



Final Proposed Plan

Site 11: Bone Yard
Naval Weapons Station Yorktown Cheatham Annex
Williamsburg, Virginia

June 2010

1 Introduction

This **Proposed Plan** describes the preferred alternative for **Environmental Restoration Program (ERP)** Site 11, commonly referred to as "the Bone Yard" because of its use as a storage area for old cars, at Naval Weapons Station (WPNSTA) Yorktown Cheatham Annex (CAX), Williamsburg, Virginia. Based on previous site investigations and removal actions to date, no further remedial action is warranted at Site 11. There are no unacceptable current or future risks to human health and the environment based on existing site conditions.

This Proposed Plan fulfills requirements specified in Section 117(a) of the **Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)** and Section 300.430(f)(2) of the **National Oil and Hazardous Substances Pollution Contingency Plan (NCP)**.

Information documenting environmental investigations at Site 11 can be found in the **Remedial Investigation (RI)** (April 2007), **Engineering Evaluation/Cost Analysis (EE/CA)** (November 2008), and other documents contained in the **Administrative Record (AR)** file for WPNSTA Yorktown/CAX (see "Please

Mark Your Calendar" box below). A glossary of key terms is provided at the end of this Proposed Plan; glossary terms are identified in bold print the first time they appear.

The United States Navy (Navy) and **United States Environmental Protection Agency (USEPA)**, in consultation with **Virginia Department of Environmental Quality (VDEQ)**, will make the final decision on the remedial approach for Site 11 after reviewing and considering all information submitted during the 45-day **public comment period**. This proposal for no further action (NFA) may be modified based on new information and/or public comments received. Therefore, public participation is encouraged.

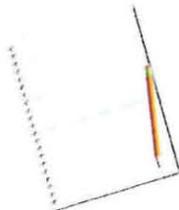
This Proposed Plan is issued jointly by the Navy, the lead agency for environmental restoration activities at CAX, and USEPA Region 3, the lead regulatory agency. The plan has been coordinated with the VDEQ, the support regulatory agency.

Please Mark Your Calendar

Public Comment Period

April 18 – June 1, 2010

The Navy, VDEQ, and USEPA will accept written comments on this Proposed Plan during the public comment period. To submit comments or obtain further information, please refer Section 7 of this document.



Attend the Public Meeting

May 27, 2010, 3:30pm – 4:00pm

York County Public Library – Yorktown
8500 George Washington Memorial Highway
Yorktown, Virginia 23692

The Navy will hold a public meeting to explain the Proposed Plan. Verbal and written comments will be accepted at this meeting.



Location of Administrative Record File:

NAVFAC Atlantic
6506 Hampton Boulevard, Norfolk, VA 23508
Phone: 757.322.4785

2 Site Background

CAX was commissioned in 1943 as a satellite unit of the Naval Supply Depot to provide bulk storage facilities and served as an assembly and overseas shipping point throughout World War II. Several portions of the original base have since been declared surplus and transferred to other government jurisdictions, including the National Park Service, the Commonwealth of Virginia, and York County. CAX supports the Navy's mission to supply Atlantic Fleet ships, and includes administration, training, maintenance, housing, and recreational use areas.

CAX is comprised of approximately 2,300 acres, and is located in Williamsburg, Virginia, west of the York River (Figure 1).

Site Description and Background

Site 11 encompasses an estimated 2.7-acre area located in the south central portion of CAX, south of Antrim Road and the Public Works Facility and west of Penniman Lake (Figure 1). The site consists of former Building 269,

abandoned Building 268, and an old concrete foundation with a low retaining wall. Between 1940 and 1978, Site 11 was reportedly used by the CAX Department of Public Works to store containers of waste-oil, tar and tar cylinders, asphalt, and other scrap materials. Oil, gasoline, petroleum-containing tanks, drums, old containers, fence posts, abandoned cars, heavy construction equipment, and various other scrap metals have been observed at the site. It was reported that wastes may have been buried at the site; however, previous investigations have not indicated the presence of buried waste. Housekeeping efforts, conducted in 1986 and 1997, included the offsite disposal of 77 drums and their contents, tar storage containers, as well as miscellaneous scrap/materials located on the ground surface.

Previous Investigations and Actions

Site 11 was characterized as part of several investigations and studies since 1984. Reports of the previous investigations conducted at Site 11 are available in the AR file for WPNSTA Yorktown/CAX and are summarized in Table 1 and the subsequent text.

