Department of the Navy

Proposed Plan for Site 5/13 Groundwater and Soils—Open Burn Area and Oil Sludge Disposal Area In-situ Chemical Reduction with Zero-Valent Iron for Groundwater and No Further Action for Soils

Former Naval Surface Warfare Center—White Oak

Silver Spring, Maryland

NAVY ANNOUNCES PROPOSED PLAN

This **Proposed Plan** recommends *in-situ* chemical reduction with zero-valent iron along with monitored natural attenuation and institutional controls to address **groundwater** contamination, and no further action be taken to address soil at Sites 5 and 13, the Open Burn Area and Oil Sludge Disposal Area, respectively. Sites 5 and 13 are adjacent to one another and are located in the northeast portion of the former Naval Surface Warfare Center, Dahlgren Division Detachment, White Oak (NSWC-White Oak). The locations of the two sites are shown in Figure 1.

Site 5 consists of three adjacent open burn areas that together were used from the late 1940s until 1970 as a burn site for paper, cardboard, wood and other bulky ignitable materials, as well as small quantities of hazardous materials. One or more of the areas may have also been used as a fire training area and for testing explosives, as well as other pyrotechnic devices.

Site 13 occupies approximately 0.7 acre and between 1970 and 1978, reportedly was used as a disposal area for approximately 6,000 to 10,000 gallons of oily sludge from storage tanks containing No. 6 fuel oil.

Sites 5 and 13 groundwater data collected between 1988 and the present indicate that concentrations of volatile organic compounds (VOCs) would present risks to receptors if groundwater were used as potable water. The greatest concentration of contaminated groundwater associated with Sites 5 and 13 coincides with the area that is historically considered Site 13. Activities at Site 5 have not impacted the groundwater. The only contaminated soil identified in the Site 5 and 13 area was the surface and subsurface soil from the base of the Site 5 burn areas. This soil has been excavated and disposed offsite as part of a prior removal action. The soil remaining at both Sites 5 and 13 no longer poses an unacceptable human health or ecological risk. In addition, the soil at the sites does not represent a source of contamination to the underlying groundwater or nearby surface water.

This Proposed Plan recommends *in-situ* chemical reduction with zero-valent iron, combined with monitored natural attenuation and institutional controls, as the preferred alternative to mitigate any potential risks from exposure to site groundwater. Also, this proposed plan recommends no further action as the preferred alternative for soil at Sites 5 and 13 because the prior removal action has mitigated

LEARN MORE ABOUT THE PROPOSED PLAN

The Navy solicits written comments from the community on the preferred alternative for Sites 5 and 13, as identified in this Proposed Plan. The Navy has set a public comment period from September 30 through October 30 to encourage public participation in the remedy selection process for Sites 5 and 13. A public meeting has been scheduled for October 14. During the public meeting, representatives of the Navy, EPA, and MDE will be available to answer questions and accept public comments on the Proposed Plan for Sites 5 and 13. In addition, an overview of the site characterization will be presented.

Important Information to Remember

Public comment period begins September 30, 2003.

Public Meeting: October 14, 2003 at 7:00 PM

Village Square Music Room
Riderwood Village
3110 Gracefield Road
Silver Spring, Maryland 20904
(301) 572-8319

Public comment period ends October 30, 2003

The relevant environmental documents for the former NSWC-White Oak Sites 5 and 13 are available for review by the public at the following locations:

Montgomery County Public Library, White Oak Branch
11701 New Hampshire Avenue
Silver Spring, MD 20904
(301) 622-2492

Hours of Operation:
Mon. – Thurs.: 10:00 AM – 8:30 PM
Fri.: 10:00 AM – 5:00 PM
Sat.: 9:00 AM – 5:00 PM
Sun.: Closed

Engineering Field Activity Chesapeake
1314 Harwood Street, SE
Washington Navy Yard, D.C. 20374-5018
(202) 685-0061

Hours of Operation:
Mon. – Fri.: 8:00 AM – 4:00 PM
Sat.: Closed
Sun.: Closed

site risks from direct exposure to soil, and minimized its potential to act as a source of contamination to groundwater or surface water.

The US Department of the Navy (Navy) has completed its investigation at Sites 5 and 13 at the former NSWC-White Oak in Silver Spring, Maryland, as well as a removal action for the soil at Site 5. The investigations and removal action were completed as part of the Navy's Installation Restoration Program (IRP) and in response to the requirements of the **Resource Conservation and Recovery Act (RCRA)** and the **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)**. The investigations completed for Sites 5 and 13 (see Site Background for a detailed description) collectively meet the requirements of both a CERCLA **remedial investigation (RI)** and a **RCRA facility investigation (RFI)**. This Proposed Plan summarizes the findings of the investigations and the soil removal action.

This Proposed Plan discusses the rationale for this proposal and explains how the public can participate in the decision-making process.

A glossary of key words used in this Proposed Plan is attached. Words included in the glossary are identified in bold print the first time they appear in the plan.

This document is issued by the Navy and the U.S. Environmental Protection Agency (EPA). The Navy and EPA, with regulatory support and guidance from the Maryland Department of the Environment (MDE), will select a remedy for Sites 5 and 13 after reviewing and considering any comments on this proposal submitted during the public **comment period**. The Navy and EPA may modify the preferred alternative or select another alternative based on new information or public comments. Therefore, the public is encouraged to review and comment on the Proposed Plan.

This Proposed Plan is issued pursuant to the public participation requirements under Section 300.430(f)(2) of the **National Oil and Hazardous Substances Pollution Contingency Plan (NCP)** and Section 117(a) of CERCLA. This Proposed Plan summarizes information that can be found in greater detail in the **Administrative Record** file and the **information repository** for the former NSWC-White Oak. Documents relevant to the remedy selection for Sites 5 and 13 (i.e., documents that comprise the Sites 5 and 13 Administrative Record) and others regarding RCRA/CERCLA activities at the former NSWC-White Oak, can be found in both the Administrative Record file and the information repository. The Administrative Record for Sites 5 and 13 is maintained by the Navy at the Engineering Field Activity Chesapeake office at the Washington Navy Yard in Washington, DC. The information repository, which contains key documents from the Administrative Record on which this proposal is based, is located at the Montgomery County Public Library, White Oak Branch. The Navy, EPA, and MDE encourage the public to review this information and to comment on the Proposed Plan during the public comment period. All comments received will become part of the Administrative Record. Information regarding when and how to comment is provided later in this Proposed Plan.

