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PUBLIC NOTICE REGARDING INVITATION TO COMMENT ON PROPOSED REMEDIAL RECOMMENDATION PLANS FOR SOIL AND GROUNDWATER AT SITE 21 NSWC INDIAN HEAD MD
6/1/2010
NAVFAC WASHINGTON

Proposed Plan

Site 21, Bronson Road Landfill

U.S. Navy Announces the Site 21 Proposed Plan

Naval Support Facility Indian Head

Indian Head, Maryland

June 2010

Introduction

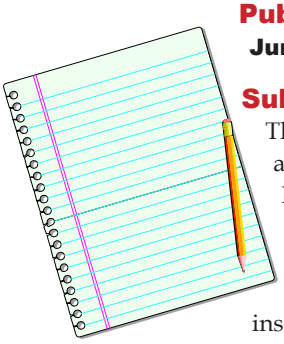
This **Proposed Plan** presents the remedial alternatives evaluated and recommended to address surface soil and **groundwater** contamination at Site 21, Bronson Road Landfill, at Naval Support Facility Indian Head (NSF-IH) in Indian Head, Maryland. This Proposed Plan recommends a protective soil cover, **institutional controls (ICs)**, and **groundwater** monitoring for shallow groundwater. In addition, this Proposed Plan provides the rationale for these recommendations, based on investigative activities performed at Site 21 to date; describes the other remedial alternatives considered; and explains how the public can participate in the decision-making process. The locations of NSF-IH and Site 21 are shown in Figure 1.

The Department of the Navy (Navy) (the lead agency for the site activities) and the U.S. Environmental Protection Agency Region III (EPA) (support agency), in consultation with the Maryland Department of the Environment (MDE) (support agency), issue this document as part of their public participation responsibilities under **Title 40 of the Code of Federal Regulations (CFR)**, Section 300.430(f)(3). Title 40 CFR Part 300 is known as the **National Oil and Hazardous Substances Pollution Contingency Plan (NCP)**. This Proposed Plan summarizes information that can be found in greater detail in the **Remedial Investigation (RI)** report, **Feasibility Study (FS)** report, and other documents contained in the **Administrative Record File** for this site.

The Navy and EPA, in consultation with MDE, will make a final decision on the **response action** for the site after reviewing and considering all information submitted during the 30-day public **comment period** and may modify the preferred response action, or select another action based on any new information or public comments. Therefore, community involvement is critical, and the public is encouraged to review and comment on this Proposed Plan. After the public comment period has ended and the comments and information submitted during that time have been reviewed and considered, the Navy and EPA, in consultation with MDE, will document the action selected for the site in a **Record of Decision (ROD)**.

A glossary of specialized terms used in this Proposed Plan is attached. Words listed in the glossary are indicated in bold print the first time they appear in this Plan.

Mark Your Calendar for the Public Comment Period



Public Comment Period

June 18, 2010 - July 18, 2010

Submit Written Comments

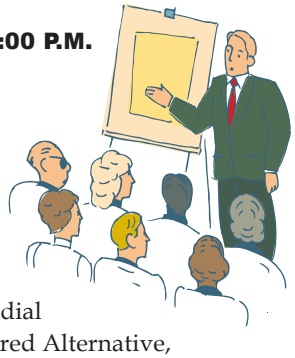
The Navy, EPA, and MDE will accept written comments on the Proposed Plan during the public comment period. To submit comments or obtain further information, please refer to the insert page.

Attend the Public Meeting

July 1, 2010, from 5:00 P.M. to 6:00 P.M.

Indian Head Senior Center
100 Cornwallis Square
Indian Head, MD 20640

The public comment period will include a public meeting during which the Navy, EPA, and MDE will provide an overview of the site, previous investigation findings, remedial alternatives evaluated, and the Preferred Alternative, answer questions, and accept public comments.



Location of Information Repository

The Information Repository is available for public viewing at the following locations:

Indian Head Town Hall
4195 Indian Head Hwy.
Indian Head, MD 20640
(301) 743-5511
Hours: Monday through Friday 8:30 a.m. to 4:30 p.m.

Charles County Public Library
2 Garrett Ave.
La Plata, MD 20646-5959
(301) 934-9001 * (301) 870-3520
Hours: Monday through Thursday 9 a.m. to 8 p.m.
Friday and Sunday 1 p.m. to 5 p.m.
Saturday 9 a.m. to 5 p.m.

Naval Support Facility Indian Head General Library
Building 620 (The Crossroads)
4163 N. Jackson Rd., Indian Head, MD 20640-5117
Hours: Monday through Wednesday 9 a.m. to 8 p.m.
Thursday and Friday 9 a.m. to 5:30 p.m.
Sunday 12 noon to 4 p.m.

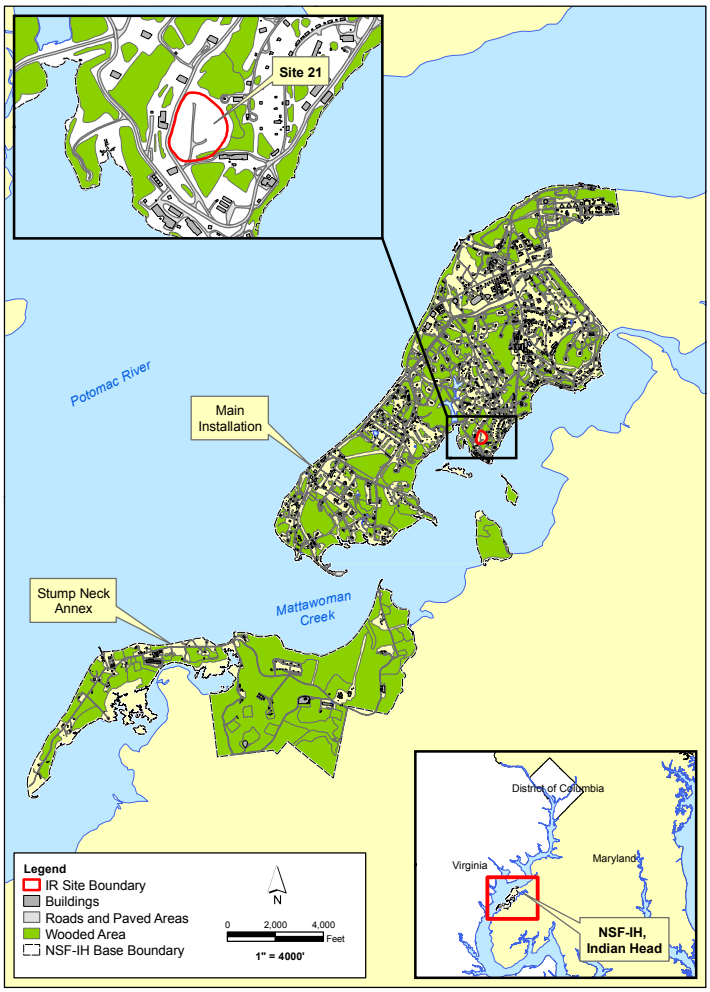


Figure 1 – Base and Site Location Map

Site History

Site 21 is located between South Bronson Road and Building 602 (Figure 2). The site was originally the location of a 2-acre gravel-mining pit. Circa 1975, the Naval Ordnance Station Public Works Department began filling the pit with solid waste generated in the explosives manufacturing area. Trenches were excavated in the landfill and these trenches were estimated to contain approximately 1,500 tons of solid waste and unknown quantities of paint sludge, asbestos, and barium sulfate. This practice ended in November 1981, when a 40-cubic- yard dumpster was placed at the north end of the site to act as a transfer station. The dumpster contents were collected weekly by a private contractor for off-station disposal. The dumpster was removed in 1996, and the area was regraded. The site also accepted sludge from paint spray booths and bagged asbestos until June 1982.