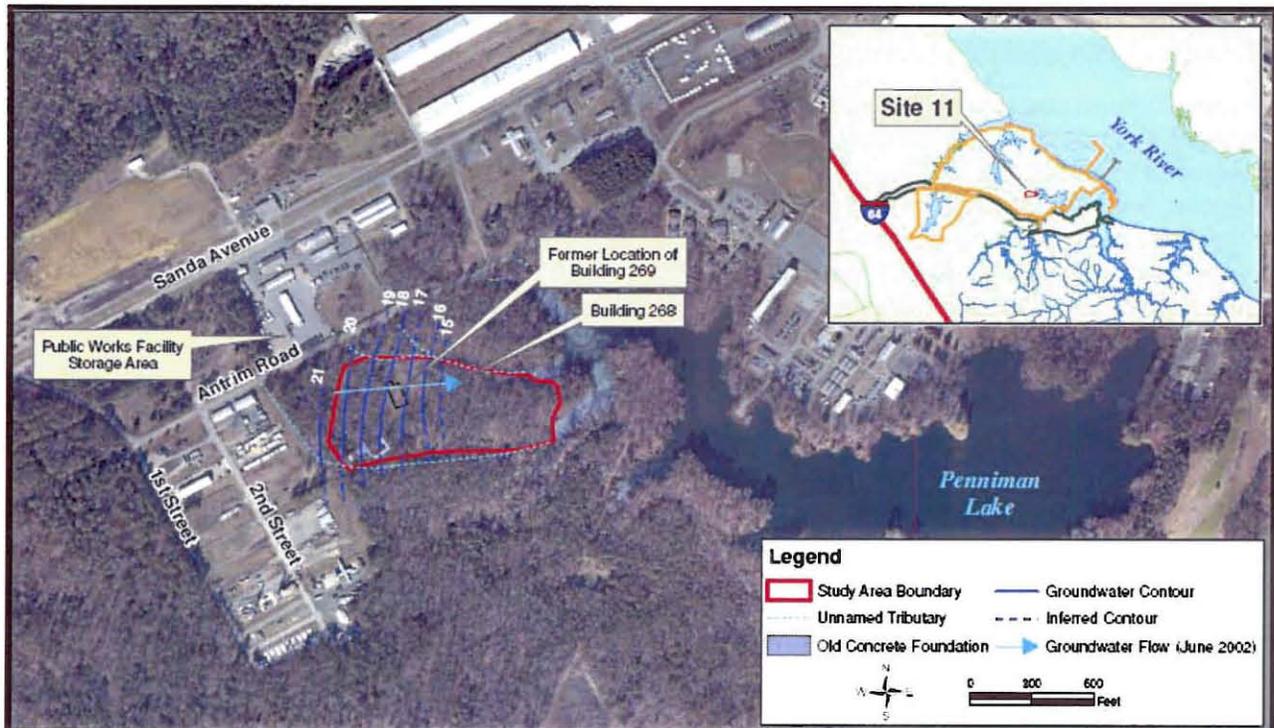


Table 1 – Previous Investigations at Site 11

Document Title /Milestone	Author/Date	AR Document Number
Final Initial Assessment Study	NEESA, 1984	247
Confirmation Study, Step 1A, Round One	Dames & Moore, 1986	135
Confirmation Study, Step 1A, Round Two	Dames & Moore, 1988	136
Final Remedial Investigation Interim Report	Dames & Moore, 1991	139
Final Site Investigation for Sites 1, 10 and 11	Baker, 1994	140
Final Site Screening Process Report Sites 1, 10, and 11	Baker, 1997	131
Final Project Plans Sites 1, 4, 7, 11, AOC1, and AOC2	Baker, 1999	1218
Draft Removal Closeout Report	Baker, 2000	1477
Pond Study Report	Baker, 2001	1212
Project Plans for Remedial Investigation	Baker, 2002	1252
Final Remedial Investigation	Baker, 2007	pending
Final Engineering Estimate / Cost Analysis	CH2M HILL, 2008	pending
Draft Final Construction Completion Report	Shaw, 2009	pending
Technical Memorandum, Cheatham Annex Site 11 No Further Action Consensus	CH2M HILL, 2009	pending

Initial Assessment Study (NEESA, 1984)

The purpose of the Initial Assessment Study (IAS) was to identify and assess sites posing a potential threat to human health or the environment resulting from prior waste management practices at CAX. The IAS entailed the collection and evaluation of archival records relating to waste generation, handling, and disposal; characterization of site conditions; and identification of **contaminant migration pathways** and potential **receptors**. Due to the presence of disposed fuel oil containers, mixing tanks, and construction debris, as well as reports of historical releases, the IAS concluded that unacceptable risk to human health and the environment may be present at Site 11 and additional investigation was recommended.

Confirmation Study, Step 1A (Dames & Moore, 1986 and 1988)

Following identification in the IAS as a site potentially affected by contamination, Site 11 was included in the Confirmation Study. **Soil, groundwater, sediment, and surface water** samples were collected in 1986 and 1988 and analyzed for **volatile organic compounds (VOCs), semivolatile organic compounds**

(SVOCs), phenols, lead, pH, and oil and grease. Additionally, drum content samples were collected and analyzed for **Resource Conservation and Recovery Act (RCRA)** characterization analyses. Of the drums sampled, one failed RCRA characterization due to sulfide reactivity, while two additional drums failed due to lead concentrations. Results of the investigation were summarized in the Remedial Investigation Interim Report (Dames and Moore, 1991). In site media, SVOCs and lead in surface water and SVOCs in groundwater were detected at concentrations potentially posing unacceptable risk to human health and the environment. The RI Interim Report concluded that additional investigation was required to further characterize the nature and extent of contamination at Site 11.

1987 Drum Removal (Baker, 2000)

Fifteen 55-gallon drums containing **petroleum products** and several 500-gallon tanks containing tar were removed in 1987 (**Figure 2**). The removal activities are then documented in the 2000 Removal Closeout Report (Baker, 2000).

Site Investigation (Removal Closeout Report; Baker, 1994)

A Site Investigation (SI) was conducted at Site 11 to further characterize contamination and determine whether additional environmental characterization and/or remedial activities were necessary. As part of the SI, soil, groundwater, surface water, and sediment samples were collected. Investigation results showed that SVOCs and metals in soil and sediment, VOCs and metals in groundwater, and metals in surface water were detected at concentrations exceeding the applicable screening criteria. The SI recommended removal of surface debris at the site and re-sampling of soil, groundwater, and surface water to confirm SI results and determine if further investigation was needed.