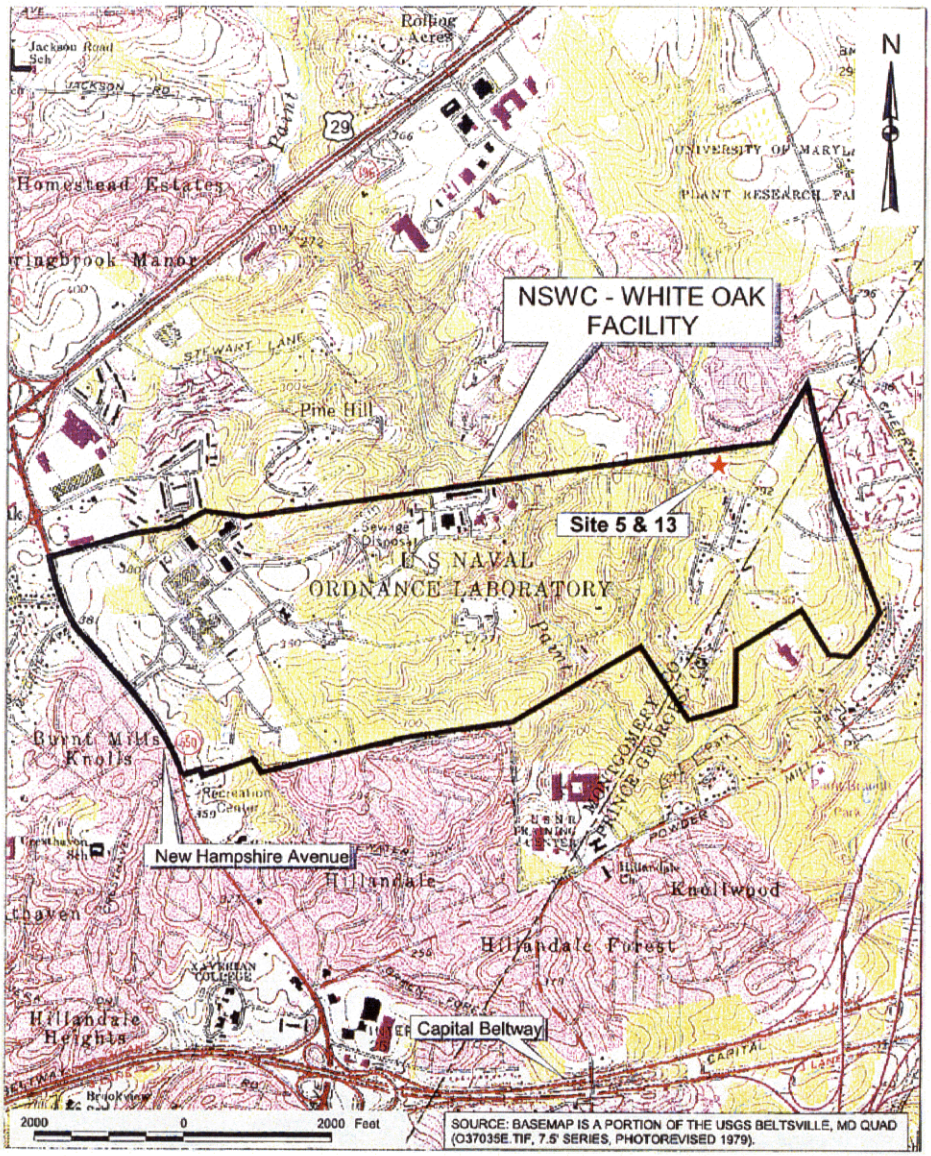

Figure 1 - White Oak Vicinity Map

A final remedy for Sites 5 and 13 will be documented in a **Record of Decision (ROD)**, which will be issued after all public comments on this Proposed Plan are considered.

SITE BACKGROUND

The former NSWC-White Oak was originally established in 1946 as the Naval Ordnance Laboratory, with a mission to carry out research on military guns and explosives. The former facility is located in Prince George's and Montgomery Counties, approximately 5 miles north of Washington, DC, off New Hampshire Avenue in Silver Spring, Maryland.

Through the years, NSWC-White Oak's mission was expanded to include research involving torpedoes, mines, and projectiles. In September 1974, the facility combined with the Naval Weapons Laboratory, Dahlgren, Virginia to become the Naval Surface Weapons Center, which was renamed the Naval Surface Warfare Center, Dahlgren Division, in 1988. After that time, the facility functioned as the principal Navy research, development, test, and evaluation center for surface warfare weapon systems, ordnance technology, strategic systems, and underwater weapons systems.

NSWC-White Oak was closed in 1997 in response to the Base Realignment and Closure (BRAC) Act. The approximately 712-acre property was transferred in two parcels to the General Services Administration (GSA) and to the U.S. Army. Approximately 662 acres were transferred to the GSA in the fall of 1997 and the remaining area in the southeastern portion of the facility was transferred to the U.S. Army in February 1998. The GSA has plans to reuse and develop the subject property for commercial purposes. The location of Sites 5 and 13 was part of the property transferred to the GSA. The property transferred to the U.S. Army will be used in conjunction with ongoing activities at the Army's adjacent Adelphi Research Laboratory. Before and after its closure, areas of potential contamination at the former NSWC-White Oak were investigated under the Navy's IRP.

On June 2, 1998, EPA issued an Administrative Order (the Order) to the Navy, pursuant to Section 7003 of the RCRA, requiring the Navy to:

- Undertake Interim Measures (IM) at the facility to prevent or mitigate threats to human health and/or the environment.
- Perform an RFI (or RI) to determine fully the nature and any release of hazardous wastes, solid wastes, and/or hazardous constituents at and/or from the facility.
- Perform a Corrective Measures Study (CMS) [or **Feasibility Study (FS)**] to identify and evaluate alternatives for corrective action necessary to prevent or mitigate migration or releases of hazardous wastes, solid wastes and/or hazardous constituents at and/or from the facility.

The Order provides the framework for completing the investigation and remediation of the former NSWC-White Oak facility. The Order also recognizes that "EPA and the Navy intend to integrate the Navy's CERCLA response obligations and RCRA corrective action obligations" at the facility. EPA and the Navy recognize that, if the preferred alternatives are selected for Sites 5 and 13 soil and groundwater, the Navy will have completed requirements related to Sites 5 and 13 under the RCRA Section 7003 Administrative Order.

