg/kg	3.57E+02	mg/kg	M		mg/kg-day	1.4E-02	mg/kg-day	NA	NA	
	LEAD	3.81E+04	mg/kg	3.81E+04	mg/kg	M		mg/kg-day		mg/kg-day	NA	NA	
	MERCURY	9.80E+00	mg/kg	9.80E+00	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	THALLIUM	1.10E+00	mg/kg	1.10E+00	mg/kg	M		mg/kg-day	7.0E-05	mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	**5.4E-01**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

Metals (other than arsenic and cadmium) - not evaluated for dermal contact with soil.

TABLE 7.4 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF OCCUPATIONAL WORKERS TO SOIL OUTSIDE BUILDING 238
SITE 10
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil Outside Building 238 (0- 2 ft)
Receptor Population: Occupational Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	LEAD	7.66E+02	mg/kg	7.66E+02	mg/kg	M	4.5E-04	mg/kg-day		mg/kg-day	NA	NA	
	MERCURY	1.30E+00	mg/kg	1.30E+00	mg/kg	M	7.6E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.5E-03
	THALLIUM	2.60E-01	mg/kg	2.60E-01	mg/kg	M	1.5E-07	mg/kg-day	7.0E-05	mg/kg-day	NA	NA	2.2E-03
	(total)												4.7E-03
Dermal	LEAD	7.66E+02	mg/kg	7.66E+02	mg/kg	M		mg/kg-day		mg/kg-day	NA	NA	
	MERCURY	1.30E+00	mg/kg	1.30E+00	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	THALLIUM	2.60E-01	mg/kg	2.60E-01	mg/kg	M		mg/kg-day	7.0E-05	mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	**4.7E-03**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

Metals (other than arsenic and cadmium) - not evaluated for dermal contact with soil.

TABLE 7.5 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE CHILD RECREATIONAL USERS TO SOIL OUTSIDE BUILDING 238
SITE 10
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil Outside Building 238 (0- 2 ft)
Receptor Population: Recreational Users
Receptor Age: Child (0 - 6 years)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	LEAD	7.66E+02	mg/kg	7.66E+02	mg/kg	M	7.3E-04	mg/kg-day		mg/kg-day	NA	NA	
	MERCURY	1.30E+00	mg/kg	1.30E+00	mg/kg	M	1.2E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	4.1E-03
	THALLIUM	2.60E-01	mg/kg	2.60E-01	mg/kg	M	2.5E-07	mg/kg-day	7.0E-05	mg/kg-day	NA	NA	3.5E-03
	(total)												**7.6E-03**
Dermal	LEAD	7.66E+02	mg/kg	7.66E+02	mg/kg	M		mg/kg-day		mg/kg-day	NA	NA	
	MERCURY	1.30E+00	mg/kg	1.30E+00	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	THALLIUM	2.60E-01	mg/kg	2.60E-01	mg/kg	M		mg/kg-day	7.0E-05	mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	**7.6E-03**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

Metals (other than arsenic and cadmium) - not evaluated for dermal contact with soil.

TABLE 7.6 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE ADULT RECREATIONAL USERS TO SOIL OUTSIDE BUILDING 238
SITE 10
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil Outside Building 238 (0- 2 ft)
Receptor Population: Recreational Users
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	LEAD	7.66E+02	mg/kg	7.66E+02	mg/kg	M	7.8E-05	mg/kg-day		mg/kg-day	NA	NA	
	MERCURY	1.30E+00	mg/kg	1.30E+00	mg/kg	M	1.3E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	4.4E-04
	THALLIUM	2.60E-01	mg/kg	2.60E-01	mg/kg	M	2.6E-08	mg/kg-day	7.0E-05	mg/kg-day	NA	NA	3.8E-04
	(total)												8.2E-04
Dermal	LEAD	7.66E+02	mg/kg	7.66E+02	mg/kg	M		mg/kg-day		mg/kg-day	NA	NA	
	MERCURY	1.30E+00	mg/kg	1.30E+00	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	THALLIUM	2.60E-01	mg/kg	2.60E-01	mg/kg	M		mg/kg-day	7.0E-05	mg/kg-day	NA	NA	
	(total)												
Total Hazard Index Across All Exposure Routes/Pathways													8.2E-04

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

Metals (other than arsenic and cadmium) - not evaluated for dermal contact with soil.

TABLE 7.7 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE CHILD RESIDENTS TO SOIL OUTSIDE BUILDING 238
SITE 10
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil Outside Building 238 (0- 2 ft)
Receptor Population: Residents
Receptor Age: Child (0 - 6 years)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	LEAD	7.66E+02	mg/kg	7.66E+02	mg/kg	M	4.2E-03	mg/kg-day		mg/kg-day	NA	NA	
	MERCURY	1.30E+00	mg/kg	1.30E+00	mg/kg	M	7.1E-06	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.4E-02
	THALLIUM	2.60E-01	mg/kg	2.60E-01	mg/kg	M	1.4E-06	mg/kg-day	7.0E-05	mg/kg-day	NA	NA	2.0E-02
	(total)												4.4E-02
Dermal	LEAD	7.66E+02	mg/kg	7.66E+02	mg/kg	M		mg/kg-day		mg/kg-day	NA	NA	
	MERCURY	1.30E+00	mg/kg	1.30E+00	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	THALLIUM	2.60E-01	mg/kg	2.60E-01	mg/kg	M		mg/kg-day	7.0E-05	mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	**4.4E-02**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

Metals (other than arsenic and cadmium) - not evaluated for dermal contact with soil.