During a site reconnaissance in 1982, it was observed that the landfilled material was partially covered with 6 inches to 1 foot of soil. Uncovered bags of asbestos were observed, as well as several small, dark-brown pools of water that may have been leachate. By 1989, the inactive landfill was completely covered with soil. In the past, 20-foot cliffs surrounded three sides of the site; however, placement of **fill** from other sites on NSF-IH has brought the ground surface nearly up to the elevation of the cliff tops. Additional soil is no longer being placed on the landfill.

Site Characteristics

Site 21 is located on South Bronson Road across from Building 1384, approximately 500 feet from the Mattawoman Creek. It extends from Building 478 on the north to Building 480 on the south. An unpaved road runs along the eastern side of the reported site limit (Figure 2).

The soil at Site 21 is heterogeneous. It is characterized by layers of sandy silt, silty sand, and sand with some gravel. The extent of the landfill was delineated using soil boring data, geophysical data, and test pit data (Figure 2). In 1996, excavation of a sediment pond near the north end of the site uncovered plastic, glass, and metal waste. Fill consisting of coal, glass, paper, and wood fragments were encountered to a depth of 45 feet below ground surface (bgs) in the northern portions of the landfill. The geophysical survey identified mixed buried metallic and nonmetallic debris. Overall, the thickness of the fill may be up to 40 feet to 45 feet, but 5 feet to 10 feet of this is likely to be soil cover. Based on the estimated bottom elevation of the fill from the geophysical survey and borings, the lower part of the waste appears to be below the water table by as much as 20 to 30 feet in some areas of the landfill.

The depth to shallow groundwater, as determined from the monitoring wells installed at the site, ranges from about 5 feet to about 15 feet below ground surface at the downgradient base of the landfill. Based on the groundwater elevations, groundwater appears to flow to the southwest with a hydraulic gradient of approximately 0.22 foot/foot (CH2M HILL 2009). The nearest potable water well is Well 18, located 450 feet north of the site.

Environmental Investigation History

Several investigations were conducted at Site 21 between 1983 and 2008. Below is a chronological summary of these investigations.

Initial Assessment Study

The objective of the **Initial Assessment Study (IAS)** (Fred C. Hart Associates Inc., 1983) was to identify and assess sites posing a threat to human health or to the environment owing to contamination from past hazardous materials operations at NSF-IH. The IAS report did not recommend a Confirmation Study for Site 21 because the nature of the site hydrogeology would not facilitate **contaminant** migration. The report recommended that the uncovered portion of the landfill should be covered to minimize the potential migration of subsurface or airborne contamination.

Remedial Investigation

Surface soil sampling, monitoring well installation, groundwater sampling, soil boring confirmation, test pit confirmation, and geophysical surveying were conducted between July and August 2000 as part of the RI (CH2M