Site Screening Process (Baker, 1997)

Data collected during the Confirmation Study and SI, in addition to new groundwater data collected as part of the **Site Screening Process (SSP)**, were used to complete qualitative human health and **ecological** risk screenings. The risk screenings identified site-related **contaminants of potential concern (COPCs)** in all **media**. However, it was noted that metals concentrations in soil and groundwater were similar to **background** and SVOC concentrations posing potential risks in sediment were at depths unlikely to result in

receptor exposure. Because drums and debris had been removed in 1987, as discussed previously, and no continuing source of contamination remained at the site, no additional investigation or action was recommended. Further information is included in the 2000 Removal Closeout Report.

1997 Drum Removal (Removal Closeout Report; Baker, 2000)

During the 1997 SSP, 59 additional drums, two additional tar storage boxes, and mixed surface debris were identified in the wooded area surrounding the then-current investigation area (**Figure 2**). These additional drums, tar storage boxes and debris were not factored into the analysis of the SSP; therefore, the site investigation area was expanded (to the current Site 11 investigation area) and a removal action was conducted in 1997. The liquid contents of each drum and tar storage box were removed and disposed of as non-hazardous liquids, and the drums and tar storage boxes were disposed of as nonhazardous materials. The mixed debris, consisting of miscellaneous scrap/materials, telephone poles, tank cradles, railroad ties, and concrete pipes, was also removed. Confirmation soil samples were collected in the vicinity of the removed drums and tar storage boxes in November 1999; evaluation of the data indicated the presence of localized areas of



Figure 2 – Historical Site Features Map

SVOC and lead contamination in soil. Based on the evaluation, a Remedial Investigation/ Feasibility Study (RI/FS) was recommended. Removal and sampling activities are documented in the 2000 Removal Closeout Report (Baker, 2000).

Remedial Investigation (Baker, 2007)

An RI was completed at Site 11 to define the nature and extent of soil, groundwater, surface water, and sediment contamination and assess potential risks to human health and the environment. All media were analyzed for VOCs, SVOCs, pesticides, polychlorinated biphenyls (PCBs), and metals.

Data collected as part of the RI and as part of the confirmatory soil sampling (Baker, 1997) were used to quantify risks. The Human Health Risk Assessment (HHRA) characterized potential current and future risks to human health. Risks were calculated for current onsite workers, potential adult/adolescent trespassers, and potential adult/adolescent recreational users. Risks were also calculated for potential future industrial workers, construction workers, and adult/child residents. It is important to note that some of these exposure scenarios are not likely to occur, but are assumed in the risk assessment process as a health-protective measure to ensure that appropriate decisions are made with respect to the need for remediation. Results of the HHRA indicated ingestion of groundwater by hypothetical future adult and child residents may result in a cancer risk and non-cancer hazard above USEPA's target levels due to ingestion of arsenic, iron, and manganese

(Table 2). No unacceptable risks to human health were identified for any other media.

The Screening-level Ecological Risk Assessment (SERA) was conducted to assess site-specific chemicals, pathways, and receptors of potential concern. The SERA concluded soils posed a potentially unacceptable risk to terrestrial receptors in four focus areas of the site (Figure 3). Potentially unacceptable ecological risks in these areas were due to concentrations of total polynuclear aromatic hydrocarbons (PAHs), pesticides (4,4-DDD, 4,4-DDE, 4,4-DDT, dieldrin, and endrin), and metals (copper, iron, lead, mercury, selenium, thallium, and zinc) that exceeded ecological screening criteria. In addition to the four areas discussed above, the SERA identified two additional locations for further evaluation in a Baseline Ecological Risk Assessment (BERA) due to concentrations of lead and mercury in soil. The SERA also concluded potentially unacceptable ecological risks were present in surface water and sediment within the unnamed tributaries. COPCs identified for the unnamed tributaries included: arsenic, iron, and Aroclor-1260.

The RI recommended additional investigation of soil, surface water, and sediment samples to further evaluate the extent of contaminants identified. Additionally, removal of the four soil focus areas was recommended to remove soil posing potentially unacceptable risk to ecological receptors and potentially providing a source of contaminants to adjacent unnamed tributaries.

Table 2 – Summary of Unacceptable Groundwater Risks

Receptor	Exposure Route	Cancer Risk	COCs with Cancer Risks >10 ⁻⁴	Exposure Route	Hazard Index	COCs with HI >1
Reasonable Maximum Exposure (RME)						
Future Adult Resident	Ingestion	1.9 x 10 ⁻⁴	Arsenic	Ingestion	3.1	Arsenic
Future Child Resident	Ingestion	1.1 x 10 ⁻⁴	Arsenic	Ingestion	7.3	Arsenic, Iron, Manganese*
Central Tendency Exposure (CTE)						
Future Adult Resident	N/A	N/A	N/A	Ingestion	1.4	Individual Constituents < 1
Future Child Resident	N/A	N/A	N/A	Ingestion	4.8	Arsenic, Iron, Manganese*

* Because these chemicals have different target organs, their respective HI values are not additive.

**Engineering Evaluation / Cost Analysis
(CH2M HILL, 2008)**

An EE/CA was prepared to evaluate removal action alternatives to mitigate potential ecological risks associated with receptors exposed to soil at Site 11. Based on an evaluation of cost, effectiveness, and implementability, the EE/CA recommended complete excavation and offsite disposal of all soil contamination posing unacceptable ecological risk.