TABLE 7.8 - REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS FROM EXPOSURE OF FUTURE ADULT RESIDENTS TO SOIL OUTSIDE BUILDING 238
SITE 10
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Soil Outside Building 238 (0- 2 ft)
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	LEAD	7.66E+02	mg/kg	7.66E+02	mg/kg	M	4.5E-04	mg/kg-day		mg/kg-day	NA	NA	
	MERCURY	1.30E+00	mg/kg	1.30E+00	mg/kg	M	7.6E-07	mg/kg-day	3.0E-04	mg/kg-day	NA	NA	2.5E-03
	THALLIUM	2.60E-01	mg/kg	2.60E-01	mg/kg	M	1.5E-07	mg/kg-day	7.0E-05	mg/kg-day	NA	NA	2.2E-03
	(total)												**4.7E-03**
Dermal	LEAD	7.66E+02	mg/kg	7.66E+02	mg/kg	M		mg/kg-day		mg/kg-day	NA	NA	
	MERCURY	1.30E+00	mg/kg	1.30E+00	mg/kg	M		mg/kg-day	2.1E-05	mg/kg-day	NA	NA	
	THALLIUM	2.60E-01	mg/kg	2.60E-01	mg/kg	M		mg/kg-day	7.0E-05	mg/kg-day	NA	NA	
	(total)												
												Total Hazard Index Across All Exposure Routes/Pathways	**4.7E-03**

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

Metals (other than arsenic and cadmium) - not evaluated for dermal contact with soil.

TABLE 7.9. REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS
EXPOSURE OF CONSTRUCTION/EXCAVATION WORKERS BY INHALATION FROM SURFACE SOIL OUTSIDE BUILDING 238
SITE 10
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Outside Building 238 (0-2 ft)
Receptor Population: Construction/Excavation Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Barium	1.25E+02	mg/kg	8.71E-05	mg/m^3	R	1.4E-05	mg/kg-day	1.43E-04	mg/kg-day	5.00E-04	mg/m^3	9.5E-02
	(total)												9.5E-02
												Total Hazard Index Across All Exposure Routes/Pathways	9.5E-02

TABLE 7.10. REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS
EXPOSURE OF CONSTRUCTION/EXCAVATION WORKERS BY INHALATION FROM SURFACE/SUBSURFACE SOIL OUTSIDE BUILDING 238
SITE 10
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Outside Building 238
Receptor Population: Construction/Excavation Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Barium	1.68E+02	mg/kg	1.17E-04	mg/m^3	R	1.8E-05	mg/kg-day	1.43E-04	mg/kg-day	5.00E-04	mg/m^3	1.3E-01
	(total)												1.3E-01
												Total Hazard Index Across All Exposure Routes/Pathways	1.3E-01

TABLE 7.12. REASONABLE MAXIMUM EXPOSURE (RME)
CALCULATION OF NON-CANCER HAZARDS
EXPOSURE OF CONSTRUCTION/EXCAVATION WORKERS BY INHALATION FROM SURFACE/SUBSURFACE SOIL UNDER BUILDING 238
SITE 10
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Under Building 238
Receptor Population: Construction/Excavation Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Barium	3.57E+02	mg/kg	2.49E-04	mg/m^3	R	7.7E-06	mg/kg-day	1.43E-04	mg/kg-day	5.00E-04	mg/m^3	5.4E-02
	(total)												5.4E-02
												Total Hazard Index Across All Exposure Routes/Pathways	5.4E-02

Calculations of Blood Lead Concentrations (PbBs) - Adult Recreational User - Surface Soil Outside Building 238

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/03

Exposure Variable	PbB Equation[1]		Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario			
					Using Equation 1		Using Equation 2	
	1*	2**			GSDi = Hom	GSDi = Het	GSDi = Hom	GSDi = Het
PbS	X	X	Soil lead concentration	ug/g or ppm	766	766	766	766
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	2.0	2.0	2.0	2.0
PbB_0	X	X	Baseline PbB	ug/dL	1.98	1.98	1.98	1.98
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0.050	0.050
W_S		X	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	1.0	1.0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0.7	0.7
$AF_{S,D}$	X	X	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12
$EF_{S,D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	52	52	52	52
$AT_{S,D}$	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PbB_{adult}			**PbB of adult worker, geometric mean**	ug/dL	**2.2**	**2.2**	**2.2**	**2.2**
$PbB_{fetal, 0.95}$			**95th percentile PbB among fetuses of adult workers**	ug/dL	**6.3**	**6.3**	**6.3**	**6.3**
PbB_t			**Target PbB level of concern (e.g., 10 ug/dL)**	ug/dL	**10.0**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$			**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	%	**1.0%**	**1.0%**	**1.0%**	**1.0%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}).
When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{fetal,0.95}$.

***Equation 1, based on Eq. 1, 2 in USEPA (1996).**

PbB_{adult} =	$(PbS*BKSF*IR_{S+D}*AF_{S,D}*EF_S/AT_{S,D}) + PbB_0$
$PbB_{fetal, 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

****Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (1996).**

PbB_{adult} =	$PbS*BKSF*([(IR_{S+D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S+D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$
$PbB_{fetal, 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

Calculations of Preliminary Remediation Goals (PRGs)

Calculations of Blood Lead Concentrations (PbBs) - Adult Recreational User - Surface/Subsurface Soil Outside Building 238

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/03

Exposure Variable	PbB Equation[1] 1*	PbB Equation[1] 2**	Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario: Using Equation 1 GSDi = Hom	Using Equation 1 GSDi = Het	Using Equation 2 GSDi = Hom	Using Equation 2 GSDi = Het
PbS	X	X	Soil lead concentration	ug/g or ppm	884	884	884	884
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	2.0	2.0	2.0	2.0
PbB_0	X	X	Baseline PbB	ug/dL	1.98	1.98	1.98	1.98
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0.050	0.050
W_S		X	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	1.0	1.0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0.7	0.7
$AF_{S,D}$	X	X	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12
$EF_{S,D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	52	52	52	52
$AT_{S,D}$	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PbB_{adult}			**PbB of adult worker, geometric mean**	**ug/dL**	**2.3**	**2.3**	**2.3**	**2.3**
$PbB_{fetal, 0.95}$			**95th percentile PbB among fetuses of adult workers**	**ug/dL**	**6.4**	**6.4**	**6.4**	**6.4**
PbB_t			**Target PbB level of concern (e.g., 10 ug/dL)**	**ug/dL**	**10.0**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$			**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**1.1%**	**1.1%**	**1.1%**	**1.1%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}).
When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{fetal,0.95}$.