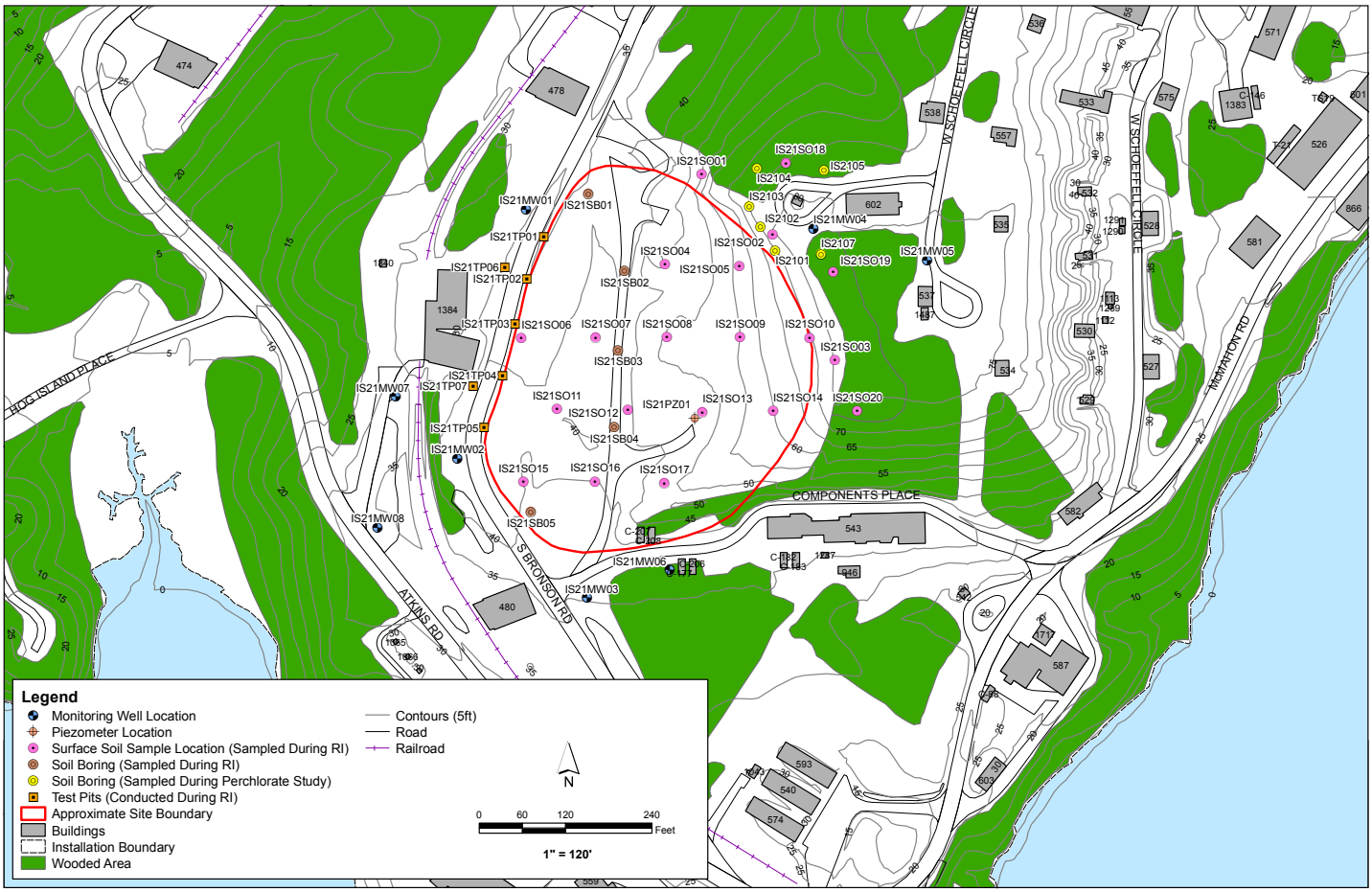


Figure 2 – Sampling Locations

HILL, 2004). The objectives of the RI were to determine (1) the lateral extent and depth of waste disposed of at the site; and (2) whether or not the waste is a source of contamination to underlying soil or groundwater at the site. Field activities consisted of: (1) collection of 20 surface soil samples (IS21SS01 through IS21SS20) for **target compound list (TCL)** organics, **target analyte list (TAL)** metals, explosives, and **total petroleum hydrocarbons (TPHs)** analyses; (2) installation of four permanent shallow groundwater monitoring wells (IS21MW01 through IS21MW04) at depths ranging between 18 feet bgs and 48 feet bgs; (3) collection of groundwater samples from the monitoring wells for TCL organics, TAL inorganics, explosives, and TPH analyses; (4) advancement of five soil borings (IS21SB01 through IS21SB05) to depths ranging from 22 feet bgs to 49 feet bgs for subsurface lithologic data; (5) excavation of seven test pits (IS21TP01 through IS21TP07) to assess the extent of the landfill waste; and (6) performance of a geophysical survey, which consisted of electromagnetic (EM) and electrical resistivity (ER) surveys to locate metallic waste buried at the site and define the boundaries of the landfill.

Figure 2 shows the locations of the surface soil samples, monitoring wells, soil borings, test pits, and geophysical survey. The results are summarized below.

- Surface soil: **Volatile organic compounds (VOCs)**, **semi-volatile organic compounds (SVOCs)**, and explosives were detected at low concentrations. Metals were detected in all samples, with the highest concentrations and most number of detections in the eastern and northern parts of the site. A few explosives were detected at low concentrations in two surface soil samples (IS21SS06 and IS21SS13).
- Groundwater: VOCs, SVOCs, and explosives were detected at two locations; however, detected concentrations were low. Manganese was detected at a maximum concentration of 23,100 micrograms per liter (µg/L) at IS21MW02. It is believed that naturally occurring manganese is being mobilized because of reduction/oxidation (redox) conditions in the subsurface. Groundwater samples collected from IS21MW01 and IS21MW04 (site-specific background well) contained perchlorate at concentrations of 2 µg/L and 2,000 µg/L, respectively.
- Results of the EM and ER geophysical surveys were used to initially estimate the lateral and vertical extent of the solid waste at the site. Test pits were excavated to confirm the lateral extent, and the soil borings were advanced to confirm the vertical extent of the fill at the site. Three areas of buried metal debris were identified—two near South Bronson Road and one on the eastern side of the site. Another area featuring both surface and buried metal debris was identified in the southeastern part along Components Place.

- The maximum thickness of waste is about 45 feet, based on an ER survey point, and is approximately 25 feet based on soil borings. The thickness of fill below the groundwater table can be as much as 20 to 30 feet in some areas of the landfill. Waste also was reportedly encountered in the excavation for a stormwater pond in the northern part of the site. The pits excavated on the western side of South Bronson Road contained no waste material. It was concluded that the lateral extent of the major part of the fill has been identified, but thinner intervals of waste appear to exist, such as those encountered in the test pits on the eastern side of South Bronson Road.

A baseline human health risk assessment (HHRA) and ecological risk assessment (ERA) also were performed as part of the RI. The results are presented in the "Summary of Site Risks" section.

Pre-FS Investigation

A pre-FS investigation was conducted in July 2002 to confirm the concentrations of manganese and perchlorate detected in groundwater (CH2M HILL, 2002). Groundwater samples were collected from the existing four monitoring wells (IS21MW01, IS21MW02, IS21MW03, and IS21MW04) and analyzed for perchlorate, TAL inorganics (total and dissolved), and sulfate.

Perchlorate was detected in only one monitoring well (IS21MW04) at a concentration of 2,900 µg/L. Manganese was detected at a concentration of 10,900 µg/L in monitoring well IS21MW02, and this concentration is lower than the concentration detected during the RI sampling event in 2000 (23,100 µg/L). The results confirmed the presence of perchlorate in the upgradient well IS21MW04, but the source was unknown. The manganese results were relatively consistent with the results from the RI. Water levels were measured in the wells to assess groundwater flow conditions. These results and those from the RI indicated that groundwater generally flows to the southwest; however, at times, flow to the west and northwest is expected, most notably in the northern portion of the site. Additionally, there was some uncertainty whether groundwater encountered at IS21MW04 flowed toward the landfill or toward the east because the well is near the top of a topographic rise that may represent a groundwater divide.

Investigation of Groundwater Flow and Perchlorate

Because perchlorate had been detected in the upgradient monitoring well (IS21MW04) at high concentrations, an investigation was conducted in December 2002 to determine if perchlorate in groundwater is associated with the landfill (CH2M HILL, 2003). Six soil borings (IS2101 through IS2105, and IS2107) were advanced at the locations shown on Figure 2. Shallow and deep groundwater samples were collected and analyzed for perchlorate. Based on the groundwater flow direction and analytical results of perchlorate, the study concluded that the perchlorate detected at well IS21MW04 was not associated with the landfill.

Feasibility Study

An FS was completed to address potential sources of contamination at Site 21 and to evaluate remedial alternatives to mitigate potential hazards associated with the landfill soil and shallow groundwater (CH2M HILL, 2006a). These remedial alternatives are presented for public comment in this document.

Geochemical Assessment

A geochemical assessment and groundwater modeling were conducted to evaluate the potential effects of installing a **RCRA Equivalent Subtitle C cap** at the site. Investigation activities completed in 2006 consisted of the collection of *in situ* groundwater samples and permanent monitoring well groundwater samples for chemical (total and dissolved manganese) and geochemical analyses.

The results of the geochemical assessment strongly suggested that the presence of manganese in groundwater is attributable to low redox conditions that may be created by the presence of the waste and not direct leaching of manganese from the waste material (CH2M HILL 2006b). The assessment also suggested that installing a RCRA Equivalent Subtitle C cap would further degrade groundwater quality by exacerbating reducing conditions, thereby mobilizing additional manganese.

