

**Final  
Record of Decision  
Site 25 – Hypo Discharges from X-Ray Building  
Number 2, Building 588**

**Naval District Washington, Indian Head  
Indian Head, Maryland**



**Contract Number N62470-95-D-6007  
CTO-0122**

**Naval Facilities Engineering Command Washington**

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# Acronyms and Abbreviations

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BERA	Baseline Ecological Risk assessment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Chemicals of Concern
COPC	Chemicals of Potential Concern
CSF	Cancer Slope Factor
CSM	Conceptual Site Model
ELCR	Excess Lifetime Cancer Risk
EPA	United States Environmental Protection Agency
FS	Feasibility Study
HEAST	Health Effects Assessment Summary Tables
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
IAS	Initial Assessment Study
IR	Installation Restoration
IRIS	Integrated Risk Information System
LOAEL	Lowest Observed Adverse Effects Level
MCL	Maximum Contaminant Level
MDE	Maryland Department of the Environment
mg/kg	milligram(s) per kilogram
µg/kg	microgram(s) per kilogram
µg/L	microgram(s) per liter
Navy	Department of the Navy
NCEA	National Center for Environmental Assessment
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NDWIH	Naval District Washington Indian Head
NPL	National Priorities List
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
RAB	Restoration Advisory Board
RfD	Reference Dose
RI	Remedial Investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SERA	Screening-Level Ecological Risk Assessment

SVOC	semivolatile organic compound
TAL	total analyte list
TCE	trichloroethene
UCL	95th percentile Upper Confidence Limit
VOC	volatile organic compound
VSI	visual site inspection

# Declaration

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## 1.1 Site Name and Location

Site 25, Hypo Discharges from X-ray Building Number 2, Building 588  
Naval District Washington, Indian Head  
Indian Head, Maryland  
CERCLIS ID No. MD 170024684

## 1.2 Statement of Basis and Purpose

This Record of Decision (ROD) presents the Selected Remedy for Site 25, Hypo Discharges from X-ray Building Number 2, Building 588 at the Naval District Washington, Indian Head (NDWIH). The Selected Remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and, to the extent practical, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on information contained in the Administrative Record file for NDWIH.<sup>1</sup>

The Department of the Navy (Navy) and the U.S. Environmental Protection Agency (EPA) jointly selected the remedy and the Maryland Department of the Environment (MDE) concurs with the selected remedy.

## 1.3 Description of the Selected Remedy

The no further action remedy selection is based on the evaluation of site conditions and site-related risks during a remedial investigation, which indicated that current conditions are protective of human health and the environment.

## 1.4 Statutory Determinations

This remedy will not result in hazardous substances, pollutants, or contaminants remaining on site above levels that prevent unlimited use and unrestricted exposure; therefore, a 5-year review will not be required for this remedial action.

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<sup>1</sup> On October 1, 2003, the installation management functions at Indian Head transferred from the Indian Head Division, Naval Surface Warfare Center (IHDIV-NSWC) to Naval District Washington. This installation will now be referred to as Naval District Washington, Indian Head (NDWIH).

## 1.5 Authorizing Signatures

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T. L. Honey, CAPT  
Deputy Commandant  
Naval District Washington

\_\_\_\_\_  
Date

\_\_\_\_\_  
Abraham Ferdas, Director  
Hazardous Site Cleanup Division  
U.S. EPA - Region III

\_\_\_\_\_  
Date

# Decision Summary

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## 2.1 Site Name, Location, and Description

Naval District Washington, Indian Head is located in northwestern Charles County, Maryland, approximately 25 miles southwest of Washington, District of Columbia. NDWIH is a Navy facility consisting of the main installation on the Cornwallis Neck Peninsula and the Stump Neck Annex on the Stump Neck peninsula. The main installation contains approximately 2,500 acres and is bounded by the Potomac River to the northwest, west, and south, Mattawoman Creek to the south and east, and the town of Indian Head to the northeast (Figure 2-1). Included as part of the main installation are Marsh Island and Thoroughfare Island, which are located in Mattawoman Creek.

The Navy is the lead agency for site activities at NDWIH. The EPA and the MDE are support agencies. Funding is provided by the Navy.

Site 25 is a drainage ditch located mostly in a forested ravine that flows from Building 588, into industrial wastewater outfall IW46 (Figure 2-2).

## 2.2 Site History, Enforcement Activities, and Investigations

### 2.2.1 Site History

Building 588 was constructed in 1944 and contained facilities used for X-ray film developing. From 1944 to circa 1964, the X-ray activities conducted at Building 588 generated wastes, which consisted of sodium thiosulfate fixer, hydroquinone developer, and silver in a silver thiosulfate complex. According to the Initial Assessment Study (IAS) (Fred C. Hart Associates, Inc., 1983), between 1944 and 1964, approximately 112,800 lb of sodium thiosulfate, 112,800 lb of hydroquinone, and 864 lb of silver were generated.

The X-ray section of Building 588 is no longer in use, and all X-ray equipment was removed. Building 588 also housed a wet spray paint booth that discharged to the ground outside of the building. A concrete pad located at the southwest corner of the building is currently used as a satellite accumulation area for the storage of non-explosive hazardous waste (e.g., waste acetone). Secondary containment is provided when the site is used (e.g., mobile secondary containment pad with cover). Prior to 1996, the concrete pad held a dumpster that was used for the storage of solid explosive hazardous waste. Drainage in the pad area is directed south to the ditch.