***Equation 1, based on Eq. 1, 2 in USEPA (1996).**

PbB_{adult} =	$(PbS*BKSF*IR_{S+D}*AF_{S,D}*EF_S/AT_{S,D}) + PbB_0$
$PbB_{fetal, 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

****Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (1996).**

PbB_{adult} =	$PbS*BKSF*([(IR_{S+D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S+D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$
$PbB_{fetal, 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

Calculations of Blood Lead Concentrations (PbBs) - Adult Recreational User - Surface/Subsurface Soil Under Building 238

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/03

Exposure Variable	PbB Equation[1] 1*	PbB Equation[1] 2**	Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario: Using Equation 1, GSDi = Hom	Using Equation 1, GSDi = Het	Using Equation 2, GSDi = Hom	Using Equation 2, GSDi = Het
PbS	X	X	Soil lead concentration	ug/g or ppm	34600	34600	34600	34600
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	2.0	2.0	2.0	2.0
PbB_0	X	X	Baseline PbB	ug/dL	1.98	1.98	1.98	1.98
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0.050	0.050
W_S		X	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	1.0	1.0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0.7	0.7
$AF_{S, D}$	X	X	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12
$EF_{S, D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	52	52	52	52
$AT_{S, D}$	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PbB_{adult}			**PbB of adult worker, geometric mean**	**ug/dL**	**13.8**	**13.8**	**13.8**	**13.8**
$PbB_{fetal, 0.95}$			**95th percentile PbB among fetuses of adult workers**	**ug/dL**	**38.9**	**38.9**	**38.9**	**38.9**
PbB_t			**Target PbB level of concern (e.g., 10 ug/dL)**	**ug/dL**	**10.0**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$			**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**62.3%**	**62.3%**	**62.3%**	**62.3%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}). When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{fetal,0.95}$.

***Equation 1, based on Eq. 1, 2 in USEPA (1996).**

PbB_{adult} =	$(PbS*BKSF*IR_{S+D}*AF_{S,D}*EF_S/AT_{S,D}) + PbB_0$
$PbB_{fetal, 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

****Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (1996).**

PbB_{adult} =	$PbS*BKSF*([(IR_{S+D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S+D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$
$PbB_{fetal, 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

Calculations of Blood Lead Concentrations (PbBs) - Occupational Worker - Surface Soil Outside Building 238

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/03

Exposure Variable	PbB Equation		Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario			
					Using Equation 1		Using Equation 2	
	1*	2**			GSDi = Hom	GSDi = Het	GSDi = Hom	GSDi = Het
PbS	X	X	Soil lead concentration	ug/g or ppm	766	766	766	766
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	2.0	2.0	2.0	2.0
PbB_0	X	X	Baseline PbB	ug/dL	1.98	1.98	1.98	1.98
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0.050	0.050
W_S		X	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	1.0	1.0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0.7	0.7
$AF_{S, D}$	X	X	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12
$EF_{S, D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	150	150	150	150
$AT_{S, D}$	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PbB_{adult}			**PbB of adult worker, geometric mean**	**ug/dL**	**2.7**	**2.7**	**2.7**	**2.7**
$PbB_{fetal, 0.95}$			**95th percentile PbB among fetuses of adult workers**	**ug/dL**	**7.7**	**7.7**	**7.7**	**7.7**
PbB_t			**Target PbB level of concern (e.g., 10 ug/dL)**	**ug/dL**	**10.0**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$			**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**2.2%**	**2.2%**	**2.2%**	**2.2%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}).
When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{fetal,0.95}$.

***Equation 1, based on Eq. 1, 2 in USEPA (1996).**

$$PbB_{adult} = (PbS*BKSF*IR_{S+D}*AF_{S,D}*EF_S/AT_{S,D}) + PbB_0$$

$$PbB_{fetal, 0.95} = PbB_{adult} * (GSD_i^{1.645} * R)$$

****Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (1996).**

$$PbB_{adult} = PbS*BKSF*([(IR_{S+D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S+D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$$

$$PbB_{fetal, 0.95} = PbB_{adult} * (GSD_i^{1.645} * R)$$

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

Calculations of Blood Lead Concentrations (PbBs) - Occupational Worker - Surface/Subsurface Soil Outside Building 238

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/03

Exposure Variable	PbB Equation 1*	PbB Equation 2**	Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario: Using Equation 1[1] GSDi = Hom	Using Equation 1[1] GSDi = Het	Using Equation 2 GSDi = Hom	Using Equation 2 GSDi = Het
PbS	X	X	Soil lead concentration	ug/g or ppm	884	884	884	884
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	2.0	2.0	2.0	2.0
PbB_0	X	X	Baseline PbB	ug/dL	1.98	1.98	1.98	1.98
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0.050	0.050
W_S		X	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	1.0	1.0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0.7	0.7
$AF_{S,D}$	X	X	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12
$EF_{S,D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	150	150	150	150
$AT_{S,D}$	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PbB_{adult}			**PbB of adult worker, geometric mean**	ug/dL	**2.9**	**2.9**	**2.9**	**2.9**
$PbB_{fetal, 0.95}$			**95th percentile PbB among fetuses of adult workers**	ug/dL	**8.0**	**8.0**	**8.0**	**8.0**
PbB_t			**Target PbB level of concern (e.g., 10 ug/dL)**	ug/dL	**10.0**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$			**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	%	**2.5%**	**2.5%**	**2.5%**	**2.5%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}).
When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{fetal,0.95}$.