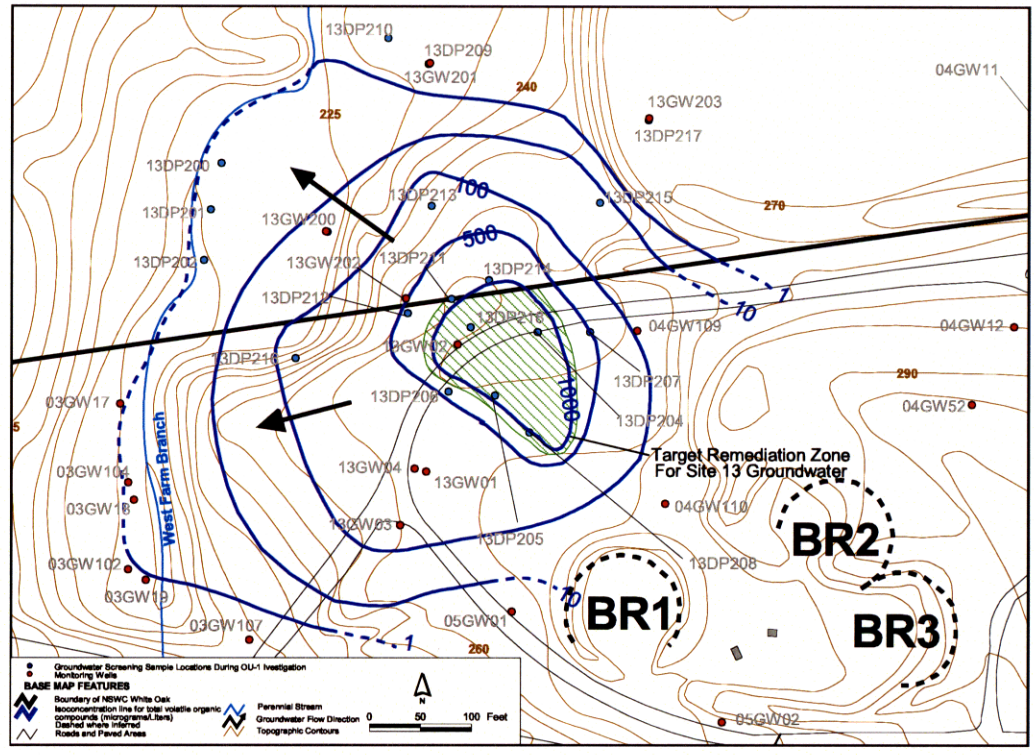

Figure 2 - Sites 5 and 13

As part of closing the facility, the Navy assembled a BRAC Clean-Up Team (BCT) to expedite the work required to comply with this order. The BCT for NSWC-White Oak includes representatives of the Navy, EPA, and MDE. GSA, while not a formal member of the BCT, actively participates as an adjunct member.

SITE CHARACTERISTICS

Site 5 consisted of three adjacent open burn areas that were surrounded by berms of compacted soil (see Figure 2). The first bermed area or burn ring (BR)-1, was used from the late 1940s until 1970 as a burn site for paper, cardboard, wood, and other bulky ignitable materials, as well as small quantities of hazardous materials. In 1969-70, materials were ignited in BR-1 using pyrotechnic devices. It has also been reported that this site may have been used as a fire training area and that explosives may have been tested here. BR-2, located east of BR-1, was reportedly used for research operations. BR-3 is located north of the other two burn areas and was used to test pyrotechnic devices.

The ground surface at Site 5 slopes generally to the south, and the maximum difference in elevation is approximately 30 feet. There are no surface water bodies within Site 5. The closest surface water body is a small, southward-flowing tributary (West Farm Branch) of Paint Branch located approximately 420 feet west of BR-1. During rain events, surface water infiltrates into the surface soil or drains off site towards West Farm Branch.

The subsurface investigation at BR-1 indicated that there was a black cobbly, sandy silt layer with a distinct petroleum odor between 2 feet and 12 feet bgs. Material encountered in the subsurface included pieces of rubber automobile tires, burnt wood chips, broken glass, plastic, cardboard, wire, and various metal fragments. No fill materials or discolored soil were discovered in BR- 2 and 3.

Site 13 is located adjacent to the north side of Site 5, between Dahlgren Road and the northern perimeter road. The site occupies approximately 0.7 acre. Anecdotal accounts state that between 1970 and 1978, approximately 6,000 to 10,000 gallons of oily sludge from storage tanks containing No. 6 fuel oil were spread over the surface of Site 13. The location and history of Site 13 is not well documented. Because very little petroleum contamination has been found in the soil and groundwater in the area that is currently considered Site 13, it is now believed that most, if not all of the oil sludge disposal activities were actually conducted in the area defined as Site 4. Site 4 is being addressed under a separate remedial action. The past activities that resulted in the chlorinated VOC contamination that is present in the groundwater at Site 13 are not documented.

The ground surface at Site 13 gently slopes to the west and consists of a relatively flat area. The maximum elevation relief across the site is approximately 5 feet, and the elevation of the site is approximately 260 feet. Areas adjacent to Site 13 to the west and southwest decrease to an elevation of 235 feet toward Dahlgren Road. There are no surface water bodies within Site 13. The closest surface water body is West Farm Branch located approximately 300 feet west of the site. During a rain event, surface water infiltrates into the surface soil or produces minor site runoff towards West Farm Branch.

With the exception of the fill material found at BR-1, the soil underlying Sites 5 and 13 consists of a layer of silty sand and gravel (Coastal Plain deposits) ranging in thickness from 40 feet at the higher elevations on the east side of Site 5 to 10 feet on the west side of Site 13. The Coastal Plain is underlain by a 10 to 20-foot layer of decayed rock (saprolite). Fractured rock underlies the saprolite.

The depth to the groundwater table varies from 25 feet on the east side of Site 5 to 12 feet at Site 13. While the upper portion of the water table aquifer resides in the relatively permeable Coastal Plain deposits on the east side of Site 5, the water table at Site 13 is present in the much-less permeable saprolitic soil.

Groundwater flow beneath Site 5 is primarily to the south, while the flow beneath Site 13 is primarily to the northwest, toward and into West Farm Branch.

Investigation History

The contaminated media related to Sites 5 and 13 have been characterized under numerous investigations and studies between 1985 and the present. A chronological listing of the major studies is provided here. The findings of the studies and the subsequent actions taken as they relate to each of the contaminated media are discussed below.