### 2.2.2 Enforcement Activities

Site 25 has been under regulatory enforcement since 1983 when the IAS defined Site 25 as the Hypo Discharges from X-ray Building No. 2, Building 588. The IAS noted that silver compounds might have been deposited along the drainage path of outfall IW46 or in Mattawoman Creek. A site reconnaissance conducted as part of the IAS indicated no

vegetation stress or visible contamination immediately behind the building at the point of the outfall discharge. There was evidence of disposal of paint materials and accessories, including paint brushes, empty solvent cans, and trash. The IAS recommended a Confirmation Study for Site 25 only if silver at Site 5 was found to be a danger to aquatic life. Site 5 is the site of the Grain Manufacture and X-ray Building (Building 731). Site 25 is similar to Site 5 in that both sites discharged photographic developing wastes to open ditches. Results of the Confirmation Study conducted at Site 5 (NACIP Confirmation Study, 1985) showed elevated levels of silver in soil samples collected from a drainage ditch at Site 5. Based on the Site 5 results, the IAS recommended a Confirmation Study at Site 25.

A Phase II RCRA Facility Assessment (Kearny, A.T., Inc., 1988) was conducted by EPA and consisted of a Preliminary Review of available documents and a Visual Site Inspection (VSI). The Site 25 VSI noted a temporary waste accumulation area, constructed of concrete, for storage of drummed wastes adjacent to Building 588. The report indicated that there is no history of releases at the temporary waste accumulation pad. It also reported that discharge of spent photographic solution, which occurred from approximately 1944 to 1964, was to an unlined ditch outside of Building 588. No visible signs of release were noted during the VSI. The entire NDWIH facility was placed on the National Priorities List (NPL) in September 1995, including, by definition, Site 25.

In 2000, a remedial investigation (RI) was conducted at Site 25 (CH2M HILL, 2004). The objective of the RI for Site 25 was to determine whether soil and groundwater in the vicinity of the drainage ditch were contaminated. The investigation included sampling and analysis of surface soil, subsurface soil, and groundwater.

Following the soil sampling in 2000, construction activities adjacent to Site 25 resulted in the removal of soil in the vicinity of sample IS25SS21/SB21, an area where many of the highest concentrations of metals were detected.

Based on the conclusions of the RI, a Feasibility Study (FS) was not warranted and a No Further Action Proposed Plan was prepared and made available for public comment in 2004.

No other enforcement activities, removal actions, or remediation activities have been initiated at Site 25.

## 2.3 Community Participation

A Restoration Advisory Board (RAB) made up of community members and Navy, Federal, and State officials meets several times each year. The RAB is designed as a forum for the exchange of information between NDWIH and the local community regarding IR activities.

The RI report and Proposed Plan for Site 25 were made available to the public. The RI report was made available in May 2004, and the Proposed Plan was made available on May 28, 2004. These documents, which are included in the Administrative Record file, can be found in the Information Repository located in the NDWIH General Library, Building 620 (The Crossroads). The notice of the availability of the Proposed Plan was published in the Maryland Independent Newspaper on May 28, 2004. A public comment period on the Proposed Plan was held from May 28, 2004, to June 28, 2004. In addition, a public meeting

was held on June 17, 2004, to present the Proposed Plan to a broader community audience than those that had already been involved at the site.

At this meeting, representatives of the Navy, EPA, and MDE answered questions about the site and the decision that no further action is required to protect human health and the environment. No written comments were received during the public comment period. This is documented in the *Responsiveness Summary*, which is a part of this ROD.

## 2.4 Scope and Role of Response Action

Site 25 is included in the NDWIH IR Program. No response action is necessary at this site to protect human health and the environment. Separate investigations and assessments are being conducted for other IR sites at NDWIH in accordance with CERCLA. Separate RODs and other CERCLA decision documents will be prepared for those other IR sites.

## 2.5 Site Characteristics

Characteristics of the site, the nature and extent of contamination, and the human health risk assessment are presented in greater detail in the *Final Remedial Investigation Report, Sites 11, 13, 17, 21, and 25, Naval District Washington, Indian Head, Indian Head, Maryland* (herein referred to as the RI Report) (CH2M HILL, 2004).

### 2.5.1 Physical Setting

Site 25, Hypo Discharges from X-ray Building No. 2, Building 588, is a drainage ditch located mostly in a forested ravine. The drainage ditch channel at the bottom of the ravine is approximately 1 foot wide. Flow in the ditch is intermittent, occurring only during stormwater runoff events and in the past when wastewater was discharged from Building 588. Water draining from Building 588 flows southwest down a steep slope into the ditch and eventually flows into outfall IW46. The discharge point of outfall IW46 into Mattawoman Creek is approximately 100 feet south of this road. The nearest potable water well is Well A, located 400 feet southeast of the site. Site features and topography are shown on Figure 2-2.

Soil underlying Site 25 consists of dense clay and silty clay with traces of sand and pebbles down to depths of 10 to 24 feet below ground surface. The groundwater table at Site 25 ranges in elevation from about 10 to 12.5 feet above mean sea level. The general flow direction of groundwater is to the south, following ground surface topography, toward Mattawoman Creek.

The land in the vicinity of Site 25 is undeveloped, forested area within the NDWIH facility. The site is not currently used for any facility activities other than drainage control.

There are no known areas of archeological or historical importance at Site 25.

### 2.5.2 Conceptual Site Model

Figure 2-3 presents the Conceptual Site Model (CSM) for human receptors at Site 25. The CSM integrates information regarding the physical characteristics of the site, potentially

exposed populations, sources of contamination, and contaminant mobility (fate and transport) to identify exposure routes and receptors evaluated in the risk assessment. A well-defined CSM allows for a better understanding of the risks at a site and aids in the identification of the potential need for remediation. Discharges of wastewater containing sodium thiosulfate fixer, hydroquinone developer, and silver in a silver thiosulfate complex from Building 588 from 1944 to circa 1964, are the sources of contamination for the site.