***Equation 1, based on Eq. 1, 2 in USEPA (1996).**

PbB_{adult} =	$(PbS*BKSF*IR_{S+D}*AF_{S,D}*EF_S/AT_{S,D}) + PbB_0$
$PbB_{fetal, 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

****Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (1996).**

PbB_{adult} =	$PbS*BKSF*([(IR_{S+D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S+D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$
$PbB_{fetal, 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

Calculations of Preliminary Remediation Goals (PRGs)

Calculations of Blood Lead Concentrations (PbBs) - Occupational Worker - Surface/Subsurface Soil Under Building 238

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/03

Exposure Variable	PbB Equation[1]		Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario			
					Using Equation 1		Using Equation 2	
	1*	2**			GSDi = Hom	GSDi = Het	GSDi = Hom	GSDi = Het
PbS	X	X	Soil lead concentration	ug/g or ppm	34600	34600	34600	34600
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	2.0	2.0	2.0	2.0
PbB_0	X	X	Baseline PbB	ug/dL	1.98	1.98	1.98	1.98
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050	0.050	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0.050	0.050
W_S		X	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	1.0	1.0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0.7	0.7
$AF_{S,D}$	X	X	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12
$EF_{S,D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	150	150	150	150
$AT_{S,D}$	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PbB_{adult}			**PbB of adult worker, geometric mean**	**ug/dL**	**36.1**	**36.1**	**36.1**	**36.1**
$PbB_{fetal,0.95}$			**95th percentile PbB among fetuses of adult workers**	**ug/dL**	**101.6**	**101.6**	**101.6**	**101.6**
PbB_t			**Target PbB level of concern (e.g., 10 ug/dL)**	**ug/dL**	**10.0**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$			**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**95.5%**	**95.5%**	**95.5%**	**95.5%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}).
When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{fetal,0.95}$.

***Equation 1, based on Eq. 1, 2 in USEPA (1996).**

PbB_{adult} =	$(PbS*BKSF*IR_{S+D}*AF_{S,D}*EF_S/AT_{S,D}) + PbB_0$
$PbB_{fetal,0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

****Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (1996).**

PbB_{adult} =	$PbS*BKSF*([(IR_{S+D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S+D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$
$PbB_{fetal,0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

Calculations of Blood Lead Concentrations (PbBs) - Construction Worker - Surface Soil Outside Building 238

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/03

Exposure Variable	PbB Equation[1] 1*	PbB Equation[1] 2**	Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario: Using Equation 1: GSDi = Hom	Using Equation 1: GSDi = Het	Using Equation 2: GSDi = Hom	Using Equation 2: GSDi = Het
PbS	X	X	Soil lead concentration	ug/g or ppm	766	766	766	766
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	2.0	2.0	2.0	2.0
PbB_0	X	X	Baseline PbB	ug/dL	1.98	1.98	1.98	1.98
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0.100	0.100	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0.100	0.100
W_S		X	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	1.0	1.0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0.7	0.7
$AF_{S,D}$	X	X	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12
$EF_{S,D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	150	150	150	150
$AT_{S,D}$	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PbB_{adult}			PbB of adult worker, geometric mean	ug/dL	3.5	3.5	3.5	3.5
$PbB_{fetal, 0.95}$			95th percentile PbB among fetuses of adult workers	ug/dL	9.8	9.8	9.8	9.8
PbB_t			Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	10.0	10.0	10.0	10.0
$P(PbB_{fetal} > PbB_t)$			Probability that fetal PbB > PbB_t, assuming lognormal distribution	%	4.7%	4.7%	4.7%	4.7%

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}).
When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{fetal,0.95}$.

***Equation 1, based on Eq. 1, 2 in USEPA (1996).**

PbB_{adult} =	$(PbS*BKSF*IR_{S+D}*AF_{S,D}*EF_S/AT_{S,D}) + PbB_0$
$PbB_{fetal, 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

****Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (1996).**

PbB_{adult} =	$PbS*BKSF*([(IR_{S+D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S+D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$
$PbB_{fetal, 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

Calculations of Preliminary Remediation Goals (PRGs)

Calculations of Blood Lead Concentrations (PbBs) - Construction Worker - Surface/Subsurface Soil Outside Building 238

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/03

Exposure Variable	PbB Equation[1]		Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario			
					Using Equation 1		Using Equation 2	
	1*	2**			GSDi = Hom	GSDi = Het	GSDi = Hom	GSDi = Het
PbS	X	X	Soil lead concentration	ug/g or ppm	884	884	884	884
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	2.0	2.0	2.0	2.0
PbB_0	X	X	Baseline PbB	ug/dL	1.98	1.98	1.98	1.98
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0.100	0.100	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0.100	0.100
W_S		X	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	1.0	1.0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0.7	0.7
$AF_{S,D}$	X	X	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12
$EF_{S,D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	150	150	150	150
$AT_{S,D}$	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PbB_{adult}			**PbB of adult worker, geometric mean**	**ug/dL**	**3.7**	**3.7**	**3.7**	**3.7**
$PbB_{fetal, 0.95}$			**95th percentile PbB among fetuses of adult workers**	**ug/dL**	**10.5**	**10.5**	**10.5**	**10.5**
PbB_t			**Target PbB level of concern (e.g., 10 ug/dL)**	**ug/dL**	**10.0**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$			**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**5.7%**	**5.7%**	**5.7%**	**5.7%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}).
When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{fetal,0.95}$.

***Equation 1, based on Eq. 1, 2 in USEPA (1996).**

PbB_{adult} =	$(PbS*BKSF*IR_{S+D}*AF_{S,D}*EF_S/AT_{S,D}) + PbB_0$
$PbB_{fetal, 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

****Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (1996).**

PbB_{adult} =	$PbS*BKSF*([(IR_{S+D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S+D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$
$PbB_{fetal, 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

Calculations of Preliminary Remediation Goals (PRGs)

Calculations of Blood Lead Concentrations (PbBs) - Construction Worker - Surface/Subsurface Soil Under Building 238

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/03

Exposure Variable	PbB Equation 1*	PbB Equation 2**	Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario: Using Equation 1, GSDi = Hom	Using Equation 1, GSDi = Het	Using Equation 2, GSDi = Hom	Using Equation 2, GSDi = Het
PbS	X	X	Soil lead concentration	ug/g or ppm	34600	34600	34600	34600
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4	0.4	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	2.0	2.0	2.0	2.0
PbB_0	X	X	Baseline PbB	ug/dL	1.98	1.98	1.98	1.98
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0.100	0.100	--	--
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--	0.100	0.100
W_S		X	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--	1.0	1.0
K_{SD}		X	Mass fraction of soil in dust	--	--	--	0.7	0.7
$AF_{S,D}$	X	X	Absorption fraction (same for soil and dust)	--	0.12	0.12	0.12	0.12
$EF_{S,D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	30	30	30	30
$AT_{S,D}$	X	X	Averaging time (same for soil and dust)	days/yr	365	365	365	365
PbB_{adult}			**PbB of adult worker, geometric mean**	ug/dL	**15.6**	**15.6**	**15.6**	**15.6**
$PbB_{fetal, 0.95}$			**95th percentile PbB among fetuses of adult workers**	ug/dL	**44.0**	**44.0**	**44.0**	**44.0**
PbB_t			**Target PbB level of concern (e.g., 10 ug/dL)**	ug/dL	**10.0**	**10.0**	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$			**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	%	**68.9%**	**68.9%**	**68.9%**	**68.9%**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}).
When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same $PbB_{fetal,0.95}$.