The results of the groundwater model indicated that placement of a RCRA Equivalent Subtitle C cap over the former landfill area would lower the water table about 1.54 feet under the cap area. Results from the RI demonstrated that there is currently up to 22 feet of fill below the water table; thus, lowering the water table by 1.54 feet would not effectively remove the contact between the fill material and the groundwater flowing through the site. The updated groundwater elevation information also demonstrated that perched groundwater conditions are not present at the site.

The overall conclusion was that a soil cover would be a more environmentally effective remedy that is equally protective of human health and at a cost that is approximately one million dollars less than a RCRA Equivalent Subtitle C cap.

Manganese Investigation

Based on the geochemical and hydrologic results from the geochemical assessment, an additional investigation was conducted in July/August and November 2008 to gain further understanding of high manganese concentrations in groundwater and associated geochemical conditions in the area of the landfill (CH2M HILL 2009).

As part of the field activities, four new groundwater monitoring wells (one upgradient and three downgradient of the landfill - IS21MW05 through IS21MW08) and one piezometer (IS21PZ01) were installed within the landfill. Soil samples were collected during the installation of the four new monitoring wells. Also, solids were collected from the bottom of the existing well IS21MW02 to provide a geochemical understanding of manganese in the shallow aquifer parent material. Two sets of ground-

water samples were collected from eight monitoring wells (four existing and four new) to provide an understanding of current, representative manganese concentrations in groundwater and geochemical conditions upgradient and downgradient of the landfill.

The results indicated that the manganese concentrations and geochemistry at the site are consistent with natural conditions and are not related to the presence of the former landfill material. Soil data from the soil borings indicated that the landfill material is not enriched in manganese and is not considered to be a source of the manganese in the groundwater.

Agent Orange Investigation

An anonymous call was made to MDE on June 25, 2008, stating that Agent Orange drums were buried at the site; specific coordinates were provided. As a result, an investigation was conducted to verify the claim. Groundwater samples were collected from a total of nine wells, consisting of eight monitoring wells (IS21MW01 through IS21MW08) and one piezometer (IS21PZ01) located within the landfill, and were analyzed for Agent Orange-related constituents. No constituents were detected in any of the nine groundwater samples. The Navy and the EPA, in consultation with MDE recommended no further action for Agent Orange at Site 21.

Principal Threats

There are no principal threats in any of the media at Site 21. Principal threats are explained in the box on this page.

Scope and the Role of the Action

This Proposed Plan addresses the evaluation of the preferred alternative for Site 21 only. It does not include or directly affect any other sites at NSF-IH. The purpose of this Proposed Plan is to summarize activities performed to date to investigate Site 21 and provide a rationale for the proposed response action. The preferred remedy is a protective soil cover, ICs, and long-term groundwater monitoring.

Summary of Site Risks

This section presents an overview of the risks associated with the current and future land uses of Site 21. A detailed discussion of potential risks at Site 21 and the risk evaluation process can be found in the *Final Remedial Investigation Report, Sites 11, 13, 17, 21, and 25, Naval District Washington, Indian Head, Indian Head, Maryland* (CH2M HILL, 2004), and *Site 21 (Bronson Road Landfill) Manganese Investigation Technical Memorandum, Naval District Washington, Indian Head, Indian Head, Maryland* (CH2M HILL 2009).

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 [40 CFR 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. If, through this analysis, a treatment remedy is selected, then this selection is reflected in the Record of Decision, which will include a finding that the remedy uses treatment as a principal element.

Human Health Risks

As part of the RI, a baseline HHRA was performed for soil and groundwater at Site 21 to evaluate the current and future effects of constituents in site media on human health. Exposure to sediment and surface water were not evaluated because data were not collected, since the creek is 500 feet from the site and it was not considered likely that the site would have had an impact on surface water or sediment in the creek. In 2008, after the RI, an additional risk assessment was performed for groundwater (CH2M HILL, 2009).

Soil

The baseline HHRA performed for soil at Site 21 during the RI evaluated the potential current and future risks associated with the presence of contaminants in soil on human health. The potential receptors evaluated in the risk assessment were as follows:

- For current uses - adolescent trespasser/visitor, adult trespasser/visitor, and industrial worker
- For future uses – child resident and adult resident

The Navy evaluated the residential exposure scenario to determine if restrictions would be necessary at the site. The site is on an industrial facility. It is unlikely that this land use will change in the future.

The risk assessment initially screened the observed maximum concentration of all constituents against their respective EPA Region III residential soil **risk-based concentrations (RBCs)** to identify the **contaminants of potential concern (COPCs)**. The COPCs in soil that were carried through the HHRA were aluminum, arsenic, chromium, iron, manganese, and vanadium. Potential risks associated with exposure to these COPCs were estimated for the receptors identified above. The baseline risk assessment concluded that under current site use

conditions, surface soil does not pose an unacceptable risk (both non-cancer and cancer) to the adolescent trespassers/visitors, adult trespassers/visitors, or industrial workers. This means that the non-cancer **hazard index (HI)** was below 1, and the calculated **carcinogenic** risk was within the EPA's acceptable cancer risk range of 1×10^{-4} to 1×10^{-6} for these receptors.

Under future land use conditions, soil does not pose unacceptable non-cancer risks to the adult resident or unacceptable cancer risks to the lifetime child/adult resident. Under the **reasonable maximum exposure (RME)** scenario, the HI exceeds the EPA's acceptable HI value of 1 for the child resident (HI = 3.0) exposed to surface soil. This risk is mostly attributable to arsenic, which has an HI of 1.0, with smaller contributions from iron, manganese, and vanadium, all with HIs below 1. The **central tendency exposure (CTE)** non-cancer risk for the child resident (HI = 0.78) is below the target value of 1. The text box on this page provides an explanation of the HHRA process.

Groundwater

The shallow groundwater at the site is not used as a potable water supply, so there is no current exposure to shallow groundwater. The potential receptors evaluated in the risk assessment during the RI were for futures uses - child resident, adult resident, and construction worker.

In the RI, the risk assessment screened the groundwater data against EPA Region III tap water RBCs and the current human health risk-based screening levels at the time the risk assessment was performed to identify the COPCs. The COPCs identified were 1,4-dichlorobenzene, aluminum, arsenic, chromium, cobalt, iron, manganese, nickel, thallium, and vanadium. Based on further evaluation in the baseline risk assessment, it was concluded that under future site use conditions, the shallow groundwater may pose an unacceptable non-cancer risk to the adult resident, child resident, and construction worker. The RME cancer risk for the lifetime resident ($6.2x10^{-5}$) was within the EPA's acceptable cancer risk range of 1×10^{-4} to 1×10^{-6}.