Human receptors under the current land use scenario include adolescent and adult trespassers/visitors and adult site workers. Human receptors under the future land use scenario also include the adult and child residents, adult and adolescent trespassers/visitors, industrial workers, and construction workers. Hypothetical future residential use of the site was evaluated to confirm that no land use controls would be needed at the site. However, residential development of the site is not a likely future land use.

### 2.5.3 Sampling Strategy

During the RI, surface and subsurface soil samples, including background samples (i.e., samples collected in areas considered to be unaffected by any release at Site 25), and groundwater samples were collected to determine if soil and groundwater in the vicinity of the drainage ditch was contaminated. Surface and subsurface soil samples, including background samples, were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), metals, and nitroglycerin. Groundwater samples were collected from the shallow monitoring wells and analyzed for VOCs, SVOCs, metals, and nitroglycerin. Figure 2-2 shows the locations of the soil sampling points and monitoring wells.

### 2.5.4 Nature and Extent of Contamination

**Summary.** The nature and extent of contamination at Site 25 can be summarized as follows:

- Several metals and SVOCs, and relatively few VOCs, were detected in low concentrations in surface and subsurface soil.
- Groundwater contained no significant levels of organic compounds and contained few metals. The metals detected in the groundwater were different from those detected in the soil.
- Silver was detected in soil south and east of Building 588 and in only one soil sample in the drainage swale. Silver was not detected in groundwater downgradient of the site.

The nature and extent of soil and groundwater contamination is discussed in more detail below.

**Soil.** The RI evaluated the nature and extent of contamination and the potential risks to people, plants, and animals from exposure to soil, by comparing soil data to Federal screening levels established to be protective of people, plants, and animals.

**Surface Soil.** Twenty-two surface soil samples, including two background samples, were collected and analyzed for VOCs, SVOCs, total analyte list (TAL) inorganics, and nitroglycerin. Table 2-1 summarizes data for surface soil.

Four VOCs (acetone, methyl acetate, methylene chloride, and toluene) were detected at low concentrations in surface soils. Acetone was detected at concentrations ranging from 2.6 to 8.9 µg/kg. Methyl acetate was detected in a single sample at a concentration of 2.1 µg/kg. Methylene chloride was detected at concentrations of 1.9 µg/kg in two samples collected west of Building 588. Toluene was detected in a single sample, at a concentration of 1.5 µg/kg, collected at the base of the hill south of Building 588.

Twenty-six SVOCs were detected in the surface soils. The following five SVOCs were selected for further discussion in the RI report based on frequency of detection, maximum concentrations, and general toxicity: benzaldehyde, benzo(a)pyrene, bis(2-ethylhexyl)phthalate, fluoranthene, and pyrene. In general, the highest concentrations and the most frequent detections of SVOCs were found on the southeast or south sides of Building 588; in the ravine west of Building 588; and east of Building 588. The detected SVOC concentrations are summarized in Table 2-1.

Twenty-two inorganic analytes were detected in surface soil at Site 25. Each analyte was detected at least once at concentrations greater than the facility-wide background 95 percent upper confidence level (UCL) of the mean concentration. Many of the highest concentrations of metals were detected on the southeast side of Building 588. Silver was detected in the surface soil in 9 of 19 surface soil samples, at concentrations that ranged from 0.9 mg/kg to 201 mg/kg. Silver was detected in the woods south of Buildings 588 and 3006, west and south of Building 588, and east of Building 588 along the fence. As noted previously, the soil around Building 588 was removed during excavation for a construction project. With the removal of this soil from Site 25, the maximum remaining silver concentration is 20.6 mg/kg. Silver was not detected in any of the facility-wide background surface soil samples nor in either of the two site-specific background samples.

Arsenic was detected in all 22 samples, at concentrations ranging from 3.7 to 21.4 mg/kg, all of which exceed the facility-wide background 95<sup>th</sup> percentile UCL. Cadmium was detected in all 22 samples, at concentrations ranging from 0.092 to 47.2 mg/kg. Eighteen of the detected cadmium concentrations exceed the facility-wide background 95<sup>th</sup> percentile UCL. Copper was detected in 19 of 22 samples, at concentrations ranging from 6.1 to 21.4 mg/kg, 17 of which exceed the facility-wide background 95<sup>th</sup> percentile UCL. Mercury was detected in 16 of 22 samples, at concentrations ranging from 0.064 to 0.39 mg/kg, all of which exceed the facility-wide background 95<sup>th</sup> percentile UCL.

Nitroglycerin was not detected in any of the surface soil samples at Site 25.

**Subsurface Soil.** Six subsurface soil samples were collected and analyzed for VOCs, SVOCs, TAL inorganics, and nitroglycerin. Table 2-2 presents the data for subsurface soil.

Two VOCs were detected in subsurface soil east of Building 588; PCE at a concentration of 1.8 µg/kg and TCE at a concentration of 3.1 µg/kg.

One SVOC, pyrene, was detected south of Building 588 in the woods, at a concentration of 130 µg/kg.

Twenty inorganics were detected, of which 15 were detected in all 6 subsurface soil samples. Six of these metals (antimony, cadmium, calcium, mercury, silver, and zinc) had one or more detected concentrations that exceeded the facility-wide background 95 percent UCL.