***Equation 1, based on Eq. 1, 2 in USEPA (1996).**

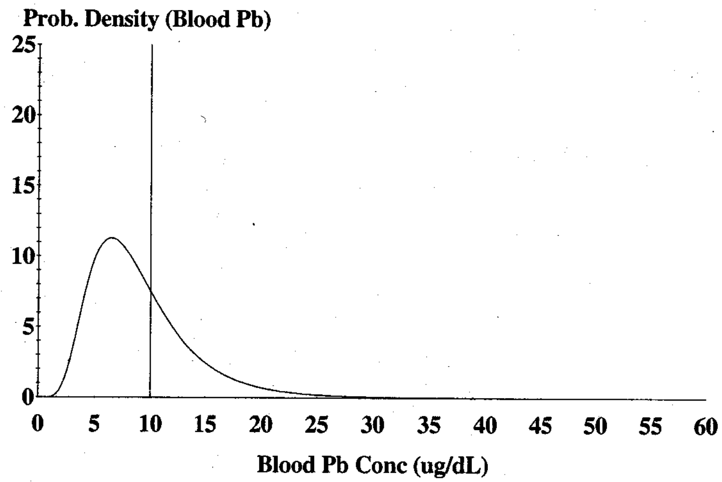
PbB_{adult} =	$(PbS*BKSF*IR_{S+D}*AF_{S,D}*EF_S/AT_{S,D}) + PbB_0$
$PbB_{fetal, 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

****Equation 2, alternate approach based on Eq. 1, 2, and A-19 in USEPA (1996).**

PbB_{adult} =	$PbS*BKSF*([(IR_{S+D})*AF_S*EF_S*W_S]+[K_{SD}*(IR_{S+D})*(1-W_S)*AF_D*EF_D])/365+PbB_0$
$PbB_{fetal, 0.95}$ =	$PbB_{adult} * (GSD_i^{1.645} * R)$

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

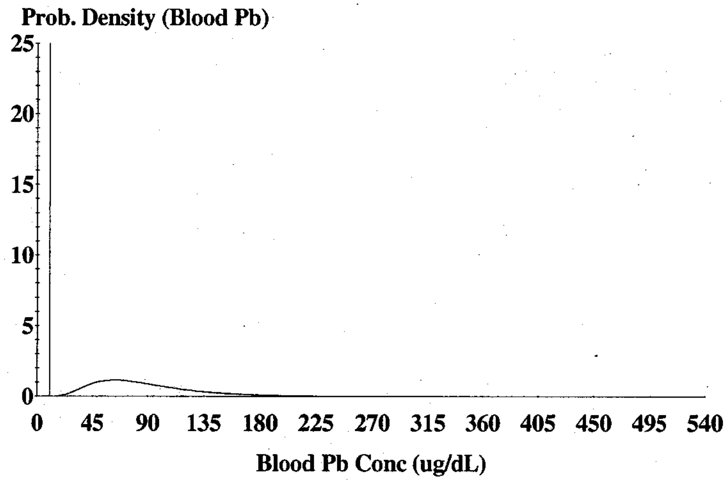
OUTSIDE SS
766 mg/kg
12.6 µg/L



Cutoff = 10.000 ug/dl
Geo Mean = 8.375
GSD = 1.600
% Above = 35.299
% Below = 64.701

Age Range = 0 to 84 months
Time Step = Every 4 Hours
Run Mode = Research

UNDER SS-SB
34,600 mg/kg
12.6 μg/L

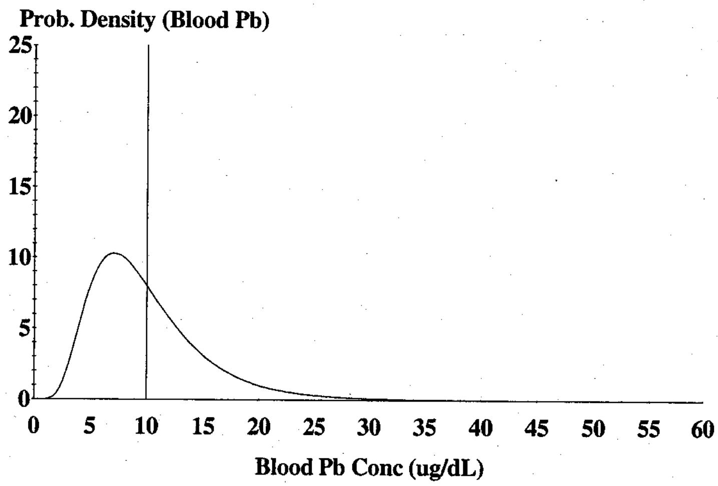


Cutoff = 10.000 ug/dl
Geo Mean = 81.970
GSD = 1.600
% Above = 100.000
% Below = 0.000

Age Range = 0 to 84 months
Time Step = Every 4 Hours
Run Mode = Research

Environmental exposures associated with blood lead levels above 30 μg/dl are above the range of values that have been used in the calibration and empirical validation of this model. (Zaragoza, L. and Hogan, K. 1998. The Integrated Exposure Uptake Biokinetic Model for Lead In Children: Independent Validation and Verification. Environmental Health Perspectives 106 (supplement 6). p. 1555)