During the development of the EE/CA, **preliminary remediation goals (PRGs)** were developed based upon their protectiveness to ecological receptors. Because there was no potentially unacceptable risk to human health from exposure to soil contamination, PRGs were identified as the higher of ecological screening criteria, background soil concentrations, or PRGs previously established at other CAX or WPNSTA Yorktown sites with similar characteristics.

As required by 40 CFR Section 300.415(n)(4) of the NCP, a public notice of availability of the Draft EE/CA was published in *The Virginia Gazette* on October 11, 2008 and the *Daily Press* on

October 12, 2008 and the Draft EE/CA was made available for public review and comment. No comments were received from the public during the comment period. The Navy signed the Action Memorandum on November 25, 2008 to implement the **Non-time-critical Removal Action (NTCRA)** as specified in the EE/CA.

Removal Action and Construction Completion Report (Shaw, 2009)

In January and February 2009, prior to implementation of the removal action, pre-construction soil sampling was conducted along the perimeters of each focus area to ensure sufficient soil removal. Samples were analyzed for focus-area-specific **contaminants of concern (COCs)** and results were compared against PRGs. The final removal areas are shown on **Figure 3**. During removal action work planning, an additional focus area for removal (Area 5) was identified due to lead concentrations in soil exceeding the ecological screening criteria, and additional soil samples were collected in March 2009 to delineate the Area 5 removal.

Beginning in February 2009, approximately 2,891 cubic yards (4,338 tons) of contaminated

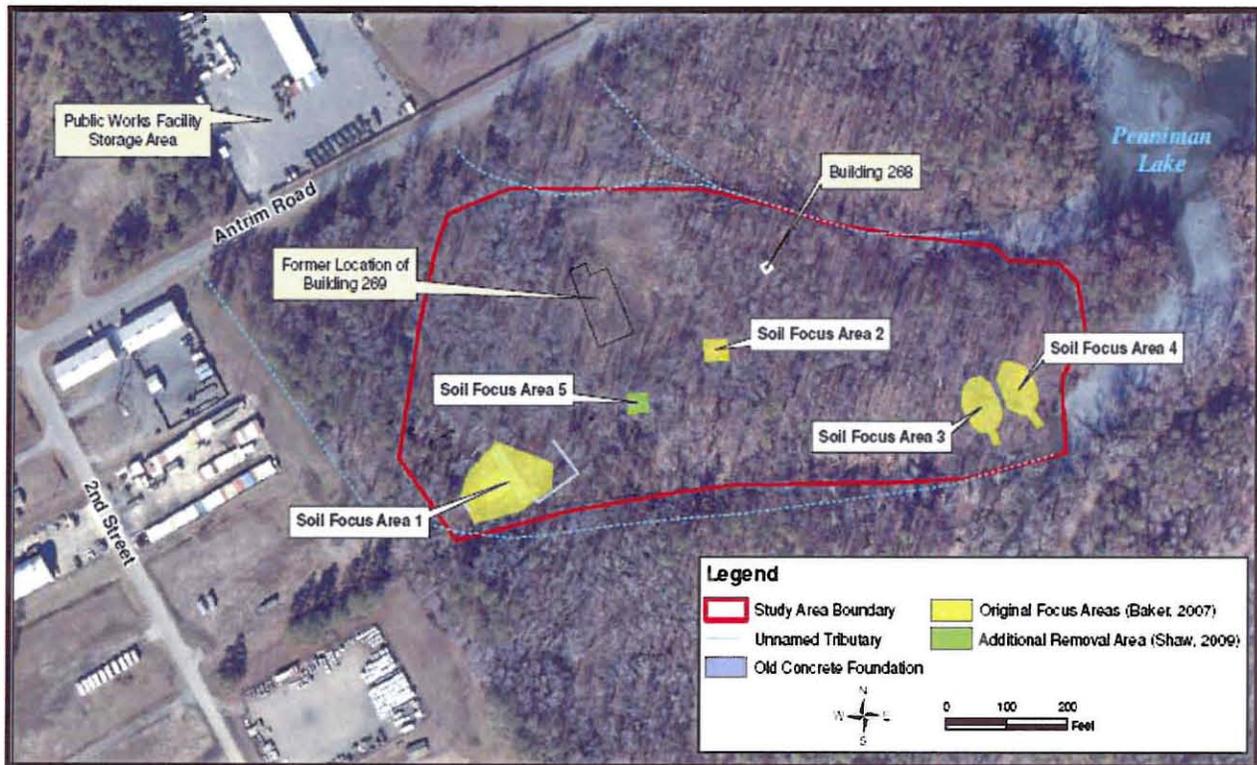


Figure 3 – 2009 NTCRA Removal Areas

soil, debris, and concrete were removed from the five focus areas. Following excavation, confirmation samples were collected and analyzed for area-specific COCs. Results were compared to PRGs, and additional excavation was conducted until all sample results met established PRGs (Table 3). Following removal, the site was backfilled, covered with 6 inches of top soil, and seeded.

southern tributary, although potential ecological risk associated with these metals appear to be minimal.

Based on the risk management considerations for groundwater, surface water and sediment, the Navy, in partnership with USEPA and VDEQ, agreed that, following the completion of the removal action, no further unacceptable risks remain at Site 11.