Cadmium was detected in all six of the subsurface soil samples. Concentrations ranged from 0.092 mg/kg to 0.32 mg/kg. One subsurface soil cadmium detection exceeded the background 95 percent UCL of 0.204 mg/kg. Mercury was detected in the subsurface soil in two of six subsurface soil samples, at concentrations of 0.075 mg/kg and 0.1 mg/kg. Both detected concentrations exceeded the facility-wide background 95 percent UCL. Silver was detected in the subsurface soil in two of the subsurface soil samples. The silver concentrations were 4.8 mg/kg and 18.3 mg/kg, both from samples collected east of Building 588, adjacent to the fence. Both subsurface soil silver concentrations exceeded the background 95 percent UCL.

Nitroglycerin was not detected in any of the subsurface soil samples at Site 25.

**Groundwater.** The Site 25 groundwater monitoring wells were sampled in October 2000 and February 2002. The October 2000 samples were analyzed for VOCs, SVOCs, inorganics in filtered and unfiltered samples, and nitroglycerin; the February 2002 samples were analyzed only for metals (in both filtered and unfiltered). The analytical data are presented in Table 2-3.

Only one VOC (1,1,2-trichloro-1,2,2-trifluoroethane) was detected in groundwater, at a concentration of 3.6 µg/L in sample IS25MW02. This VOC is used in fire extinguishers and as a dry-cleaning solvent (Lewis, 1993). No SVOCs were detected in groundwater at Site 25.

In the unfiltered samples collected from IS25MW01 and IS25MW02 during October 2000, 14 metals were detected. Eight of these metals (barium, beryllium, cobalt, magnesium, manganese, nickel, sodium, and zinc) had one or more detections that exceeded the facility-wide background 95 percent UCL. In the February 2002 unfiltered samples, 11 metals were detected. Aluminum, copper and vanadium were detected in the October 2000 samples but not in the February 2002 samples. For the February 2002 samples, the same metals exceeded the facility-wide background 95 percent UCLs as for the October 2000 samples. Although the February 2002 concentrations were typically lower than the October 2000 concentrations, these differences were not substantial.

Barium was detected in the October 2000 and February 2002 groundwater samples from both monitoring wells. In the February 2002 samples, the barium concentrations were 243 µg/L and 110 µg/L. Although lower than the October 2000 maximum concentration, the maximum February 2002 barium concentration still exceeded the background 95 percent UCL. Beryllium was detected in one monitoring well, at a concentration of 2.4 µg/L in October 2000 and a concentration of 1.8 µg/L in February 2002. Beryllium was not detected in the background data set.

Cobalt was detected in all four groundwater samples. In October 2000, the cobalt concentrations were 28.5 µg/L and 64.7 µg/L. Both concentrations were above the background 95 percent UCL of 15.6 µg/L. The cobalt concentration of the February 2002 sample was consistent with background levels.

Manganese was detected in all groundwater samples collected from monitoring wells. In the October 2000 samples, manganese concentrations were 2,040 µg/L and 343 µg/L. In the February 2002 samples, there were 1,470 µg/L and 262 µg/L of manganese.

The elevated manganese concentration in well IS25MW01 is assumed to be predominantly naturally occurring. Manganese is not associated with the processes known to be used at Site 25. In addition, the manganese concentrations in the surface and shallow subsurface soils were consistent with background levels. The Site 25 surface soil manganese concentrations ranged from 156 mg/kg to 971 mg/kg, with a 95 percent UCL (log-transformed) of 498 mg/kg. In the facility-wide background surface soil samples, the manganese concentrations ranged from 22.7 mg/kg to 882 mg/kg, with a 95 percent UCL (log-transformed) of 569 mg/kg. Only one Site 25 surface soil sample, IS25SS07, had a manganese concentration above the range of concentrations detected in the facility-wide background samples. The 95 percent UCL for the Site 25 surface soil samples is less than the background 95 percent UCL. The maximum subsurface soil manganese concentration was 103 mg/kg, which is less than one-tenth the background 95 percent UCL of 1,270 mg/kg. These data do not support the presence of a manganese source in the soil at Site 25.

Manganese dissolution in the soil occurs under acidic or reducing conditions (McBride, 1994). The pH of the Site 25 surface soil samples ranged from 4.2 to 6.8. Three samples were in the pH 4 range, three samples were in the pH 5 range, and eleven samples had pHs between 6.0 and 6.8. These results indicate that the soil at Site 25 was acidic and would promote the dissolution of manganese. The presence of the acidic soil likely resulted from the heavy leaf litter at the site. Leaf litter promotes a high organic content of the underlying soil, which generates natural organic acids that promote dissolution of manganese present in the soil (McBride, 1994). In addition, general reports in scientific literature studies indicate that, because of accumulation of manganese in tree leaves, the leaf litter itself may be a manganese source for stormwater runoff and rainwater that percolates through the soil (McBride, 1994).

The water quality characteristics of the groundwater samples further support the hypothesis that the elevated manganese concentration observed resulted from natural sources. The pH of the groundwater sample IS25MW01 in October 2000 was 4.2, while, concurrently, the pH of the groundwater sample IS25MW02 was 6.5. In February 2002, IS25MW01 had a pH of 4.3, while IS25MW02 had a pH of 6.0. The acidic pH in the vicinity of well IS25MW01 likely would promote dissolution of manganese.

In general, there was little difference between concentrations of any of the metals in filtered and unfiltered samples, indicating that there was little turbidity in groundwater samples. As described for manganese, the concentration differences between wells IS25MW01 and IS25MW02 might have resulted from the substantially lower pH of groundwater in IS25MW01 as compared to the groundwater in IS25MW02. The solubility of cobalt, nickel, and zinc are increased under acidic conditions (McBride, 1994). The concentrations of these three metals were greater in sample IS25MW01 compared to IS25MW02.