The RME non-cancer HI was 40 for the adult resident (mostly due to manganese [36], thallium [2.4], and iron [1.5]), 94 for the child resident (mostly due to manganese [84], thallium [5.7], and iron [3.5]), and 2.2 for the construction worker (mostly due to manganese [2.0]. The CTE assessment for the construction worker (0.78) resulted in a non-cancer hazard below the target level of 1. The CTE evaluation for the adult resident (1.9) and the child resident (23) resulted in a non-cancer hazard above the target level of 1.

The HHRA was updated using groundwater data collected during the manganese study conducted in 2008 (CH2M HILL, 2009). The manganese and iron concentrations of these groundwater samples were evaluated in the risk assessment. The RME non-cancer HIs were 23 for the child resident (due to manganese [14] and iron [8.3]) and 9.6 for the adult resident (due to manganese [6] and iron [3.5]). The CTE for the child resident (5.4) and the adult resident (3.4) resulted in a non-cancer hazard above the target level of 1. Although the RME and CTE risks associated with manganese have decreased over time, the hazard indices are still greater than the target level of 1.

The National Center for Environmental Assessment recently withdrew the provisional Reference Dose (RfD) for iron. Until (and if) a new RfD is proposed, potential risks associated with exposure to this metal cannot be quantitatively assessed. Therefore, iron cannot be evaluated as a risk driver.

Ecological Risks

As part of the RI, the Navy conducted a screening ERA for surface soil at Site 21 (CH2M HILL, 2004). The results

WHAT IS HUMAN HEALTH 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 cleanup action were taken at a site. The Navy undertakes a four-step process to estimate baseline risk at a site:

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 that portrays the highest level of human exposure that reasonably could 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 adverse, 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 together the potential risks from the individual contaminants to determine the total risk resulting from the site.

of this assessment are presented in greater detail in the RI report. The ERA process is explained in the box on this page. The results indicated that contaminants in the soil posed minimal risk to **ecological receptors** because: (1) no lowest observed adverse effect level-based hazard quotients (HQs) exceeded 1 for upper trophic level receptors; (2) concentrations of several metals that exceeded screening values were comparable to **background** concentrations; and (3) toxicity evaluations for arsenic and mercury (whose concentrations exceeded screening values and background) suggested that significant impacts to plants and soil invertebrates were unlikely.

The average arsenic concentration was 14.6 mg/kg, and, at this concentration, there are no indications that the vegetation is being impacted, as there is good grass cover in locations that have not been recently disturbed. The average site arsenic concentration was less than other screening benchmarks (e.g. screening benchmarks of 60 mg/kg for earthworms). The average mercury concentration on the site was 0.23 mg/kg. A study of mercury toxicity to earthworms (not specific to Site 21) by Efroymson et al (1997a) showed that minimal effect was observed at mercury concentrations of 0.5 mg/kg. As the average concentration at the site is below the concentration that produced an effect in the study, the observed mercury concentrations at Site 21 are not expected to pose a significant risk to soil invertebrates. In addition, the average mercury concentration at the site is lower than the 0.3 mg/kg screening benchmark for toxicity to plants (Efroymson et al., 1997b).

Evaluation of contaminant migration suggested that the potential for chemicals to be released from soil to groundwater is low, as is the potential for discharge to the Mattawoman Creek, which is approximately 500 feet from the site. As a result, the downgradient aquatic resources were not evaluated for ecological risk. Placement of additional soil cover on the landfill will reduce any remaining potential risk by decreasing the exposure to surface soil. The text box on this page provides an explanation of the ecological risk assessment process.

Remedial Action Objectives

The **Remedial Action Objectives (RAOs)** for Site 21 soil and groundwater are:

- Prevent or minimize direct contact of human and ecological receptors with landfill contents.
- Prevent surface water from running onto the site and control surface water runoff and erosion.
- Prevent unacceptable risks to human receptors from exposure to contaminants in the shallow groundwater.
- Return the groundwater to beneficial use to the extent practicable.

WHAT IS ECOLOGICAL RISK AND HOW IS IT CALCULATED?

An ecological risk assessment evaluates the potential adverse effects that human activities have on the plants and animals that make up ecosystems. The ecological risk assessment process follows a phased approach similar to that of the human health risk assessment. The risk assessment results are used to help determine what measures, if any, are necessary to protect plants and animals.

Ecological risk assessment includes three steps:

Step 1: Problem Formulation

The problem formulation includes:

- Identifying area(s) and environmental media (e.g., surface water, soil, sediment) in which site-related constituents may be present;
- Evaluating potential transport pathways (i.e., movement) of constituents in these areas/media;
- Consideration of site-specific habitat information for identification of ecological receptors; and
- Identifying exposure pathways and routes for these receptors.

Step 2: Risk Analysis

In the risk analysis, potential exposures to plants and animals are estimated and the concentrations of chemicals at which an effect may occur are evaluated.

Step 3: Risk Characterization

The risk characterization uses all of the information identified in the first two steps to estimate the risk to plants and animals. This step also includes an evaluation of the uncertainties (potential degree of error) associated with the predicted risk evaluation and their effects on the conclusions that have been made.

Summary of Remedial Alternatives

In the FS, four alternatives were developed to satisfy the RAOs. Before the remedial alternatives in the FS were evaluated, the **contaminants of concern (COCs)** identified during the HHRAs were screened further to identify which contaminants require remediation. A contaminant was deemed to require remediation if its maximum detected concentration exceeded its **site remediation goal (SRG)**. The approximate area for soil cover within Site 21 is shown on Figure 3.

SRGs for Site 21 were developed for all COCs in soil and shallow groundwater. For soil, the SRG was based on the greater of the site-specific, risk-based **preliminary remediation goals (PRGs)** or and the facility-wide background (95 percent **upper confidence limit**) . For shallow groundwater, SRGs were based on the greater of risk-based PRGs, site background concentrations, or federal **maximum contaminant level (MCLs)**. Active remediation is not proposed for groundwater because the manganese study indicated that elevated manganese concentrations are not related to presence of landfill material. The long-term monitoring of groundwater will confirm that manganese concentrations are consistent with natural conditions. Appendix E of the final FS report (CH2M HILL 2006a)