Table 3 – Maximum Concentrations of COCs Remaining in Soil following Removal Action

COC	Copper	Lead	Mercury	Selenium	Zinc	Iron	4,4-DDD	4,4-DDE	Total PAHs
Remediation Goal (mg/kg)	70	120	0.24	1.8	120	46,400	0.1	0.1	18
Maximum Remaining Concentration (mg/kg)	18	15.3	0.059	ND	36.5	34,900	0.007	0.0693	2.1

mg/kg = milligrams per kilogram
 ND = not detected

Technical Memorandum Consensus for No Further Action in Soil and Groundwater (CH2M HILL, 2009)

A technical memorandum was prepared in September 2009 to acknowledge the mitigation of potentially unacceptable ecological risks associated with Site 11 soil through the completion of the NTCRA and to document groundwater, surface water, and sediment risk management consensus by the Navy, USEPA, and VDEQ.

Unacceptable ecological risks identified in the RI were mitigated through the removal of soils exceeding established remediation goals; therefore, no further action is warranted to protect ecological receptors from potential exposures to soil. Concentrations of arsenic, iron, and manganese in two hydraulically upgradient monitoring wells (11GW01 and 11GW05) were identified in the RI as potentially posing risk to human health. However, since these monitoring well are located upgradient, these concentrations are not attributable to Site 11. In addition, these detections are consistent with background concentrations.

The presence of Aroclor-1260 in surface water and sediment in the site tributaries was determined to not be site-related and will be investigated under a separate study of Penniman Lake (AOC 9). Arsenic and iron were identified as COPCs in the surface water of the

3 Site Characteristics

Site 11 is mainly an open, overgrown, grassy field surrounded by mixed-hardwood woodland. The site is bordered on the east by Penniman Lake, and two unnamed tributaries to the north and south. The unnamed tributaries flow eastward to Penniman Lake and drain Site 11. In addition to runoff from Site 11, the unnamed tributaries and Penniman Lake receive runoff from surrounding areas.

Shallow groundwater at the site ranges from 9 to 16 feet below ground surface and generally flows east, discharging to the two unnamed tributaries adjacent to the site and the downgradient Penniman Lake. The shallow aquifer system at the site consists of the Columbia aquifer, which is underlain by the Yorktown confining unit. The confining unit impedes vertical migration of groundwater to the Yorktown aquifer.

There are no current or expected future uses for groundwater at the site. Potable water at WPNSTA Yorktown is supplied by the City of Newport News Waterworks.

4 Scope and Role of Response Action

CAX was placed on USEPA's National Priorities List (NPL) in January 2001. Currently, one site at CAX has a Final Record of Decision (ROD):

- Site 1 – NFA

In addition to Site 11, nine sites are being investigated under CERCLA at CAX: Site 4, Site 7, Site 9, Area of Concern (AOC) 1, AOC 2, AOC 3, AOC 6, AOC 7, AOC 8, and AOC 9 (which includes the PCB Study Area).

Details of these investigations are presented in the Site Management Plan for CAX, which is available in the AR file.

5 Summary of Site Risks

Detailed results of the HHRA and Ecological Risk Assessment (ERA) conducted at Site 11 prior to the 2009 NTCRA are presented in the RI (Baker, 2007) available in the AR file. In summary, prior to any removal actions at the site, potentially unacceptable human health risks were associated with potable use of groundwater. Potentially unacceptable ecological effects were also identified to terrestrial plants, soil invertebrates, and upper trophic-level receptors from exposure to soil. No unacceptable risks were identified for surface water or sediment. Post-removal confirmation samples were collected to verify that, subsequent to the NTCRA, unacceptable risks attributable to Site 11 soil had been mitigated. The Construction Closeout Report (Shaw, 2009) documents that the NTCRA activities successfully removed soils containing contaminants at concentrations posing unacceptable ecological risks. Based upon a revised risk assessment completed as part of the NFA Technical Memorandum (CH2M HILL, 2009), unacceptable risk posed by site soils was mitigated by the 2009 NTCRA. These findings are further summarized below.

5.1 Soil

Potentially unacceptable ecological risks associated with soil have been mitigated by the 2009 NTCRA. Site-specific remediation goals

were met, as determined by post-excavation confirmation samples.

The Navy, in partnership with USEPA and VDEQ, agreed that the 2009 removal action mitigated the unacceptable ecological risk.

5.2 Groundwater

Risk estimates calculated for future construction workers exposed to groundwater in an open excavation were below USEPA's target levels for remedial action under the NCP; however, risk estimates for future industrial workers and residents based on potable use of groundwater were above USEPA's target levels.

What is Human Health Risk and How is it Calculated?

A Human Health Risk Assessment (HHRA) estimates the likelihood of health problems occurring if no cleanup action were taken, and consists of the following four-step process:

Step 1: Analyze Contamination

Step 2: Estimate Exposure

Step 3: Assess Potential Health Dangers

Step 4: Characterize Site Risk

In **Step 1**, comparisons of the concentrations of site chemicals to scientific studies on the effects those chemicals have on people help determine which chemicals pose the greatest threat to human health.

In **Step 2**, the Navy considers different ways people might be exposed to chemicals, the concentrations, how often, and how long they may be exposed to determine a "reasonable maximum exposure" (RME) scenario that portrays the highest level of human exposure that could reasonably be expected to occur.