OUT SS_SB
884 mg/kg
12.6 µg/L



Cutoff = 10.000 ug/dl
Geo Mean = 9.175
GSD = 1.600
% Above = 42.736
% Below = 57.264

Age Range = 0 to 84 months
Time Step = Every 4 Hours
Run Mode = Research

Appendix E
ARARs

TABLE E-1

**LIMITED EXCAVATION AND DISPOSAL WITH LAND USE CONTROLS AND MONITORING
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 1 - FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE**

Medium/Activity	Requirement/ Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL CHEMICAL-SPECIFIC TBCs				
Soil/Risk Assessment	OSWER Directive 9355.4-12	TBC	USEPA has provided recommended methodology for assessing risk caused by exposure to lead in surface soil under residential scenarios.	This remedy will meet the guideline for residential exposure by establishing land use controls that will prevent residential exposure to soil at OU1 with concentrations greater than the residential remediation goal.
Soil/Risk Assessment	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. (USEPA, January 2003)	TBC	USEPA has provided recommended methodology for assessing risks to adult receptors caused by exposure to lead in soil under residential and commercial/industrial scenarios.	The guideline was used to develop site-specific remediation goals for adult current and future receptors. The remedy will meet the remediation goals by excavating lead-contaminated soil within the crawl space to reduce lead concentrations to less than the remediation goals.
Soil/Risk Assessment	USEPA Risk RfDs from IRIS	TBC	RfDs are estimates of daily exposure for human populations (including sensitive subpopulations) considered unlikely to cause significant adverse health effects associated with a threshold mechanism of action in human exposure over a lifetime.	The RfD for antimony was used to develop the remediation goal for residential exposure to antimony. Excavating lead-contaminated soil within the crawl space will also remove antimony-contaminated soil to reduce antimony concentrations to less that the residential remediation goal.
STATE CHEMICAL-SPECIFIC ARARs and TBCs: No ARARs or TBCs				

TABLE E-1

LIMITED EXCAVATION AND DISPOSAL WITH LAND USE CONTROLS AND MONITORING
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 1 - FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/ Citation	Status	Synopsis	Evaluation/Action To Be Taken
FEDERAL LOCATION-SPECIFIC ARARs and TBCs				
Coastal Zone	Coastal Zone Management Act (16 USC 1451 et seq.)	Applicable	This act provides for the preservation and protection of coastal zone areas. Federal activities that are in or directly affecting the coastal zone must be consistent, to the maximum extent practicable, with a federally approved state management program.	Excavation within the crawl space will not impact the coastal zone. Activities associated with LUCs (e.g., land use restrictions, posting of signs) and monitoring will also not impact the coastal zone. MEDEP will review remedial design and work plans to meet the substantive requirements of this act.
Historic Preservation	National Historic Preservation Act (16 USC 470 et seq., 36 CFR 800)	Applicable	Provides requirements relating to potential loss or destruction of significant scientific, historical, or archaeological data due to remedial actions at a site.	Prehistoric and historical archeological resource sensitivity for OU1 is low. Placement of surface cover and LUCs will not impact resources of historical value.
STATE LOCATION-SPECIFIC ARARs and TBCs: No ARARs or TBCs				
FEDERAL ACTION-SPECIFIC ARARs and TBCs:				
Hazardous Waste	RCRA Subtitle C, RCRA Regulations for Identification and Listing of Hazardous Water (40 CFR 261), and Standards Applicable to Generators of Hazardous Waste (40 CFR 262)	Applicable	RCRA regulations govern the generation transportation and disposal of hazardous waste. The State of Maine has RCRA delegation, and the Maine Hazardous Waste Management Rules provide references to the federal RCRA regulations where appropriate.	Excavated material will be analyzed to determine whether it is RCRA characteristic hazardous waste. If it is determined to be hazardous, the material will be managed, transported, treated, disposed, or stored in accordance with RCRA requirements. Based on the levels of lead in soil in the remediation areas, the excavated material is likely to be hazardous based on toxicity.

TABLE E-1

LIMITED EXCAVATION AND DISPOSAL WITH LAND USE CONTROLS AND MONITORING
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 1 - FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/ Citation	Status	Synopsis	Evaluation/Action To Be Taken
STATE ACTION-SPECIFIC ARARs and TBCs				
Hazardous Waste	Maine Hazardous Waste Management Rules (06-096 CMR 800-801, 850 – 853, 857)	Applicable	These regulations provide standards for the generation, transportation, treatment, storage, and disposal of hazardous waste. They set forth the state definition and criteria for establishing whether waste materials are hazardous and subject to associated hazardous waste regulations. They also provide standards for detailing groundwater monitoring requirements for hazardous waste facilities.	Excavation, staging, and disposal of hazardous wastes at OU1 will comply with these standards.
Waste	Maine Solid Waste Management Regulations (06-096 CMR 400, 411)	Applicable	Provides standards for generation, transportation, treatment, storage, and disposal of solid and special wastes. Also provides closure and post-closure maintenance standards.	Wastes generated during remedial actions will be disposed at appropriately licensed and permitted facilities.
Erosion	Erosion and Sedimentation Control (38 MRSA 420-C)	Applicable	Erosion control measures must be in place before activities such as filling, displacing, or exposing soil or other earthen materials occur. Prior MEDEP approval is required if the disturbed area is in the direct watershed of a body of water most at risk for erosion or sedimentation.	The remedial action design and work plans will address erosion and sedimentation controls necessary during excavation and staging activities.
Stormwater	Stormwater Management (38 MRSA 420-D; 06-096 CMR 500)	Applicable	Stormwater management measures must be in place before activities such as filling, displacing, or exposing soil or other earthen materials occur.	The remedial action design and work plans will address stormwater management controls necessary during excavation and staging activities.