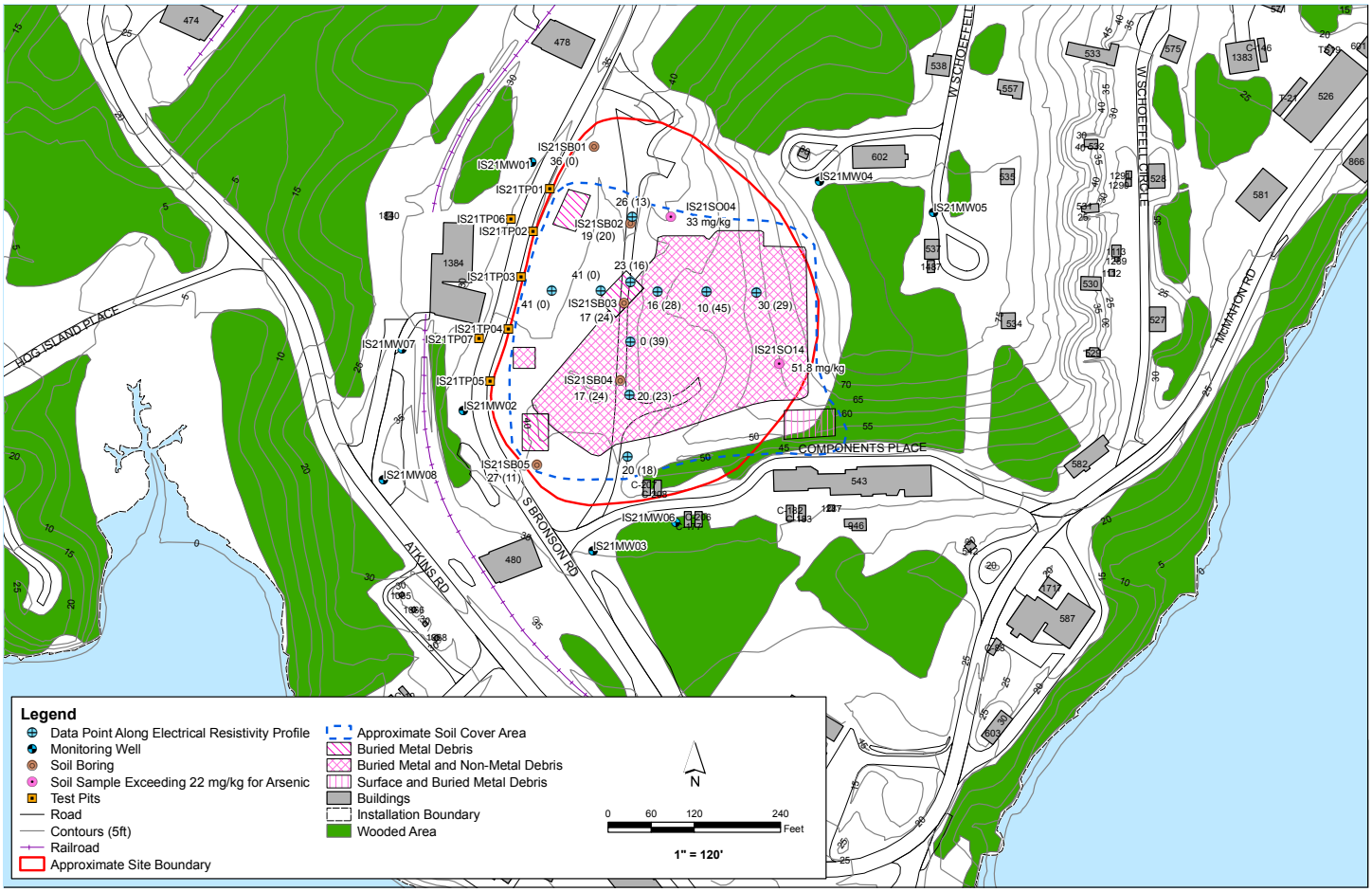


Figure 3 – Area Requiring Remediation

presents the detailed calculations of the PRGs at Site 21. The table below shows the SRG for each contaminant requiring remediation in surface soil and shallow groundwater.

Contaminants Requiring Remediation	SRG (milligrams /kilogram)
Soil	
Arsenic	22
Shallow Groundwater	
Manganese	0.824
Thallium	0.002

Alternative 1 – No Action

This alternative is required by the NCP as a baseline. Under this alternative, no remediation or action is planned.

Alternative 1 - Estimated Cost	
Capital Cost	$0
Lifetime Operation and Maintenance (O&M) Cost	$0
Lifetime Present-Worth O&M Cost	$0
Projected Time Frame to Achieve RAOs	Not Applicable

Alternative 2 – Protective Soil Cover, ICs, and Groundwater Monitoring

This alternative involves installing a protective soil cover that complies with the Code of Maryland regulations 26.04.07. ICs would be established for the area of attainment, including areas affected by landfill contaminants. These would include prohibiting (1) digging into or disturbing the existing cover or contents of the landfill, (2) residential development on the site, and (3) use of the shallow groundwater beneath the site. Long term groundwater monitoring would also be performed to evaluate manganese levels as described in the Summary of Remedial Alternatives section and ensure that the remedy continues to be protective. This alternative would require a variance from MDE Solid Waste regulations with respect to construction of the soil cover.

Alternative 2 - Estimated Cost	
2010 Capital Cost	$1.39 million
Lifetime O&M Cost	$1.68 million
Lifetime Present-Worth O&M Cost	$940,000
Total Present-Worth Cost	$2.33 million
Projected Time Frame to Achieve RAOs	30 years

Alternative 3 – RCRA Equivalent Subtitle C Cap, ICs, and Groundwater Monitoring

This alternative involves installation of a RCRA Equivalent Subtitle C cap in conjunction with ICs and long-term monitoring. The ICs and long-term groundwater monitoring would be similar to Alternative 2.

Alternative 3 - Estimated Cost	
2010 Capital Cost	$2.27 million
Lifetime O&M Cost	$2.25 million
Lifetime Present-Worth O&M Cost	$1.04 million
Total Present-Worth Cost	$3.31 million
Projected Time Frame to Achieve RAOs	30 years

Alternative 4 – Excavation and Offsite Disposal

This alternative involves excavation of the solid waste and contaminated soil within the landfill area and offsite disposal at a permitted landfill. The excavated area would be filled with clean fill and vegetated. ICs would be established for groundwater only.

Alternative 4 - Estimated Cost	
2010 Capital Cost	$20.33 million
Lifetime O&M Cost	$0
Lifetime Present Worth O&M Cost	$0
Total Present-Worth Cost	$20.33 million
Projected Time Frame to Achieve RAOs	Not Applicable

Evaluation of Remedial Alternative

The NCP outlines the approach for comparing remedial alternatives. Remedial alternatives are evaluated using **nine evaluation criteria** to facilitate a comparison of the relative performance of the alternatives and provide a means to identify their advantages and disadvantages. The criteria are:

1. Overall protection of human health and the environment
2. Compliance with **Applicable or Relevant and Appropriate Requirements (ARARs)**
3. Long-term effectiveness and permanence
4. Reduction of toxicity, mobility, and volume
5. Short-term effectiveness
6. Implementability
7. Cost
8. State acceptance
9. Community acceptance

The FS provides a detailed analysis and evaluation of the remedial alternatives based on criteria 1 through 8. Criterion 9 will be evaluated after receipt of the public's comments on this Proposed Plan during the 30-day comment period. Table 1 summarizes how each alternative satisfies each criterion on its own merit. The text below provides further evaluation of the alternatives compared to each other.