Nitroglycerin was not detected in any of the groundwater samples at Site 25.

## 2.6 Current and Potential Future Land and Resource Uses

Site 25 is a drainage ditch located mostly in a forested ravine and flows from Building 588 into the industrial wastewater outfall IW46. The site is currently an undeveloped forested area within an industrial facility with no other current or projected future land uses.

Shallow groundwater beneath the site is not used for any purpose. The Navy has no plans to develop this resource in the future.

It is unlikely that Site 25 would be developed for residential use. However, hypothetical future residential use of the site was evaluated in the risk assessment to assess the need for institutional controls.

## **2.7 Summary of Site Risks**

A detailed discussion of risks at Site 25 and the risk evaluation process is presented in the RI Report.

### **2.7.1 Human Health Risk Assessment**

A baseline human health risk assessment (HHRA) was performed for surface and subsurface soil, as well as for groundwater, at Site 25, to determine the current and future effects of contaminants on human health. The receptors evaluated in the risk assessment for both current and future uses included:

- For current uses - adolescent and adult trespassers/visitors, adult industrial workers.
- For future uses - adult and child residents, adult and adolescent trespassers/visitors, adult industrial workers, and adult construction workers.

The Navy evaluated the residential exposure scenario to confirm that no land use restrictions would be necessary at the site. A detailed discussion of the HHRA is provided in Sections 3.3 and 8.6 in the RI Report.

#### **2.7.1.1 Identification of Chemicals of Potential Concern**

Chemicals of potential concern (COPCs) are those chemicals that are identified as a potential threat to human health and are evaluated further in the baseline risk assessment.

The COPCs for the soil under both current (surface soil) and future (surface and subsurface soil) use scenarios consist of four SVOCs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and dibenzo(a,h)anthracene) and nine metals (aluminum, arsenic, cadmium, chromium, iron, manganese, silver, thallium, and vanadium). COPCs for the soil under the future use scenario were determined by pooling the analytical results for the surface soil and subsurface soil samples. This pooling is based on the assumption that the future exposed soil is a mixture of the current surface soil and the current subsurface soil. The COPCs for groundwater were barium, iron, and manganese. At least a portion of all of these COPCs are naturally occurring. Section 8.6.2 in the RI Report presents the identification of COPCs, including those that do not pose unacceptable risks to human health.

#### **2.7.1.2 Exposure Assessment**

The exposure assessment defines and evaluates the type and magnitude of human exposure to the chemicals present at or migrating from a site. The exposure assessment is designed to depict the physical setting of the site, identify potentially exposed populations, and estimate chemical intakes under the identified exposure scenarios. Actual or potential exposures are based on the most likely pathways of contaminant release and transport, as well as human

activity patterns. A complete exposure pathway has three components: a source of chemicals that can be released into the environment, a route of contaminant transport through an environmental medium, and an exposure or contact point for a human receptor.

Onsite exposure points include surface soil. It is assumed that current trespassers/visitors and industrial workers could be exposed to surface soil through dermal absorption and incidental ingestion. All future receptors could be exposed to future exposed soils (a mixture of surface soil and subsurface soil) through dermal absorption and incidental ingestion. Inhalation of fugitive emissions from both current surface soil and future exposed soil are not complete exposure pathways because no COPCs were retained for these pathways.

Groundwater from Site 25 is not currently used as a potable water supply at NDWIH nor is it expected to be used as such in the future. However, groundwater data from the site were used in a conservative assessment of groundwater quality for future offsite or onsite residents. Additionally, exposure to shallow groundwater in an excavation pit during construction activities was evaluated for future construction workers. Section 8.6.3 in the RI Report presents a detailed discussion of the exposure assessment.

### **2.7.1.3 Toxicity Assessment**

Toxicity assessment weighs the available evidence regarding the potential for a particular chemical to cause adverse effects in exposed individuals and provides a numerical estimate of the relationship between the extent of exposure and possible severity of adverse effects. Toxicity assessment consists of two steps: hazard identification and dose-response assessment. Hazard identification is the process of determining the potential adverse effects from exposure to a chemical. Dose-response assessment is the process of quantitatively evaluating the toxicity information and characterizing the relationship between the dose of the contaminant administered or received and the incidence of adverse health effects in the exposed population. From this quantitative dose-response relationship, toxicity values (e.g., reference doses [RfDs] and carcinogenic slope factors [CSFs]) are derived. These are the toxicity values, used in conjunction with the exposure assessment, to estimate noncarcinogenic hazards and carcinogenic risks.

EPA has assessed the toxicity of many chemicals and has published the resulting toxicity information and toxicity values in the Integrated Risk Information System (IRIS) and Health Effects Assessment Summary Tables (HEAST) databases. Additionally, toxicity information is available from USEPA's National Center for Environmental Assessment (NCEA).

Health effects are divided into two broad groups: noncarcinogenic and carcinogenic effects. This division is based on the different mechanisms of action currently associated with each category. Chemicals causing noncarcinogenic health effects were evaluated independently from those having carcinogenic effects. Some chemicals may produce both noncarcinogenic and carcinogenic effects, and were evaluated in both groups. Noncarcinogenic health effects are evaluated using the RfDs. Carcinogenic effects are evaluated using CSFs. Section 3.3.3 in the RI Report provides more detail of the toxicity assessment.