Site Screening Report for IRP Sites 1, 5, 6, 12, 13, 28, 29, 31, 32, 33, and EBS AOC 100 – December 1998
Operable Unit 1 (Groundwater) Remedial Investigation—August 2002
Operable Unit 1 (Groundwater) Feasibility Study—June 2003
RCRA Facility Investigation for Site 5 and 13 (Soil)—May 2003

Soil Characterization/Removal Action

Site 5

The site screening investigation, conducted in 1997 and 1998, identified miscellaneous fill material, discolored soil, and soil contaminated with petroleum hydrocarbons and semi-volatile organic compounds (SVOC) in the area of BR-1. The majority of the discoloration, odors, and elevated SVOC concentrations in the soil were in the top 2 to 3 feet. A soil removal action was conducted in 2000, during which the circular soil berms were removed and used as clean backfill at nearby Site 3 and the top three feet of contaminated soil that made up the floor of the three burn rings was excavated and disposed of in an offsite landfill. The remaining surface and subsurface soil was investigated in 2002 as part of the Site 5 RFI. Data collected in 2002 as well as the 1997-98 data from soil not removed during the removal action, was used to conduct human health and ecological risk assessments.

Contaminants that were still present in the Site 5 soil after the removal action consisted of low levels of semivolatile organic compounds, PCBs, pesticides, explosives compounds, and metals. Ten compounds slightly exceeded the risk-based screening criteria used by EPA Region 3 to identify potential risks to people in residential settings. These compounds were benzo(a)pyrene, dibenzo(a,h)anthracene, Aroclor 1260, dieldrin, 2-amino-4,6-dintitrotoluene, RDX, copper, selenium, and thallium.

Site13

Samples were collected from the soil above the water table during the 1997 Site Screening Investigation and as part of the 2002 RFI. The only contaminants that were detected above the EPA Region 3 risk-based screening criteria for residential soil were benzo(a)pyrene, dibenzo(a,h)anthracene, and thallium. While low levels of chlorinated VOCs were detected near the water table, they were not at concentrations in excess of the risk-based criteria nor did they represent potential sources of groundwater contamination.

Groundwater Characterization

The groundwater at Sites 5 and 13 was investigated initially during the 1997 site screening investigation and further as part of the Operable Unit (OU)-1 RI (August 2002). OU-1 includes groundwater beneath IR sites in the eastern portion of NSWC-White Oak. OU-1 was designated by the BCT to allow for a more complete understanding of the nature and extent of groundwater contamination in this part of the facility.

A Feasibility Study (FS) for OU-1 (March, 2003) was completed that assessed the nature and extent of groundwater contamination that exceed Preliminary Remedial Goals (PRG). The FS concluded that groundwater beneath Site 13 and the western portion of Site 5 is contaminated with several VOCs and other compounds exceeding PRGs. These compounds and the maximum concentrations at which they were detected since 2000 are:

- 1,1,2,2-Tetrachloroethane—1,100 µg/L
- cis-1,2-Dichloroethene—520 µg/L
- Trichloroethene—420 µg/L
- Tetrachloroethene—150 µg/L
- Vinyl Chloride—20 µg/L
- RDX—110 µg/L
- Iron (dissolved)—18,900 µg/L

The main chemical in Site 13 groundwater is 1,1,2,2-tetrachloroethane. All of the other chlorinated VOCs are known breakdown products of 1,1,2,2-tetrachloroethane. The elevated concentration of dissolved iron is also likely a by-product of the organic contamination. The high organic concentrations create reducing conditions which convert insoluble iron in the soil to soluble iron.

The area where the total concentration of VOCs exceeds 500 µg/L is approximately 15,000 square feet. This has been identified as the Target Remediation Zone (TRZ). The contamination is migrating to the northwest, toward and into West Farm Branch. However, no VOCs have ever been detected in the stream. Wells on the opposite side of West Farm Branch from Site 13 indicate that the contamination is not crossing beneath the stream.

PRINCIPAL THREATS

There are no principal threat wastes in the soil or groundwater at Sites 5 and 13. Principal threats are explained in the box on this page.

SCOPE AND ROLE OF THE ACTION

This Proposed Plan summarizes the preferred alternatives for Sites 5 and 13 soil and groundwater at NSWC-White Oak. Given the lack of significant levels of contamination or risks in soil to existing or potential site users, it is recommended that no further action be taken for soil at Sites 5 and 13. Given the levels of groundwater contamination and risks to potential site users, it is recommended that *in-situ* chemical reduction with zero-valent iron combined with monitored natural attenuation and institutional controls, be implemented to mitigate site risks. The purpose of this

What is a "Principal Threat?"

The National Contingency Plan establishes an expectation that EPA will use treatment to address "principal threats" posed by a site wherever practicable [National Contingency Plan Section 300.430 (a)(1)(iii)(A)]. The "principal threat" concept is applied to the characterization of "source materials" at a Superfund site. A source material is 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. Contaminated groundwater generally is not considered to be a source material; however, non-aqueous-phase liquids (NAPLs) in groundwater may be viewed as a source material. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur. The decision to treat these wastes is made on a site-specific basis through a detailed analysis of the alternatives using the nine remedy selection criteria. This analysis provides a basis for making a statutory finding that the remedy uses treatment as a principal element.

Proposed Plan is to present the preferred alternatives that the Navy and EPA, with MDE concurrence and, based on public input, plan to select in a ROD for the sites.

To date, five RODs have been signed for sites at the former NSWC-White Oak. Proposed Plans and RODs for other sites at the former NSWC-White Oak will be issued in the future.

SUMMARY OF SITE RISKS

Soil

Baseline human health and ecological **risk assessments** were prepared for soil at Sites 5 and 13. The goal of the risk assessments was to determine the current and future effects of contaminants in soil on human health and the environment. Based on the risk assessments, it is the Navy's and EPA's current judgement that the preferred alternative for soil (i.e., no further action) identified in this Proposed Plan is appropriate and no further action is required to protect public health and welfare or the environment from actual or threatened releases of hazardous substances from the soil into the environment.

Human Health Risks

The human health risk assessments for Site 5 and Site 13 soil were performed after the 2000 soil removal action to characterize the potential risks to likely human receptors under current and future land use. For an explanation of the human health risk assessment process, see the text box on page 6. The receptors evaluated in the risk assessments included present and/or future full-time workers, maintenance/utility workers, construction workers, recreational users, trespassers, day care center children, and hypothetical child and adult residents. For these risk assessments, the Navy assumed that all receptors were exposed to soil (surface and subsurface). Land at these sites is currently limited to commercial and industrial use and is expected to be so in the future. The residential exposure scenario is conservative and is evaluated to confirm that no land use restrictions would be necessary at these sites.