In **Step 3**, the Navy uses the information from Step 2 combined with toxicity information to assess potential health risks. The Navy considers two types of risk: (1) cancer risk, and (2) non-cancer hazard. The likelihood of any kind of cancer resulting from a contaminated site is generally expressed as a probability; "1 in 10,000 chance" (for every 10,000 people that could be exposed, one extra cancer may occur as a result of exposure). For non-cancer health effects, the Navy calculates a "hazard index" (HI), that is the ratio between the "reference dose," (the dosage at which no adverse health effects are expected), and the RME (the estimated maximum exposure level). A "threshold level" (HI less than 1) exists below which non-cancer health effects are no longer predicted.

In **Step 4**, the Navy determines whether site risks are high enough to cause health problems for people at or near the site. The results of the three previous steps are combined, evaluated, and summarized. The Navy adds up the potential risks from the individual contaminants and exposure pathways and calculates a total site risk.

Groundwater is not currently used as a potable water source, and there is no direct route of exposure to humans under current site conditions and land use. Based on reasonable maximum exposure (RME) calculations, these future exposure scenarios may result in cumulative **cancer risks** and/or **non-cancer hazards** primarily associated with metals in groundwater (arsenic, iron, and manganese) (Table 2). However, the potential risks associated with arsenic, iron, and manganese are acceptable based on the following facts and rationale.

Risks Not Attributable to Site 11

- Unacceptable risks were due to elevated concentrations of arsenic, iron, and manganese detected in monitoring wells located hydraulically upgradient of the site and, therefore, are not attributable to Site 11.

Concentrations are Consistent with Background

- The detected concentrations of arsenic, iron, and manganese in monitoring wells 11GW01 and 11GW05 are consistent with CAX background conditions.
- Arsenic is commonly associated with iron and manganese oxides and clay minerals derived from the weathering of volcanic rocks. Arsenic is naturally released from these source materials to groundwater. These source materials are also variable within aquifer sediments due to the mineralogy and weathering conditions. Monitoring wells 11GW01 and 11GW05 also contained elevated concentrations of iron and manganese.
- Background arsenic, iron, and manganese concentrations within the coastal plains of southeast Virginia have elevated concentrations and are highly variable.

There is no Discernable Plume

- Arsenic was detected in only two of eight monitoring wells.
- Iron and manganese were detected above background concentrations in only two of eight monitoring wells.

5.3 Surface Water and Sediment

Based on the results of the HHRA, no unacceptable human health risks associated with surface water and sediment within the unnamed tributaries were identified.

The SERA identified potentially unacceptable risks associated with insect, fish (lower trophic-level receptors), or fish-eating bird (avian piscivore) exposure to the PCB Aroclor-1260 in surface water and sediment within the unnamed tributaries adjacent to Site 11. However, the presence of Aroclor-1260 in the tributaries is not site-related. PCB contamination present in Penniman Lake is not related to Site 11 and is being addressed as part of a separate site under CERCLA. Arsenic and iron concentrations in sediment posing unacceptable risk to ecological receptors may be attributed to migration from site soils. However, because the source of contamination in site soils was addressed as part of the NTCRA and because the elevated concentrations were detected in only one sample (the same sample with detections of Aroclor-1260) directly adjacent to Penniman Lake, that sample location has been grouped with other Penniman Lake samples and will be addressed as part of future investigations of Penniman Lake (AOC 9).

What is Ecological Risk and How is it Calculated?

An Ecological Risk Assessment (ERA) evaluates the potential risks to plants, animals, habitats, and communities, and is conducted using a step-wise process (as outlined in Navy and USEPA ERA policy and/or guidance), that includes decision points where agreement among stakeholders is reached to determine if the process should continue or terminate. The process continues until a final decision has been reached (i.e., remedial action if unacceptable risks are identified, or no further action [NFA] if risks are acceptable). The process can also be iterative if data needs are identified at any step; the needed data are collected and the process starts again at the point appropriate to the type of data collected. An ERA has three principal components:

1. Problem Formulation establishes the goals, scope, and focus of the ERA and includes:

- Compiling and reviewing existing information on the habitats, plants, and animals that are present on or near the site.
- Identifying and evaluating area(s) where site-related chemicals may be found (source areas) and at what concentrations.
- Evaluating potential movement (transport) of chemicals in the environment.
- Identifying possible exposure media (soil, air, water, sediment).
- Evaluating if/how the plants and animals may be exposed (exposure pathways).
- Evaluating routes of exposure (for example, ingestion).
- Identifying specific receptors (plants and animals) that could be exposed.
- Specifying how the risk will be measured (assessment and measurement endpoints) for all complete exposure pathways.

2. Risk Analysis which includes:

- Exposure Estimate - An estimate of exposures concentrations. This includes direct exposures to lower trophic level receptors (organisms low on the food chain such as plants and insects) and upper trophic level receptors (organisms higher on the food chain such as birds and mammals), and indirect exposures (exposures via the food chain) for upper trophic level receptors.
- Effects Assessment - The concentrations of chemicals at which an adverse effect may occur are determined.

3. Risk Calculation or Characterization:

- The first two steps are used to estimate potential risk to plants and/or animals by comparing the exposure estimates with the effects thresholds.
- Also included is an evaluation of the uncertainties (potential degree of error) that are associated with the predicted risk estimate and their effects on ERA conclusions.