### 2.7.1.4 Risk Characterization

**Methodology.** The risk characterization summarizes and combines outputs of the exposure and toxicity assessments to characterize baseline risks, both in quantitative expressions and in qualitative statements. For carcinogens, risk is generally expressed as the incremental probability of an individual developing cancer over a lifetime of exposure to the carcinogen. Excess lifetime cancer risk is calculated from the following equation:

$$\text{ELCR} = \text{CDI} \times \text{SF}$$

where:

ELCR = excess lifetime cancer risk, a unitless probability (e.g. 33 percent) of an individual's developing cancer, that is in addition to the incidence of cancer in the general population unaffected by these releases

CDI = chronic daily intake averaged over 70 years (mg/kg-day)

SF = slope factor, (cancer potency factor), expressed as (mg/kg-day)<sup>-1</sup>.

These risks are probabilities that usually are expressed in scientific notation. An excess lifetime cancer risk of 1E-06 indicates that an individual experiencing the reasonable maximum exposure estimate has a one in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" (ELCR) because exposure to site conditions results in an incremental additional risk in addition to the risks of cancer from other causes, such as smoking. The chance of an individual developing cancer from all other causes has been estimated to be as high as one in three (33 percent or 3E-1) for women and one in two (50 percent or 5E-1) for men. The EPA generally acceptable ELCR range for site-related exposure is 1E-04 to 1E-06 (i.e., 1 in 10,000 to 1 in 1,000,000).

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

The HQ is calculated as follows:

$$\text{Noncancer HQ} = \text{CDI}/\text{RfD}$$

Where: CDI = chronic daily intake

RfD = reference dose

CDI and RfD are expressed in the same units and represent the same exposure period (i.e., chronic, subchronic, or short term). The CDI for HQ calculations may not be the same as that used in the ELCR calculations.

**Carcinogenic Risks.** Carcinogenic risks for all evaluated receptors were within or below the EPA acceptable ELCR range (1E-04 to 1E-06).

**Noncarcinogenic Risks.** Noncarcinogenic risks for all evaluated receptors had an HI less than one, except for the future construction workers and hypothetical child and adult residents.

When the HI is greater than one, the HI is separated into HIs for individual toxicological endpoints (target organs or effects). If the HIs for each toxicological endpoint are below one, toxic noncarcinogenic effects are unlikely. The HIs for the individual toxicological endpoints for the construction worker are all below one; therefore, toxic non-carcinogenic effects to the construction worker are unlikely. The HIs for the individual toxicological endpoints for the future hypothetical child and adult residents are not all below one. The primary contributor to the HI for the child resident is manganese in groundwater and iron in soil (both of which are naturally occurring). The primary contributor to the HI for the adult resident is manganese in groundwater.

A detailed discussion of the risk characterization is provided in Section 3.3.4 and Section 8.6.4 in the RI Report. Section 3.3.5 in the RI Report presents the uncertainty analysis for the HHRA.

## 2.7.2 Ecological Risk Assessment

A screening-level ecological risk assessment (SERA) was conducted for Site 25 to estimate the risks the site would pose to ecological receptors if no action were taken. The SERA provides a conservative assessment of potential ecological risk. The general approach and site-specific approach for the ecological risk assessment are provided in Section 3.4 and Section 8.7, respectively, in the RI Report.

### 2.7.2.1 Identification Of Chemicals Of Concern

Chemicals of concern (COCs) are selected in Step 3A from the preliminary list of ecological COPCs. The selection process involves consideration of the ecological HQs based on refined exposure assumptions, patterns in detection, consideration of likely risk from chemicals without screening values, consideration of background concentrations, and consideration of the basis of the direct contact and ingestion-based screening values compared to site conditions. If there are COCs at the end of Step 3A, the risk assessment process continues to Step 3B (revised problem formulation) and Step 4 (baseline ecological risk assessment work plan). No COCs were identified after Step 3A for Site 25. Detailed steps for identifying the COCs are provided in Sections, 3.4.3, 3.4.4, 8.7.3, and 8.7.4 in the RI Report.

### 2.7.2.2 Exposure Assessment

According to Superfund guidance (USEPA, 1997), Step 3 initiates the problem formulation phase of the Baseline Ecological Risk Assessment (BERA). Under Navy guidance (CNO, 1999), the BERA is defined as Tier 2, and the first activity under Tier 2 is Step 3A. In Step 3A, the conservative assumptions employed in Tier 1 are refined and risk estimates are

recalculated using the same conceptual site model for the site. This step is conducted to assist with the identification of risk drivers (i.e., chemicals that may pose the greatest risk).

In some cases, additional information is presented that has bearing on whether a chemical is identified as a potential risk driver. Risk estimates were based on maximum concentrations in Step 2 and average concentrations in Step 3A. For upper trophic level receptors (i.e., carnivorous animals), average chemical concentrations provide a more representative estimate of the likely level of chemical exposure because the local population (and in many cases individual organisms for highly mobile species with large home ranges relative to the size of the site) would be expected to occur throughout the site (where suitable habitat is present) and, in many cases, off the site. Mean concentrations (or some other estimate of central tendency) may also be appropriate for evaluating potential risks to populations of lower trophic level terrestrial and aquatic receptors because the members of the population are expected to be found throughout the site (where suitable habitat is present), rather than concentrated in one particular area.

While effects on individual organisms might be important for some receptors, such as rare and endangered species, population- and community-level effects are typically more relevant to ecosystems. In many cases, the average concentration is a conservative representation of the true site average because samples are generally biased toward areas of known or suspected contamination.

### 2.7.2.3 Ecological Effects Assessment

The purpose of the effects evaluation is to establish chemical exposure levels (screening values) that represent conservative thresholds for adverse ecological effects. Direct contact screening values were used to assess potential risks to the soil invertebrate and terrestrial plant communities. Ingestion screening values for dietary exposures were derived for each avian and mammalian receptor species and chemical evaluated in the assessment. Section 3.4.2.1 in the RI Report provides a detailed description of the screening values used in the ecological risk assessment.