The Navy developed quantitative risk estimates for potential human receptors for those chemicals identified as potential chemicals of concern (PCOCs) at Sites 5 and 13, based on the 2002 soil RFI sampling. The risk assessment includes an evaluation of all PCOCs and selected exposure pathways, including those that do not pose unacceptable risks to human health at this site. PCOCs are those chemicals that are identified as a potential threat to human health and are evaluated further in the **baseline risk assessment**. Chemicals of concern (COCs) are a subset of the PCOCs; they are those chemicals identified in the baseline human health risk assessment as needing to be addressed by a **response action**.

WHAT IS RISK AND HOW IS IT CALCULATED?

A human health risk assessment estimates "baseline risk." This is an estimate of the likelihood of health problems occurring if no clean-up action were taken at a site. To estimate baseline risk at a site, the Navy undertakes a 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, the Navy looks at the concentrations of contaminants found at a site as well as past scientific studies on the effects these contaminants have had on people (or animals, when human studies are unavailable). Comparisons between site-specific concentrations and concentrations reported in past studies help the Navy to determine which contaminants are most likely to pose the greatest threat to human health.

In Step 2, the Navy considers the different ways that people might be exposed to the contaminants identified in Step 1, the concentrations that people might be exposed to, and the potential frequency and duration of exposure. Using this information, EPA calculates a "reasonable maximum exposure" (RME) scenario, which 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 information on the toxicity of each chemical, to assess potential health risks. The Navy considers two types of risk: cancer risk and non-cancer risk. The likelihood of any kind of cancer resulting from a site is generally expressed as an upper-bound probability; for example, a "1 in 10,000 chance." In other words, for every 10,000 people that could be exposed, one extra cancer may occur as a result of exposure to site contaminants. An extra cancer case means that one more person could get cancer than would normally be expected to from all other causes. For non-cancer health effects, the Navy calculates a "hazard index (HI)." The key concept here is that a "threshold level" (measured usually as a hazard index of less than 1) exists below which non-cancer health effects are no longer predicted.

In Step 4, the Navy determines whether site risks are great 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 to determine the total risk resulting from the site.

The PCOCs for Site 5 soil are: benzo(a)pyrene, dibenzo(a,h)anthracene, Aroclor 1260, dieldrin, 2-amino-4,6-dintitrotoluene, RDX, copper, selenium, and thallium.

The PCOCs for Site 13 soil are: benzo(a)pyrene, dibenzo(a,h)anthracene, and thallium.

Quantitative estimates of noncarcinogenic and carcinogenic risks were developed separately for each site. The assessments looked at the combined risk through ingestion of contaminated soil and skin contact. The results of the quantitative risk analysis indicated no unacceptable risks (i.e., the hazard index (HI) was less than unity (1) and the incremental lifetime cancer risk (ILCR) was below the upper risk range of 1 in 10,000) for any potential receptors for exposure to soil at Sites 5 and 13.

The greatest HI for Site 5 soil is 0.45 and the greatest HI for Site 13 soil is 0.16, both of which pertain to a child living at the site. The greatest ILCR for Site 5 soil is 1 in 170,000 and the greatest ILCR for Site 13 is 1 in 240,000. These risks pertain to a child resident also.

The potential for inhalation of contaminants coming off the soil at Sites 5 and 13 were semi-quantitatively evaluated in the risk assessment. Inhalation of volatile emissions from soil and fugitive dust were evaluated by comparing maximum constituent concentrations to EPA site screening levels (SSLs) for transfer from soil to air. The SSLs are based on residential land use and lifetime exposure scenarios and are, therefore, conservative values for workers, recreational users, trespassers, and day care center children. Maximum detected concentrations were less than the inhalation SSLs for all constituents, and potential risks associated with inhalation exposure risks via migration from soil to air are minimal.

Because the baseline risk assessments determined that the soil at both Sites 5 and 13 does not present an unacceptable risk for any receptors, no COCs have been identified for the soil.

Ecological Risks

The Navy has also conducted a phased ecological risk assessment (ERA) at the former NSWC-White Oak, to characterize the potential risks to ecological receptors from site-related chemicals at Sites 5 and 13. At Site 5, one surface soil sample was collected for toxicity testing (14-day earthworm test) during the Baseline Ecological Risk Assessment (BERA) because of elevated levels of PAHs in that sample. The sample was toxic versus the control sample, but still had a high mean survival of 87.5 percent. The surface soil from Site 5 was excavated as part of a removal action, so the soil from the location of the toxicity test is no longer present. No other samples from Site 5 had chemical concentrations that exceeded the risk-based levels developed during the BERA so risks to ecological receptors at Site 5 are expected to be negligible.

All chemical concentrations in surface soil samples collected at Site 13 were below the risk-based levels developed during the BERA so risks to ecological receptors at Site 13 are expected to be negligible.

Groundwater

A human health risk assessment was prepared for groundwater at Sites 5 and 13. The goal of the risk assessment was to determine the current and future effects of contaminants in groundwater at Site 5 and Site 13, on human health. Based on the risk assessment, it is the Navy's and EPA's current judgement that action is necessary to remediate groundwater, and the preferred alternative for groundwater identified in this Proposed Plan is appropriate to protect public health and welfare from actual or threatened releases of hazardous substances into the environment.

Human Health Risks

Quantitative risk estimates were developed by the Navy for potential human health risks under current conditions and under potential future land-use scenarios. The receptors evaluated in this risk assessment included present and/or future industrial workers, child and adult residents, and future construction workers. For this risk assessment, it was assumed that all receptors were exposed to groundwater either through dermal content or through use as a primary water supply. These are conservative scenarios because groundwater is not currently used as a water supply. Furthermore, the area surrounding NSWC-White Oak is serviced by a public water supply and local ordinances prevent the installation of new private potable supply wells.

The Navy developed quantitative risk estimates for potential human receptors for those chemicals identified as PCOCs in groundwater at Sites 5 and 13, based on the results of site investigations. The risk assessment which is provided in the OU-1 RI, contains an evaluation of all PCOCs identified throughout OU-1. The risk assessment determined that the only unacceptable risk posed by the groundwater contamination across OU-1 would be to hypothetical future onsite residents that would use the groundwater as a primary water supply. The FS for OU-1 evaluated specific areas within OU-1, such as Sites 5 and 13, to identify site-specific PCOCs that may contribute to this potential risk.

The PCOCs identified for Sites 5 and 13 groundwater are: five chlorinated VOCs (1,1,2,2-tetrachloroethane, tetrachloroethene, trichloroethene, cis-1,2-dichloroethene, and vinyl chloride), one explosive compound (RDX), and iron.

All seven of these compounds have subsequently been identified as COCs in the OU-1 FS and need to be addressed by a remedial action for Sites 5 and 13 groundwater.