The three principal components of an ERA are implemented as an 8-step, 3-tiered process as follows:

1. **Screening-level Ecological Risk Assessment (SERA) (Steps 1-2; Tier 1)** – The SERA conducts an assessment of ecological risk using the three steps described above and very conservative assumptions (such as using maximum chemical concentrations).
2. **Baseline Ecological Risk Assessment (BERA) (Steps 3-7; Tier 2)** – If potential risks are identified in the SERA, a BERA is typically conducted. The BERA is a reiteration of the three steps described above but uses more site-specific and realistic exposure assumptions, as well as additional methods not included in the SERA, such as consideration of background concentrations. The BERA may also include the collection of site-specific data (such as measuring the concentrations of chemicals in the tissues of organisms, such as fish) to address key risk issues identified in the SERA.
3. **Risk Management (Step 8; Tier 3)** – Step 8 develops recommendations on ways to address any unacceptable ecological risks that are identified in the BERA and may also include other activities such as evaluating remedial alternatives.

6 Preferred Alternative

As a result of the NTCRA completed at Site 11 and risk management decisions made by the Navy and USEPA in consultation with VDEQ, there is no unacceptable risk to human health or the environment attributable to the site. Furthermore, removal of drums and debris, as well as impacted soils, has eliminated the potential future source of contamination. Because there are no unacceptable risks at Site 11, no alternatives other than the NFA alternative were evaluated.

Under this alternative, no further response actions will be performed at Site 11 and no restrictions on land use or exposure will be implemented. The Navy may reconsider NFA as the preferred alternative or select another alternative if public comments or additional data indicate that another alternative warrants consideration.

7 Community Participation

The Navy and USEPA, in consultation with VDEQ, provide information regarding the cleanup of CAX to the public through the Restoration Advisory Board, public meetings, the AR file for the site, the information repository, and announcements published in the *Daily Press* and *The Virginia Gazette* newspapers. The public is encouraged to gain a more comprehensive understanding of Site 11 and the ERP. Minutes of all public meetings are included in the AR file. The Navy will summarize and respond to comments in a responsiveness summary, which will become part of the official ROD and will also be included in the AR file.

The 45-day public comment period for this Proposed Plan was from Sunday, April 18 to Monday, June 1, 2010, and a public meeting will be held Thursday, May 27, 2010 from 3:30 pm to 4:00pm.

During the comment period, interested parties may submit written comments to the following address:

Mr. Christopher Murray
Remedial Project Manager
NAVFAC MIDLANT, Code OPHREV4
9742 Maryland Avenue, Bldg N-26
Norfolk, VA 23511-3095
Phone: (757) 445-6680
E-mail: christopher.r.murray@navy.mil

For further information, please contact:

Ms. Susanne Haug
USEPA (Region 3)
1650 Arch Street
Philadelphia, PA 19103
Phone: (215) 814-3394
Fax - (215) 814-3025
Email: haug.susanne@epamail.epa.gov

Mr. Wade Smith
Virginia Dept. of Environmental Quality
629 East Main Street, 4th Floor
Richmond, VA 23219
Phone: (804) 698-4125
Fax: (804) 698-4234
Email: wade.smith@deq.virginia.gov

Glossary

Administrative Record (AR): Site information is compiled in an Administrative Record and placed in the general ERP information repository for public review.

Area of Concern (AOC): An area of suspected or known contamination that warrants further study to determine if CERCLA-related risk to human health or the environment is present.

Background: The concentration of a naturally occurring or manmade constituent, such as a metal, found in groundwater, soil, sediment, and surface water in areas not affected by spills, releases, or other site-specific activities. Background concentrations of some metals and other constituents are often at levels that may pose a risk to human health or the environment. These background-related risks should be considered (i.e., subtracted) when calculating the risk posed by site conditions.

Baseline Ecological Risk Assessment (BERA): A second round of ecological risk assessment following the SERA which uses more site-specific and realistic exposure assumptions, as well as additional methods not included in the SERA, such as consideration of background concentrations.

Cancer Risk: Cancer risks are expressed as a number reflecting the increased chance that a person will develop cancer if exposed to chemicals or substances. For example, USEPA's acceptable risk range for Superfund sites is 1×10^{-4} to 1×10^{-6} , meaning there is 1 additional chance in 10,000 (1×10^{-4}) to 1 additional chance in 1 million (1×10^{-6}) that a person will develop cancer if exposed to a site that is not remediated.

Central Tendency Exposure (CTE): Mean concentration of site data is used as an exposure concentration in the risk assessment.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA): A Federal law, commonly referred to as the "Superfund" Program, originally enacted in 1980. CERCLA provides for cleanup and emergency response in connection with existing inactive hazardous waste disposal sites

that endanger public health and safety or the environment.

Contaminants of Concern (COCs): Chemicals that, based upon comparison to regulatory screening criteria and evaluation of more realistic exposure scenarios, pose unacceptable risks or hazards to receptors at the site.

Contaminants of Potential Concern (COPCs): Chemicals that, based upon comparison to regulatory screening criteria, have potential to pose unacceptable risks or hazards to receptors at the site.

Contaminant Migration Pathway: A potential path or route of contaminants from the source of contamination to contact with human or ecological receptors. Migration pathways include transport through air, soil, groundwater, surface water, and sediment.

Ecological: Refers to plants and animals in the environment.

Ecological Risk Assessment (ERA): An evaluation of the risk posed to the environment if remedial activities are not performed at the site.

Engineering Evaluation/Cost Analysis (EE/CA): A cost estimate and evaluation of removal actions considered to be non-time-critical that would reduce the risk to human health and the environment.