TABLE E-1

LIMITED EXCAVATION AND DISPOSAL WITH LAND USE CONTROLS AND MONITORING
CHEMICAL, LOCATION, AND ACTION-SPECIFIC ARARs AND TBCs
OPERABLE UNIT 1 - FEASIBILITY STUDY REPORT
PORTSMOUTH NAVAL SHIPYARD, KITTERY, MAINE

Medium/Activity	Requirement/ Citation	Status	Synopsis	Evaluation/Action To Be Taken
STATE ACTION-SPECIFIC ARARs and TBCs (continued)				
Air Emissions	Visible Emissions Regulation (38 MRSA 584; 06-096 CMR 101).	TBC	These regulations establish opacity limits for emissions from several categories of air contaminant sources, including general construction activities.	Excavation will be conducted so that opacity limits would not be impacted. Any measures need to ensure compliance with these standards will be discussed in the remedial design and work plans.

ARAR – Applicable or Relevant and Appropriate Requirement
CMR - Code of Maine Rules
FR – Federal Register
MRSA - Maine Revised Statutes Annotated
TBC- To Be Considered
USC – United States Code
CFR - Code of Federal Regulations.
CWA – Clean Water Act
MEDEP - Maine Department of Environmental Protection
RCRA - Resource Conservation and Recovery Act
TSD – Treatment, storage, and disposal

Appendix F
Alternative Calculations and Cost Estimates

CLIENT: PORTSMOUTH NAVAL SHIPYARD		JOB NUMBER: 112G01021.0000.0410
SUBJECT: Site 10, OU-1		
BASED ON:		DRAWING NUMBER:
BY: TJR Date:	CHECKED BY: Date:	APPROVED BY: DATE:

General Assumptions for Production Rates and Time

Production rates are based on the limited area access, tidal action, and the confined work area. Access next to Building 238 would be limited due to Navy ongoing work activities. It was assumed this area is available 4 out of 5 work days during the work week. The area around Building 238 would be used for material storage, waste consolation, and equipment storage during time of tidal flooding. Naval ship and submarine schedules would determine the actual days work may be performed in this area. The time to work under Building 238 is also limited by health requirements and tidal flooding. This confined space would require the establishment of air monitoring, air movement by fans, and air sampling prior to allowing personnel to enter under the building and during the work under the building.

Tidal flooding occurs twice daily 11 to 13 hours apart. The five hour work shift is based on flooding for 3 to 4 hours, health monitoring and equipment setup (mobilization) 1 to 2 hours, work 4 to 6 hours, equipment removal (demobilization) prior to flooding 1 hour. The excavation rate of 265 cubic feet per work shift is based on hand excavation, micro-excavation, and material removal by wheel barrow using RS Mean's production rates.

Preferred Alternative: Limited Excavation and Disposal with Land Use Controls

Capital Cost

Excavation:

Assume all excavation under Building 238 would be conducted by hand with some small equipment used to assisted the labors like motorized wheel barrows and micro-excavators. No shoring or dewatering cost was included in the estimate. Excavation crew would consist of 6 labors with HSO and Supervisor as support. To excavate 10,500 cubic feet (390 cy) of soil assumes 265 cf (10 cy) a day with crew. This assumes crew can work a minimum of 5 hours per day 4 days a week to complete the excavation within 40 days. The area would be backfilled over 20 days following excavation with the same crew and equipment. Different methods of soil removal and backfill placement may be used by contractor. Other methods would be explored as part of Pre-Design Investigation and the Construction Design.

Work Order:

1) Mobilization
2) Removal of wall on southwest side of Building 238 for access; assume remove concrete, size 8' wide by 6' high & two 2' by 2' for fans.
3) Install lighting & fans
4) Excavate lead contaminated soil and load into rolloff boxes.
5) Backfill with sand/gravel, 390 cy
6) Replace wall

Fans:

Use 4 sets of fans during all work under building.

Lighting:

Set up 6 sets of lights for work under building.

CLIENT: PORTSMOUTH NAVAL SHIPYARD		JOB NUMBER: 112G01021.0000.0410	
SUBJECT: Site 10, OU-1			
BASED ON:		DRAWING NUMBER:	
BY: TJR Date:	CHECKED BY: Date:	APPROVED BY:	DATE:

Disposal: 390 cy
1.4 ton/cy
546 tons, hazardous

Pavement Replacement:
10,400 sf = 1,160 sy

Time to complete work:

Mob	5	days
Remove wall	3	days
Lighting & fans	7	days
Excavate	40	days
Backfill & Pavement	20	days
Replace wall & demob	5	days
	80	days
or	16	weeks
or	4	months

Annual Cost

Inspections:
Crew of 2, local, yearly to inspect the land use controls.

Asphalt Repair:
Seal asphalt around building (1,160 sy) during years 5, 15, & 25
Replace asphalt around building (1,160 sy) during years 10, 20, & 30

Monitoring Sampling:
Labor & Materials, per round (5 wells)
Assume 3 days to sample with 2 people, local

2 people @ $60.00 per hour for 10 hours per day for 3 days =	$3,600
car for 3 days =	$300
report @ $55.00 per hour for 60 hours =	$3,300
Waste Disposal from Sampling =	$250
Misc supplies, copying, etc. =	$325
	$7,775

Analytical: per round for 2 years
Collect 5 water samples from wells and analyze for lead

type	cost each	number	total
Lead	$20	5	$100
			$100
40% QA/QC & Data Validation			$40
			$140

Present Worth Discount Rate:
Use 7% discount rate following same rate on past FS.