Potential noncarcinogenic and carcinogenic risks from groundwater were evaluated for all receptors. Risks for each receptor are summed across all applicable exposure routes; unacceptable risks exist for the residential exposure pathways only. This assumes that the most contaminated water at Sites 5 and 13 is used as a residential drinking water source. Under this scenario, the HI is 8.2 for a adult resident and 19.4 for a child resident. The ILCR under the same scenario is 1 in 600, which is greater than the upper risk range of 1 in 10,000.

Ecological Risks

As stated above, the Navy has completed a BERA at NSWC-White Oak. As groundwater exposure is not associated with ecological receptors, no ecological risks are posed by Sites 5 and 13 groundwater. Surface water and sediment in West Farm Branch do not contain Sites 5 and 13 related chemicals that represent risks to plants and animals.

Summary of Risks

Concentrations of contaminants present in Sites 5 and 13 soil following the Site 5 removal action do not present an unacceptable risk to human health or ecological receptors, therefore, no further action is recommended for Sites 5 and 13 soil. Concentrations of contaminants present in Sites 5 and 13 groundwater present an unacceptable risk to human health under a future residential-use exposure scenario.

SUMMARY OF THE PREFERRED ALTERNATIVES

The preferred alternative for Sites 5 and 13 soil is no further action because there are no unacceptable risks under current or future exposure scenarios. The Navy's removal action successfully addressed historic site contamination and mitigated unacceptable risks associated with soil. The preferred alternative for Sites 5 and 13 groundwater is *in-situ* chemical reduction with zero-valent iron along with monitored natural attenuation and institutional controls.

SUMMARY OF REMEDIAL ACTION OBJECTIVES

The remedial action objectives (RAOs) for Sites 5 and 13 groundwater are:

- To prevent unacceptable risks to human receptors from exposure to contaminants in the groundwater.
- Where practicable, to restore contaminated groundwater to a quality amenable to beneficial use (i.e. meet the PRGs identified).

COC	PRG (µg/L)
cis-1,2-Dichloroethene	70
1,1,2,2-Tetrachloroethane	3
Tetrachloroethene	5
Trichloroethene	5
Vinyl Chloride	2
RDX	6
Iron	4,600

SUMMARY OF REMEDIAL ALTERNATIVES FOR GROUNDWATER

Nine remedial alternatives were developed to address the COCs in groundwater at Sites 5 and 13. Each is identified and summarized below.

Alternative 1—No Action

No action would be taken under this alternative. In addition, no monitoring would be performed. Costs are associated with 5-year reviews.

Alternative 1—Estimated Cost	
Capital Cost	$0
Annual Operation and Maintenance (O&M) Cost	$0–$6,000
Present-Worth Cost	$20,000
Remediation Time Frame	30–50 years

Alternative 2—Institutional Controls (ICs) with Long-Term Monitoring

Alternative 2 would consist of a Land Use Control and Implementation Plan (LUCIP) which prohibits installation of water supply wells into the contaminated aquifer to ensure there is no human exposure pathway to the contaminants left in-place. The plume would be monitored once every 9 months to determine if contamination is spreading or receding and if restrictions need to be revised.

Alternative 2—Estimated Cost	
Capital Cost	$47,000
Annual O&M Cost	$16,000–$21,000
Present-Worth Cost	$388,000
Remediation Time Frame	30–50 years

Alternative 3—Monitored Natural Attenuation (MNA) with ICs

Alternative 3 would consist of remediation of the sites by naturally occurring processes of biodegradation, adsorption, dilution, and dispersion. A group of monitoring wells would be observed for trends in contaminant concentrations and

natural attenuation indicator parameters to support the effectiveness of MNA. The objective would be to allow for natural degradation of groundwater contaminants to PRGs. Institutional controls described in Alternative 2 would be put in place until RAOs are achieved.

Alternative 3—Estimated Cost	
Capital Cost	$51,000
Annual O&M Cost	$23,000–$45,000
Present-Worth Cost	$439, 000
Post-Closure Cost	$32,000
Remediation Time Frame	20 years

Alternative 4—Enhanced Reductive Dechlorination with MNA and ICs

Under Alternative 4 the naturally occurring process of biodegradation would be enhanced through injection and distribution of an electron donor such as sodium lactate, in the area of greatest contamination to increase the biodegradation rates of the contaminants. The proposed area of injection is shown as the Target Remediation Zone (TRZ) in Figure 2. The objective is biodegradation of the groundwater contaminants to carbon dioxide, water and chloride. Areas outside the TRZ would be monitored for natural attenuation.

Alternative 4—Estimated Cost	
Capital Cost	$382,000
Annual O&M Cost	$19,000–$206,000
Present-Worth Cost	$1,040, 000
Post-Closure Cost	$52,000
Remediation Time Frame	17 years

Alternative 5—*In-situ* Chemical Oxidation (ISCO) with MNA and ICs

In Alternative 5, an oxidant would be injected and distributed throughout the TRZ in the aquifer to promote oxidization of the contaminants to innocuous compounds such as carbon dioxide and water. Areas outside the TRZ would be monitored for natural attenuation.

Alternative 5—Estimated Cost	
Capital Cost	$329,000
Annual O&M Cost	$19,000–$327,000
Present-Worth Cost	$929, 000
Post-Closure Cost	$48,000
Remediation Time Frame	17 years

Alternative 6—Groundwater Extraction and Treatment (P&T) with MNA and ICs

Alternative 6 involves a groundwater pump and treat system installed to hydraulically control/isolate the contaminant plume and remove dissolved contaminants from the subsurface. A network of pumping wells would discharge to a treatment system to remove the contaminants from the groundwater prior to discharge to a surface water body. The objective is the containment of the dissolved contaminants and reduction of the groundwater concentrations to PRGs. Institutional controls described in Alternative 2 would be put in place until RAOs are achieved by this technology.

Alternative 6—Estimated Cost	
Capital Cost	$334,000
Annual O&M Cost	$100,000–$170,000
Present-Worth Cost	$1,140, 000–$1,370,000
Post-Closure Cost	$66,000
Remediation Time Frame	17 years

Alternative 7—Air Sparging with MNA and ICs

Air sparging is an *in-situ* technology that involves injecting ambient air into the groundwater target remediation zone to volatilize dissolved, absorbed, and residual contaminants. A network of air injection wells would be installed in the target remediation zone. Pressurized air would be forced into the aquifer through these wells. The air bubbles would promote the transfer of the VOCs in the groundwater to the air bubbles, which would migrate up through the soil and into the atmosphere. Because the mass of VOCs is small, collection and treatment of the vapors is not required under state air pollution laws. Areas outside the TRZ would be monitored for natural attenuation.