Alternatives 2, 3, and 4 are all protective of human health and the environment, comply with the site-specific ARARs, and achieve long-term effectiveness and permanence. None of the alternatives would reduce the toxicity,

Table 1 – Soil and Solid Waste

Soil and Solid Waste				
Criteria	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4**
Overall Protectiveness of Human Health and the Environment	○	●	●	●
Compliance with Applicable or Relevant and Appropriate Requirements	○	●[1]	●	●
Long-Term Effectiveness and Permanence	○	◎	◎	●
Reduction of Toxicity, Mobility or Volume Through Treatment	○	○	○	○
Short-Term Effectiveness	○	●	●	●
Implementability	●	●	●	●
Cost[1]	$0	$2.33	$3.31	$20.33
State/Support Agency Acceptance	○	●	●	●
Community Acceptance	To Be Determined	To Be Determined	To Be Determined	To Be Determined

Ranking: ● Well satisfies criterion ◎ Moderately satisfies criterion ○ Poorly satisfies criterion

Alternative 1 – No Action

Alternative 2 – Protective Soil Cover, ICs, and Groundwater Monitoring

Alternative 3 – RCRA Equivalent Subtitle C Cap, ICs, and Groundwater Monitoring

Alternative 4 – Excavation and Offsite Disposal

1 – Cost is the total present-worth value ($Million); cost accuracy ranges from -30% to +50%.

mobility, or volume of contaminants through treatment. However, Alternative 4 would afford the greatest extent of mobility reduction by removing and disposing of the waste in an offsite permitted facility. For short-term effectiveness, Alternatives 2 is slightly favorable to Alternative 3, and both are favorable to Alternative 4, based on the timeframe for construction activities and the resulting vehicle traffic generated. Each of these three alternatives is readily implementable at the site because they are all well-accepted and conventional remedies, and they have been used successfully at numerous other **National Priorities List (NPL)** sites. As shown in Table 1, with the exception of Alternative 1, Alternative 2 is considered the most cost-efficient alternative, followed by Alternatives 3 and 4.

Alternative 2 was selected as the preferred remedial alternative over Alternatives 3 and 4 because of the cost. The total present worth cost of Alternative 2 is approximately one million dollars lower than Alternative 3 and approximately 18 million dollars lower than Alternative 4. Alternative 2 is also preferable to Alternative 3 because Alternative 3 could result in further degradation of groundwater quality, as discussed in the Geochemical Assessment section.

Preferred Remedial Alternative

The Navy and EPA, with the support of MDE, are proposing to implement Alternative 2 as the final remedy. Figure 3 shows the area requiring remediation. Alternative 2 is expected to be protective of human health and the environment. The soil cover will require the issuance of a variance to comply with the ARARs; specifically, the MDE requirements for landfill closure. A detailed list of ARARs can be found in Appendix D of the FS.

The components of this alternative include the following:

- Verify or grade/fill to achieve minimum 2 feet existing cover over waste material.
- Constructing 2 feet of soil cover consisting of 18 inches of clean fill and 6 inches of topsoil, with a 4 percent slope and a stabilized vegetative cover in accordance with Code of Maryland regulations 26.04.07. The seed mixture for the cover vegetation will be designed so that it will serve as a bio-barrier to burrowing animals.
- Grading for surface water control and stormwater management.
- Implementing ICs, which consist of land-use and groundwater-use restrictions. These include prohibiting (1) digging into or disturbing the existing cover or contents of the landfill, (2) residential development on the site, and (3) use of the shallow groundwater beneath the site.
- Performing long-term groundwater quality monitoring; a detailed description of the monitoring program will be included in the long-term monitoring plan, which will be prepared after the ROD is signed.
- Conducting 5-year reviews.

Community Participation

The Navy and EPA provide information regarding the cleanup of NSF-IH to the public through public meetings, the Administrative Record File for the site, the **information repository**, and announcements published in the newspaper. The Navy and EPA encourage the public to gain a more comprehensive understanding of the site and the **Comprehensive Environmental Response, Compensation, and Liability Act** activities that have been conducted at the site.

The public comment period provides the public time to review and comment on the information provided in the Proposed Plan. The 30-day public comment period for this Proposed Plan is June 18, 2010 through July 18, 2010. The public meeting will be held on July 1, 2010, from 5:00 P.M. to 6:00 P.M. at the Indian Head Senior Center, 100 Cornwallis Square, Indian Head, Maryland. The location of the Administrative Record and information repository are provided on Page 1 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.

Written comments can be submitted via mail and should be sent to the following addressee:

Naval Support Activity South Potomac
Attn: Public Affairs Officer, Code 00P
6509 Sampson Rd.
Dahlgren, VA 22448-5108
(540) 653-8153

For further information, please contact:

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Fax: 410-537-4133
Email: cdetore@mde.state.md.us

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CH2M HILL. 2003. *Investigation of Groundwater Flow and Perchlorate at Site 21, Naval District Washington, Indian Head, Indian Head, Maryland.*

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CH2M HILL 2006b. *Final Technical Memorandum for Site 21 Manganese Investigation Results, Naval District Washington, Indian Head, Indian Head, Maryland.*

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Efroymson, R.A., M.E. Will, G.W. Suter II, and A.C. Wooten. 1997b. Toxicological benchmarks for screening contaminants of potential concern for effects on terrestrial plants: 1997 revision. Environmental Restoration Division, ORNL Environmental Restoration Program. ES/ER/TM-85/R3.

Fred C. Hart Associates, Inc., *Initial Assessment Study of Naval Ordnance Station, Indian Head, Md., 1983.*

Glossary of Terms

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.

Applicable or Relevant and Appropriate Requirements (ARARs): A comprehensive set of state and federal environmental laws and regulations that must be complied with or waived when taking an action at a CERCLA (see below) site.

Background: Area not affected by facility or site activities.

Carcinogenic: Causing or inciting cancer.

Central Tendency Exposure (CTE): The CTE scenario is based on the "average" level of human exposure that may be expected to occur at a site. It is often presented to show the potential range of risks at a site, and is probably more representative of the actual risk to the majority of receptors.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA): A Federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act of 1986 (SARA). CERCLA provides the authority and procedures for responding to releases of hazardous substances, pollutants, and contaminants from inactive hazardous waste disposal sites.

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.

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.

Contaminants of Concern (COCs): Specific constituents that are identified for evaluation in the risk assessment process.

Contaminants of Potential Concern (COPCs): Chemicals that are potentially site-related, with data of sufficient quality that have been retained for quantitative analysis as a result of a site-specific risk screening process.