Environmental Restoration Program (ERP): The Navy, as the lead agency, acts in partnership with USEPA Region 3 and VDEQ to address environmental investigations at the facility through the ERP. The current ERP is consistent with CERCLA and applicable state environmental laws.

Feasibility Study (FS): A study that encompasses the development and screening of remedial action alternatives and a detailed analysis of the best options to establish the basis for a remedy selection.

Groundwater: Subsurface water that occurs in soil and geologic formations that are fully saturated.

Human Health Risk Assessment (HHRA): An evaluation of the risk posed to human health should remedial activities not be implemented.

Media: Soil, groundwater, surface water, or sediment at the site.

National Oil and Hazardous Substances Pollution Contingency Plan (NCP): Federal regulations at 40 C.F.R. Part 300 that provide the organizational structure and procedures to prepare for and respond to discharges of oil and releases of hazardous substances, pollutants, and contaminants.

National Priorities List (NPL): A list, developed by USEPA regulation, of uncontrolled hazardous substance release sites in the United States that are priorities for long-term remedial evaluation and response.

Non-cancer Hazard: Non-cancer Hazards (or risk) are expressed as a quotient that compares the existing level of exposure to the acceptable level of exposure. There is a level of exposure (the reference dose) below which it is unlikely for even a sensitive population to experience adverse health effects. USEPA's threshold level for noncarcinogenic risk at Superfund sites is 1, meaning that if the exposure exceeds the threshold, there may be a concern for potential noncancer effects.

Non-time-critical Removal Action (NTCRA): An action taken to abate, prevent, minimize, stabilize, mitigate, or eliminate the release or threat of release of a contaminant at a Superfund site for which a planning period of at least 6 months is available before on-site activities must begin to abate risk.

Petroleum Product: Materials derived from crude oil (petroleum) as it is processed in oil refineries.

Plume: A space in air, water, or soil containing pollutants released from a point source.

Polychlorinated Biphenyls (PCBs): A class of organic compounds with 1 to 10 chlorine atoms attached to biphenyl group. PCBs were widely used in transformers and capacitors and as coolants. Production of PCBs was banned by the United States Congress in 1976 due to its known toxicity.

Polynuclear Aromatic Hydrocarbons (PAHs): A class of organic compounds consisting of only carbon and hydrogen atoms with a structure of two or more closed rings. PAHs have known carcinogenic, mutagenic and

teratogenic properties; however, the level of toxicity is highly variable between individual PAH compounds. Some PAHs are naturally occurring in the environment, with elevated concentrations attributable to combustion of organic compounds.

Potable: Any liquid that is considered safe for drinking.

Preliminary Remediation Goals (PRGs): Establishes the metric criteria to be achieved during a remedial action. A PRG represents the contaminant levels that may remain upon completion of a remedial or removal action and still be protective of human health and the environment. PRGs are determined as the greater value of either the remediation goal or background concentration for each contaminant.

Proposed Plan: A document that presents a proposed cleanup alternative and requests public input regarding that alternative.

Public Comment Period: The time allowed for the members of an affected community to express views and concerns regarding an action proposed to be taken by the Navy and USEPA, such as a rulemaking, permit, or Superfund-remedy selection.

Reasonable Maximum Exposure (RME): The highest level of exposure that reasonably is expected to occur.

Receptors: Humans, animals, or plants that may be exposed to risks from contaminants related to a given site.

Record of Decision (ROD): A legal document that describes the cleanup action or remedy selected for a site, the basis for choosing that remedy, and public comment on the selected remedy.

Remedial Investigation (RI): A study that assesses the nature and extent of contamination and the associated health and environmental risks.

Resource Conservation and Recovery Act (RCRA): Federal law governing the storage and disposal of solid and hazardous wastes.

Screening-level Ecological Risk Assessment (SERA): An assessment of ecological risk based

on very conservative assumptions (such as maximum chemical concentrations).

Sediment: Particulate matter that can be transported by fluid flow and which is found submerged under water.

Semivolatile Organic Compounds (SVOCs): Manufactured chemicals that do not evaporate as easily as VOCs and are typically used in manufacturing materials such as adhesives and preservatives.

Site: The area of the facility where a hazardous substance, hazardous waste, pollutant, or contaminant from the facility has been deposited, stored, disposed of, placed, has migrated to, or otherwise come to be located.

Site Screening Process (SSP): Process to determine if an area should be considered a site for further investigation.

Soil: A mixture of organic and inorganic solids, air, water, and biota which exists on the earth surface above bedrock, including materials of anthropogenic sources, such as slag, sludge, etc.

Surface Water: All water naturally open to the atmosphere (rivers, lakes, reservoirs, ponds, streams, impoundments, seas, estuaries, etc.)

Tributary: A small stream or river, which enters and increases the volume of the receiving river, lake, or reservoir.

Trophic Level: A classification system of organisms according to their means of obtaining nutrition; organisms at higher (upper) trophic levels consume organisms at lower trophic levels.

United States Environmental Protection Agency (USEPA): The Federal agency responsible for administration and enforcement of CERCLA (and other environmental statutes and regulations). The USEPA has final approval authority for the Selected Remedy.

Virginia Department of Environmental Quality (VDEQ): The Commonwealth agency responsible for administration and enforcement of environmental regulations.

Volatile Organic Compound (VOC): Organic compounds that evaporate readily at room temperature.