### 2.7.2.4 Ecological Risk Characterization

The concentrations of aluminum, chromium, iron, mercury, silver, vanadium, and zinc exceeded soil screening values. The next step is to evaluate whether the concentrations of release-related inorganics in site soils pose an unacceptable risk to populations of plants and soil invertebrates at the site.

Of the metals that exceeded soil screening values, aluminum, iron, and vanadium were present at concentrations that are consistent with NDWIH background levels. Chromium, mercury, silver, and zinc were present at higher concentrations than those in the NDWIH background data set. Maximum concentrations were detected at sample locations near Building 588. Section 8.7.4.3 in the RI Report provides a detailed description of the ecological risk characterization.

**Distribution of Contamination.** The average chromium concentration at the site was 22.7 mg/kg. Chromium concentrations in surface soil exceeded the screening value across the site. However, excluding the location of maximum detection (IS25SS03 at 124 mg/kg), the average site-wide concentration is consistent with NDWIH background for combined

surface and subsurface soil. Sample IS25SS03 may represent a potential hot spot area for ecological receptors. However, this area is of marginal habitat value for soil invertebrates. The area is developed and maintained with compacted soil and little vegetation.

Mercury concentrations exceeded the soil screening value at seven of the twenty sampling locations. The exceedances were generally near the buildings, with mercury concentrations below the screening value away from the buildings. The average mercury concentration was 0.13 mg/kg, slightly above the screening value of 0.10 mg/kg. Therefore, other than the area immediately surrounding the buildings where a slightly elevated risk may exist, there appears to be minimal risk to plants and soil invertebrates from mercury. Additionally, the areas surrounding the buildings are of marginal habitat value for soil invertebrates.

Silver was detected in 9 of 19 surface soil samples. With the exception of sample IS25SS14, all locations where silver was detected were within 100 ft of buildings at the site, mostly in areas that are developed or maintained where the soils are compacted. Only one sample in the drainage leading away from the site contained a silver concentration greater than the screening value.

Zinc concentrations exceeded the soil screening value in one-half of the samples collected. The spatial distribution of zinc concentrations above the screening value was similar to that of mercury, with the majority of the exceedances occurring near the site buildings, where the soil quality is marginal for soil invertebrates.

**Toxicological Evaluation.** The observed mercury concentrations at Site 25 are not expected to pose a significant risk to soil invertebrates (see the RI Report for detailed toxicological evaluation). In addition, the average mercury concentration at the site is lower than the 0.3 mg/kg screening benchmark for toxicity to plants provided by Efroymsen et al. (1997a).

Zinc is not expected to pose a significant risk to populations of plants at Site 25. The screening value is conservatively based on a soluble form of zinc, and the site-wide average, excluding the maximum concentration, is only 1.2 times greater than the conservative screening value. In addition, zinc at the site is not expected to pose a significant risk to soil invertebrates. The average site concentration of 82.9 mg/kg is less than the screening benchmark of 200 mg/kg for earthworms provided by Efroymsen et al. (1997b).

The results of the risk assessment indicate that chemicals in the soil at Site 25 pose minimal risk to ecological receptors, based on there being no LOAEL-based HQs in excess of 1 for upper trophic level for the average exposure case. Section 8.7.4.4 and Section 8.7.4.5 in the RI Report present the uncertainty and conclusions, respectively, of the ecological risk assessment.

### 2.7.3 Conclusions

There were no unacceptable risks to human health or ecological receptors from exposure to the chemicals detected at Site 25. Although the HHRA indicates that manganese in the groundwater and iron in the soil may pose unacceptable noncancer hazards to future residents, the site conditions and data indicate that manganese and iron are naturally occurring. The ecological risk assessment concluded that risk to ecological receptors was minimal.

According to the RI report, silver is not a chemical of concern at this site. Based on the historical use and site operations, silver was expected to have the greatest potential for adverse impacts. Sections 8.8.3 and 8.8.4 in the RI Report present the conclusions of the HHRA and ERA, respectively.

## **2.8 Selected Remedy**

The Navy and the EPA, with the support of the MDE, have selected no further action as the preferred alternative for Site 25. Based on the results of investigations conducted at Site 25, the Navy, EPA, and MDE have determined that the site does not pose an unacceptable risk to people, plants, and animals; therefore, no alternative other than the no further action alternative was evaluated. Under this alternative, no response action will be performed at the site; therefore, no institutional controls, remedy schedule, capital cost estimation, or annual operation and maintenance are necessary.

## **2.9 Documentation of Significant Changes**

The Proposed Plan for Site 25, Hypo Discharges from X-ray Building No. 2, Building 588, at NDWIH, Indian Head, Maryland was released for public comment on May 28, 2004. The Proposed Plan identified that no action is necessary for protection of human health and the environment. No written or oral comments were received during the public comment period. It was determined that no significant changes to this decision, as originally identified in the Proposed Plan, were necessary or appropriate.