Alternative 7—Estimated Cost	
Capital Cost	$273,000
Annual O&M Cost	$19,000–$97,000
Present-Worth Cost	$763, 000
Post-Closure Cost	$58,000
Remediation Time Frame	17 years

Alternative 8—Groundwater Extraction with Wetlands Treatment

Alternative 8 involves using a passive groundwater extraction trench to collect contaminated groundwater and prevent it from migrating offsite. The collected groundwater would be discharged to a constructed wetlands for treatment. A 185-foot long by 38-foot deep groundwater extraction trench would be constructed along the property line that constitutes the northern edge of Sites 5 and 13.

Alternative 8—Estimated Cost	
Capital Cost	$297,000
Annual O&M Cost	$41,000
Present-Worth Cost	$1,090,000
Post-Closure Cost	$39,000
Remediation Time Frame	30 years

Alternative 9—*In-situ* Chemical Reduction with Zero-valent Iron, MNA and ICs

Alternative 9 consists of injecting a mixture of zero-valent iron powder and nitrogen gas into the aquifer using a series of injection boreholes similar to those proposed under alternatives 4, 5 and 7. The iron reacts with the 1,1,2,2-PCA, TCE and other chlorinated organic chemicals in the groundwater to reduce them to ethene and chloride. The treatment would be employed in the area of greatest 1,1,2,2-TCA and TCE concentrations (the TRZ). Lower levels of chlorinated organic compounds downgradient of the TRZ would be monitored for natural attenuation.

Alternative 9—Estimated Cost	
Capital Cost	$649,000
Annual O&M Cost	$46,000–$118,000
Present-Worth Cost	$1,142,000
Post-Closure Cost	$52,000
Remediation Time Frame	17 years

EVALUATION OF GROUNDWATER ALTERNATIVES

Each alternative was evaluated with respect to threats to human health and the environment posed by contamination at the site. The National Contingency Plan (NCP) requires that the remedial alternatives be evaluated against the nine criteria listed below, as defined in the NCP.

- Protection of human health and the environment
- Compliance with ARARs
- Long-term effectiveness and permanence
- Reduction in toxicity, mobility, or volume
- Short-term effectiveness
- Implementability
- Cost
- State Acceptance
- Community Acceptance

A comparison of the alternatives is presented in Table 1. The FS provides a more detailed analysis and evaluation. The last two alternatives listed above, State and Community acceptance, are not evaluated here. They will be evaluated in the ROD after comments are received on the Proposed Plan.

COMMUNITY PARTICIPATION

The Navy and EPA provide information regarding the cleanup of the former NSWC-White Oak to the public through public meetings, the Administrative Record file for the site, the information repository, and announcements published in the *Washington Post (County Extras)*, *Silver Spring Gazette*, *College Park Gazette,* and *Burtonsville Gazette*. The Navy and EPA encourage the public to gain a more comprehensive understanding of the site and the BRAC activities that have been conducted at the site. The dates for the public comment period are September 30, 2003 through October 30, 2003. The public meeting will be held on October 14, 2003 at 7:00 p.m. at the Riderwood Village, 3110 Gracefield Road, Silver Spring, Maryland. The location of the Administrative Record and Public Repository are provided on the front page of this Proposed Plan.

Minutes of the public meeting will be included in the Administrative Record file. All comments received during the public meeting and comment period will be summarized and responses will be provided in the Responsiveness Summary section of the ROD. The ROD is the document that will present the selected remedy and will be included in the Administrative Record file.

CERCLA Criteria	ALT-1 NFA	ALT-2 IC	ALT-3 MNA	ALT-4 ERD	ALT-5 ISCO	ALT-6 P&T	ALT-7 AS	ALT-8 Wetlands	ALT-9 ZVI
Protection of Human Health and the Environment[1]	L	M	M	H	M	M	M	M	H
Compliance with ARARs[1]	L	L	M	M	M	M	M	M	H
Long-term Effectiveness and Permanence[1]	L	M	M	H	L	M	M	M	H
Reduction in Toxicity, Mobility, or Volume[1]	L	L	M	H	M	M	M	M	H
Short-term Effectiveness[1]	L	L	L	H	M	M	M	M	H
Implementability[1]	H	M	H	M	M	M	M	H	M
Cost[2]	$20,000	$390,000	$440,000	$1,000,000	$930,000	$1,400,000	$760,000	$1,100,000	$1,100,000
TOTAL SCORE	L	L	M	H	M	L	M	M	H
L – Low Ranking M – Moderate Ranking H – High Ranking									

Table 1 - Relative Ranking of Groundwater Alternatives

Written comments can be submitted via mail, e-mail, or fax and should be sent to the following addressee:

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GLOSSARY OF TERMS

This glossary defines the terms used in this Proposed Plan. The definitions apply specifically to this Proposed Plan and may have other meanings when used in different circumstances.

Administrative Record File: A record made available to the public that includes all information considered and relied on in selecting a remedy for a site.

Baseline Risk Assessment: A study conducted as a supplement to an RI to determine the nature and extent of contamination at an NPL site and the risks posed to human health and/or the environment.

Berm: A pile of soil or other material used as a barrier.

Comment Period: A time for the public to review and comment on various documents and actions taken, either by the Navy, EPA, or MDE. A minimum 30-day comment period is held to allow community members to review the Administrative Record file and review and comment on the Proposed Plan.

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.

Contaminant: Any physical, biological, or radiological substance or matter that, at a high enough concentration, could have an adverse effect on human health or the environment.

Groundwater: Water beneath the ground surface that fills spaces between materials such as sand, soil, or gravel to the point of saturation. In aquifers, groundwater occurs in quantities sufficient for drinking water, irrigation, and other uses. Groundwater may transport substances that have percolated downward from the ground surface as it flows towards its point of discharge.

Hazard Index (HI): The ratio of the daily intake of chemicals from onsite exposure divided by the reference dose for those chemicals. The reference dose represents the daily intake of a chemical that is not expected to cause adverse health effects.

Hazardous Substance: Any material that poses a threat to public health and/or the environment. Typical hazardous substances are materials that are toxic, corrosive, ignitable, explosive, or chemically reactive.

Information Repository: A file containing information, technical reports, and reference documents regarding an NPL site. This file is usually maintained in a place with easy public access, such as a public library.

National Oil and Hazardous Substances Pollution Contingency Plan (NCP): The purpose of the NCP is to provide the organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants, or contaminants.

National Priorities List (NPL): The EPA list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial response.