PORTSMOUTH NAVAL SHIPYARD
Kittery, Maine
OU-1, Site 10
Preferred Alternative - Limited Excavation and Disposal with Land Use Controls
Capital Cost

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
1 PROJECT PLANNING & DOCUMENTS											
1.1 Prepare LUC Documents	150	hr			$35.00		$0	$0	$5,250	$0	$5,250
1.2 Prepare Documents & Plans including Permits	300	hr			$35.00		$0	$0	$10,500	$0	$10,500
1.3 Completion Report	80	hr			$35.00		$0	$0	$2,800	$0	$2,800
2 MOBILIZATION AND DEMOBILIZATION											
2.1 Preconstruction Meeting	24	hr			$55.00		$0	$0	$1,320	$0	$1,320
2.2 Site Support Facilities (trailers, phone, electric, etc.)	1	ls		$1,000.00		$3,500.00	$0	$1,000	$0	$3,500	$4,500
2.3 Equipment Mobilization/Demobilization	3	ea			$163.00	$414.00	$0	$0	$489	$1,242	$1,731
3 FIELD SUPPORT											
3.1 Site Support Facilities (trailers, phone, electric, etc.)	4	mo		$210.00	$350.00		$0	$840	$1,400	$0	$2,240
3.2 Survey Support	10	day	$1,025.00				$10,250	$0	$0	$0	$10,250
3.3 Site Superintendent	16	week			$1,234.20		$0	$0	$19,747	$0	$19,747
3.4 Site Health & Safety and QA/QC	16	week			$701.20		$0	$0	$11,219	$0	$11,219
4 DECONTAMINATION											
4.1 Decontamination Services	3	mo		$1,142.00	$2,102.00	$1,453.00	$0	$3,426	$6,306	$4,359	$14,091
4.2 Equipment Decon Pad	1	ls		$3,500.00	$3,000.00	$425.00	$0	$3,500	$3,000	$425	$6,925
4.3 Decon Water	3,000	gal		$0.20			$0	$600	$0	$0	$600
4.4 Decon Water Storage Tank, 6,000 gallon	3	mo				$730.00	$0	$0	$0	$2,190	$2,190
4.5 Clean Water Storage Tank, 4,000 gallon	3	mo				$656.00	$0	$0	$0	$1,968	$1,968
4.6 Disposal of Decon Waste (liquid & solid)	3	mo	$950.00				$2,850	$0	$0	$0	$2,850
5 SITE PREPARATION											
5.1 Underground Utility Clearance	1	ls	$7,500.00				$7,500	$0	$0	$0	$7,500
5.2 Skid-Steer	10	day				$246.40	$0	$0	$0	$2,464	$2,464
5.3 Area Lighting (6 each)	60	day				$18.50	$0	$0	$0	$1,110	$1,110
5.4 Under Building Fans (4 each)	40	day				$21.40	$0	$0	$0	$856	$856
5.5 Site Labor, (6 laborers)	10	day			$1,452.00		$0	$0	$14,520	$0	$14,520
5.6 Dumpster Rental (1 for 5 days)	10	day				$18.00	$0	$0	$0	$180	$180
5.7 Debris Disposal (wall)	4	ton	$79.00				$316	$0	$0	$0	$316
5.8 Pavement Milling	1,160	sy	$2.48				$2,877	$0	$0	$0	$2,877
6 EXCAVATION AND DISPOSAL											
6.1 Skid-Steer	40	day				$246.40	$0	$0	$0	$9,856	$9,856
6.2 Self-propelled Wheel Barrow (4 each)	160	day				$56.40	$0	$0	$0	$9,024	$9,024
6.3 Micro-excavator (2 each)	80	day				$138.00	$0	$0	$0	$11,040	$11,040
6.4 Area Lighting (6 each)	240	day				$18.50	$0	$0	$0	$4,440	$4,440
6.5 Under Building Fans (4 each)	160	day				$21.40	$0	$0	$0	$3,424	$3,424
6.6 Site Labor, (6 laborers)	40	day			$1,452.00		$0	$0	$58,080	$0	$58,080
6.7 Dumpster Rental (2 for 2 months)	80	day				$18.00	$0	$0	$0	$1,440	$1,440
6.8 Verification Samples, Lead	13	ea	$20.00	$50.00	$100.00	$50.00	$260	$650	$1,300	$650	$2,860
6.9 Offsite Disposal Soil Testing	2	ea	$543.00	$10.00			$1,086	$20	$0	$0	$1,106
6.10 Off Site Disposal, Hazardous	546	ton	$245.00				$133,770	$0	$0	$0	$133,770
7 SITE RESTORATION											
7.1 Backfill Soil	390	cy		$18.00			$0	$7,020	$0	$0	$7,020
7.2 Self-propelled Wheel Barrow (4 each)	80	day				$56.40	$0	$0	$0	$4,512	$4,512
7.3 Area Lighting (6 each)	120	day				$18.50	$0	$0	$0	$2,220	$2,220
7.4 Under Building Fans (4 each)	80	day				$21.40	$0	$0	$0	$1,712	$1,712
7.5 Site Labor, (6 laborers)	25	day			$1,452.00		$0	$0	$36,300	$0	$36,300
7.6 Wall Removal & Replacement	1	ls	$4,500.00				$4,500	$0	$0	$0	$4,500
7.7 Pavement Milling	1,160	sy	$3.72				$4,315	$0	$0	$0	$4,315
7.8 Pavement Replacement, 2 inches thick	1,160	sy	$16.40				$19,024	$0	$0	$0	$19,024
7.9 Seal Pavement Edges	1	ls	$500.00				$500	$0	$0	$0	$500

Item	Quantity	Unit	Unit Cost				Extended Cost				Subtotal
			Subcontract	Material	Labor	Equipment	Subcontract	Material	Labor	Equipment	
Subtotal							$187,248	$17,056	$172,231	$66,612	$443,147
Overhead on Labor Cost @	30%								$51,669		$51,669
G & A on Labor Cost @	10%								$17,223		$17,223
G & A on Material Cost @	10%							$1,706			$1,706
G & A on Equipment Cost @	10%									$6,661	$6,661
G & A on Subcontract Cost @	10%						$18,725				$18,725
Tax on Materials and Equipment Cost @	5%							$853		$3,331	$4,183
Total Direct Cost							$205,973	$19,614	$241,124	$76,604	$543,315
Indirects on Total Direct Cost @	25%	(excluding transportation and disposal cost)									$101,595
Profit on Total Direct Cost @	10%										$54,331
Subtotal											$699,241
Health & Safety Monitoring @	3%										$20,977
Total Field Cost											$720,218
Pre-Design Investigation @	$75,000										$75,000
Contingency on Total Field Costs @	25%										$180,055
Engineering on Total Field Cost @	15%										$108,033
TOTAL CAPITAL COST											**$1,083,306**