Ecological Receptors: Non-human plant or animal species that may be exposed to site contaminants.

Feasibility Study (FS): An analysis of the appropriateness, efficacy, feasibility, and cost of potential remedial options or cleanup alternatives for a site.

Fill: Material consisting of soil (sand, gravel, silt, and clay) and/or non-soil materials (such as brick and wood) placed artificially on a property to expand the area to its present shoreline boundary or to raise ground surface elevation.

Groundwater: Water beneath the ground surface that fills pore 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 to the reference dose for those chemicals. The reference dose represents the daily intake of a chemical not expected to cause adverse health effects. Therefore, an HI of 1, means that the amount to which a receptor is exposed is equivalent to the amount not expected to cause adverse health effects.

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

Initial Assessment Study (IAS): The first of two phases of environmental investigation under the Navy Assessment and Control of Installation Pollutants program (NACIP). The IAS is a preliminary evaluation of a facility that (1) identifies areas potentially contaminated by previous handling, storage, and disposal of hazardous substances; (2) assesses the potential

effects of the contamination on human health and animals; and (3) recommends remedial measures appropriate for the contaminated areas. The second phase of the NACIP, the Confirmation Study, is completed if further action is required.

Institutional Control (IC): A legal or administrative action or requirement imposed on a property to limit or prevent property owners or other people from coming into contact with contamination on the property. Institutional controls may be used to supplement a cleanup (by limiting contact with residual contamination), or may be used instead of conducting a cleanup. Examples include deed restrictions and long-term site security requirements.

Maximum Contaminant Level (MCL): The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

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

National Priorities List (NPL): The EPAs list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial response. The list is based, primarily, on the score a site receives on the Hazard Ranking System. EPA is required to update the NPL at least once a year.

Nine Evaluation Criteria: Criteria used by EPA at all Superfund sites to evaluate remediation alternatives and select a preferred alternative to be presented in a Proposed Plan.

Preliminary Remediation Goals (PRGs): Target contaminant media concentration levels selected for long-term targets during the analysis and selection of remedial alternatives.

Proposed Plan: A public participation requirement of SARA in which the lead agency summarizes the preferred cleanup strategy and rationale for the public. This agency also 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.

RCRA Equivalent Subtitle C Cap: A multilayered, low-permeability, landfill cap used to cover waste, stabilize surface soil, and reduce surface water infiltration. A RCRA Equivalent Subtitle C Cap is a modified RCRA Subtitle C cap, in which a composite drainage net is used instead of a 12-inch sand layer and a geosynthetic clay liner is used instead of a 2-foot compacted clay layer.

Reasonable Maximum Exposure (RME): The RME scenario portrays the highest level of human exposure that could reasonably be expected to occur. The RME scenario is used to make human-health risk-based decisions at the site.

Record of Decision (ROD): An official public document that explains which cleanup alternative(s) will be used at an NPL site. 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 lead agency following the public comment period.

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

Remedial Action Objectives (RAOs): Describes what the proposed site cleanup is expected to accomplish. These objectives typically serve as the design basis for the remedial alternatives.

Response Action: As defined by Section 101(25) of CERCLA, a removal, remedy, or response 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.

Risk-Based Concentrations (RBCs): Conservative screening chemical-specific values that are protective of human health, used to identify contaminants of potential concern.

Semi-volatile organic compounds (SVOCs): An organic compound which has a boiling point higher than water and which may vaporize when exposed to temperatures above room temperature. Semi-volatile organic compounds include phenols and PAHs.

Site Remediation Goals (SRGs): The concentration levels of constituents in a particular media that are met and are protective of human health and the environment, as a result of remediation activities.

Superfund: The program operated under the legislative authority of CERCLA and SARA that funds and carries out EPA solid waste emergency and long-term removal and remedial activities. These activities include establishing the NPL, investigating sites for inclusion on the NPL, determining their priority, and conducting and/or supervising the cleanups and other remedial actions.

Target Analyte List (TAL): A list originally derived from the EPA Priority Pollutant List. In the years since the inception of the Contract Laboratory Program, compounds and analytes have been added to, and deleted from, this list based on advances in analytical methods, evaluation of method performance data, and the needs of the Superfund program.

Target Compound List (TCL): A list originally derived from the EPA Priority Pollutant List. In the years since the inception of the Contract Laboratory Program, compounds and analytes have been added to, and deleted from, this list based on advances in analytical methods, evaluation of method performance data, and the needs of the Superfund program.

Title 40 of the Code of Federal Regulations (CFR): Comprehensive documentation of regulations pertaining to the environment.

Total Petroleum Hydrocarbons (TPH): TPH refers to a measure of concentration or mass of petroleum hydrocarbon constituents present in a given amount of air, soil, or water.

Upper Confidence Limit: Value of the upper end of the confidence interval, the region of the sample mean that is likely to be representative of site-specific conditions.

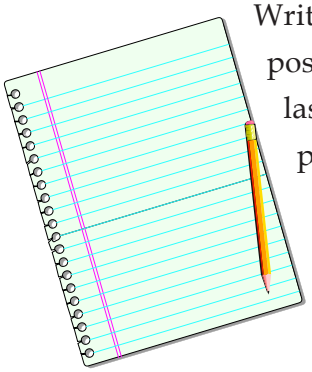
Volatile Organic Compounds (VOCs): Naturally occurring or manmade chemicals containing carbon. Volatile organics can evaporate more quickly than semi-volatile organics.

Please print or type your comments for Site 21 here

Mark Your Calendar for the Public Comment Period

Public Comment Period
June 18, 2010 - July 18, 2010

Submit Written Comments

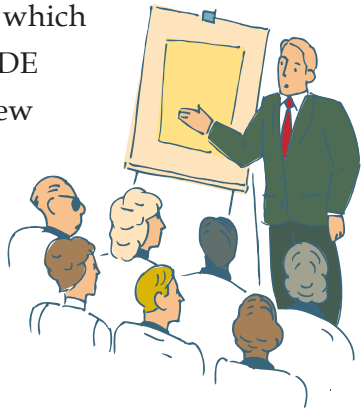


Written comments must be postmarked no later than the last day of the public comment period, which is July 18, 2010. Based on the public comments or on any new information obtained, the Navy may modify the Preferred Alternative. The insert page of this Proposed Plan may be used to provide comments, although the use of the form is not required. If the form is used to submit comments, please fold page, seal, add postage where indicated, and mail to addressee as provided.

Attend the Public Meeting
July 1, 2010, from
5:00 P.M. to 6:00 P.M.

Indian Head Senior Center
100 Cornwallis Square
Indian Head, MD 20640

The public comment period will include a public meeting during which the Navy, EPA, and MDE will provide an overview of the site, previous investigation findings, remedial alternatives evaluated and the Preferred Alternative; answer questions; and accept public comments on the Proposed Plan.



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