Organic Compounds: These are naturally occurring or man-made chemicals containing carbon. Volatile organics can evaporate more quickly than semivolatile organics. Other organics associated with RI/FS activities include pesticides and polychlorinated biphenyls (PCBs). 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): Regulation-based or risk-based contaminant concentrations that have been selected as preliminary clean-up targets for a given media (i.e., groundwater or soil). PRGs for Sites 5 and 13 groundwater are federal drinking water standards (if they exist for a COC) or human health risk-based concentrations (if drinking water standards do not exist for a contaminant).

Proposed Plan: A public participation requirement of SARA in which the lead agency summarizes for the public the preferred clean-up strategy and rationale for preference and reviews the alternatives presented in the detailed analysis of the FS. The Proposed Plan may be prepared either as a fact sheet or as a separate document. In either case, it must actively solicit public review and comment on all alternatives under consideration.

Resource Conservation and Recovery Act (RCRA): RCRA was enacted in 1976 to address the huge volumes of municipal and industrial hazardous waste generated nationwide. After several amendments, the Act as it stands today governs the management of solid and hazardous waste and underground storage tanks. RCRA focuses on active and future facilities and does not address abandoned or historical sites (see CERCLA).

RCRA Facility Investigation (RFI): An RFI is conducted at a site to evaluate thoroughly the nature and extent of the release of hazardous waste and hazardous constituents and to gather necessary data to support the Corrective Measures Study and/or interim/stabilization measures. This study is one of the four components of the Corrective Action Plan for a site under RCRA. The study is similar to a Remedial Investigation that is completed under CERCLA.

Record of Decision (ROD): An official public document that explains which clean-up alternative(s) will be used at NPL sites. The ROD is based on information and technical analysis generated during the RI/FS and consideration of public comments and community concerns. The ROD explains the remedy selection process and is issued by the Navy following the public comment period.

Remedial Investigation/Feasibility Study (RI/FS): Investigation and analytical studies usually performed at the same time in an interactive process and together referred to as the "RI/FS." They are intended to gather data needed to determine the type and extent of contamination, establish criteria for cleaning up the site, identify and screen clean-up alternatives for remedial action, and analyze in detail the technology and costs of the alternatives.

Remedial Response: A long-term action that stops or substantially reduces a release or threatened release of hazardous substances that is serious but does not pose an immediate threat to public health or the environment.

Response Action: As defined by Section 101(25) of CERCLA, means remove, removal, remedy, or remedial action, including related enforcement activities.

Responsiveness Summary: A summary of oral and written public comments received by the lead agency during a comment period and the responses to these comments prepared by the lead agency. The responsiveness summary is an important part of the ROD, highlighting community concerns for decision makers.

Revegetate: To replace topsoil, seed, and mulch on prepared soil to prevent wind and water erosion.

Risk Assessment: Evaluation and estimation of the current and future potential for adverse human health or environmental effects resulting from exposure to contaminants.

Superfund: An informal name for CERCLA.

Superfund Amendments and Reauthorization Act (SARA): The public law enacted to reauthorize the funding provisions and amend the authorities and requirements of CERCLA and associated laws. Section 120 of SARA requires that all federal facilities be subject to and comply with this act in the same manner and to the same extent as any non-federal entity.

EVALUATION CRITERIA FOR REMEDIAL ALTERNATIVES

In selecting a recommended remedial alternative under CERCLA, EPA requires the use of the following nine criteria to evaluate each of the alternatives developed in the FS. The first two criteria are **threshold criteria** that must be met to a certain degree in order for an alternative to be considered in the FS.

1. Protection of Human Health and the Environment: The protection of human health and the environment provides an overall evaluation of the remedial alternatives. This standard considers the extent to which the remedial alternative mitigates potential short- and long-term exposure to residual contamination and how the remedy protects human health and the environment from unacceptable risks both during and after implementation of the alternative. In addition, the levels and characterization of contaminants remaining onsite, potential exposure pathways, potentially affected populations, the level of exposure to contaminants, and the associated reduction of exposure over time are considered.

2. Compliance with ARARs: This criteria considers whether the remedial alternative would meet all of the chemical-, action- and location-specific regulations that are applicable, relevant or appropriate. These include the PRGs established for each media, as well as Federal, state, and local environmental and public standards, regulations, guidance, advisories, ordinances, or community relations on the design, operation, and timing of each alternative.

The next five criteria are **primary balancing criteria.** They are used to determine which alternative provides the best combination of attributes. These criteria consist of:

3. Long-term Effectiveness: Long-term reliability and effectiveness evaluation includes an evaluation of the corrective measure alternative's performance. Performance considerations include the effectiveness and useful life of the corrective measure. The reliability of a corrective measure includes the operation and maintenance requirements and demonstrated reliability.

4. Reduction in Toxicity, Mobility, or Volume: This factor includes the ability of the corrective measure to reduce the toxicity, mobility, or volume of the contaminants and/or media through treatment.

5. Short-Term Effectiveness: This factor includes an evaluation of the corrective measure effectiveness in the short-term (< 6 months), in comparison to the long-term effectiveness, and in particular potential risks to human health and the environment during implementation.

6. Implementability: This factor includes the relative ease of installation (constructability) and the time required to achieve a given level of response.

7. Cost: A cost estimate of the corrective measure includes both estimated capital and operation and maintenance costs. Capital costs include both direct and indirect costs. Operation and maintenance costs are post-construction activities which may be necessary to ensure the continued effectiveness of a corrective measure.

Based on feedback obtained during the Proposed Plan comment period, the alternatives are evaluated further against the following two **modifying criteria**.

8. State Acceptance: This criteria considers whether the state agrees with the Navy's and EPA's analyses and recommendations, as described in the RI/FS, RFI/CMS, and Proposed Plan.

9. Community Acceptance: This criteria considers whether the local community agrees with the Navy's analysis and recommended alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

MAILING LIST

If you are not on the mailing list and would like to receive future publications pertaining to Sites 5 and 13, or other sites at the former NSWC-White Oak as they become available, please call or complete, detach, and mail a copy of this form to the point of contact listed below:

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Name: _____

Address: _____

_____

Telephone: _____

Affiliation: _____

USE THIS SPACE TO WRITE YOUR COMMENTS

Your input on the Proposed Plan for Sites 5 and 13 at the former NSWC-White Oak is important to the Navy. Comments provided by the public are valuable in helping the Navy select a final cleanup remedy for this site.

You may use the space below to write your comments, then fold and mail. Comments must be postmarked by October 30, 2003. Comments can be submitted via mail, e-mail, or fax and should be sent to the following addressee:

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