Table 2-1  
 Detected Compounds in Site 25 Surface Soil Samples  
 Record of Decision  
 NDWIH, Indian Head, Maryland

Station ID	IS25SO01		IS25SO02	IS25SO03	IS25SO04	IS25SO05	IS25SO06	IS25SO07
Sample ID	IS25SS010001	IS25SS010001P	IS25SS020001	IS25SS030001	IS25SS040001	IS25SS050001	IS25SS060001	IS25SS070001
Sample Date	07/18/00	07/18/00	07/18/00	07/18/00	07/19/00	07/19/00	07/19/00	07/19/00
Chemical Name								
<b>Volatile Organic Compounds (UG/KG)</b>								
Acetone	7.6 J	8.9 J	3.9 J					
Methyl acetate								
Methylene chloride					1.9 J	1.9 J		
Toluene								
<b>Semi-volatile Organic Compounds (UG/KG)</b>								
2-Methylnaphthalene								
Acenaphthene								
Acenaphthylene								
Acetophenone							51 J	
Anthracene								
Benzaldehyde			55 J					400 J
Benzo(a)anthracene				200 J				49 J
Benzo(a)pyrene			55 J	190 J				53 J
Benzo(b)fluoranthene	240 J	210 J	78 J	230 J				62 J
Benzo(g,h,i)perylene				130 J				
Benzo(k)fluoranthene	200 J	220 J	64 J	220 J				60 J
Butylbenzylphthalate								
Carbazole								
Chrysene	190 J	200 J	97 J	280 J			54 J	95 J
Di-n-butylphthalate				540 J				
Dibenz(a,h)anthracene								
Dibenzofuran								
Diethylphthalate			170 J					530
Dimethyl phthalate								
Fluoranthene	200 J	200 J	110 J	380 J			68 J	100 J
Fluorene								
Indeno(1,2,3-cd)pyrene			51 J	150 J				49 J
Naphthalene								
Phenanthrene			71 J	220 J				65 J
Pyrene	160 J	170 J	84 J	230 J			61 J	90 J

J - Estimated Value  
 K - Biased high  
 L - Biased low

Table 2-1  
Detected Compounds in Site 25 Surface Soil Samples  
Record of Decision  
NDWIH, Indian Head, Maryland

Station ID	IS25SO01		IS25SO02	IS25SO03	IS25SO04	IS25SO05	IS25SO06	IS25SO07
Sample ID	IS25SS010001	IS25SS010001P	IS25SS020001	IS25SS030001	IS25SS040001	IS25SS050001	IS25SS060001	IS25SS070001
Sample Date	07/18/00	07/18/00	07/18/00	07/18/00	07/19/00	07/19/00	07/19/00	07/19/00
<b>Chemical Name</b>								
bis(2-Ethylhexyl)phthalate				17,000				
<b>Total Metals (MG/KG)</b>								
Aluminum	12,000	12,800	13,600	5,530	6,330	7,490	4,880	7,850
Antimony	2.1 L	1.5 L						
Arsenic	7.3	8.7	9	4.6	4.5	4.5	4.5	10.2
Barium	65.8	62.8 J	57.5 J	73.4	40.4 J	30.3 J	38 J	111
Cadmium	5.3	4.4	2.6	47.2	0.29 J	0.37 J	1.2 J	0.82 J
Calcium	3,410 J	3,000 J	1,520 J	2,370 J			1,910	2,140
Chromium	28.5	28.9	30.1	124	10.3	16.1	9.4	18.5
Cobalt	8.1 J	7.7 J	4.1 J	8 J	3.4 J	2.6 J	3 J	9.6 J
Copper	49	49	52.6	108		15.2	58	31.6
Cyanide								
Iron	20,100	22,200	24,400	20,000	9,340	16,500	12,500	15,600
Lead	73.9 K	74.2 K	75.9 K	174 K	19 K	18.5 K	35.2 K	60.2 K
Magnesium	2,090	1,760	793 J	830 J		477 J	549 J	608 J
Manganese	213	164	208	407	269	323	160	971
Mercury	0.31	0.35	0.39	0.34	0.084 J	0.087 J	0.12 J	0.27
Nickel	34	32.9	10.9 J	16.2	4.5 J	5.6 J	5.8 J	11.9
Potassium	748 J	735 J	730 J	358 J	294 J	677 J	508 J	639 J
Selenium			1.6			1.2 J		
Silver	8.8	9.8	20.6	2.4 J				13.7
Thallium								
Vanadium	58.3	72.8	42	27.8	19.9	27.5	24.8	34.8
Zinc	117 J	108 J	101 J	529 J				101 J
<b>Wet Chemistry (MG/KG)</b>								
% Moisture	37.6	40.4	34	27.7	23.8	25	25.7	31.3
% Solids	58.3	69.3	70.7	80.4	75.6	73.1	75.9	70.4
Total organic carbon (TOC)	120,000	103,000	124,000	37,400	34,100	29,000	90,000	78,400
pH	6.2	6.3	5	6.6	4.6	6	4.9	5.8

J - Estimated Value  
K - Biased high  
L - Biased low

Table 2-1  
Detected Compounds in Site 25 Surface Soil Samples  
Record of Decision  
NDWIH, Indian Head, Maryland

Station ID	IS25SO08	IS25SO09	IS25SO10	IS25SO11	IS25SO12	IS25SO13	IS25SO14	
Sample ID	IS25SS080001	IS25SS090001	IS25SS100001	IS25SS110001	IS25SS120001	IS25SS130001	IS25SS140001	IS25SS140001P
Sample Date	07/19/00	07/19/00	07/19/00	07/19/00	07/19/00	07/19/00	07/19/00	07/19/00
Chemical Name								
<b>Volatile Organic Compounds (UG/KG)</b>								
Acetone								
Methyl acetate								
Methylene chloride								
Toluene								
<b>Semi-volatile Organic Compounds (UG/KG)</b>								
2-Methylnaphthalene								
Acenaphthene								
Acenaphthylene	90 J							
Acetophenone	45 J					100 J	49 J	59 J
Anthracene	54 J							
Benzaldehyde								
Benzo(a)anthracene	410 J		100 J				47 J	56 J
Benzo(a)pyrene	400 J		110 J		45 J		51 J	56 J
Benzo(b)fluoranthene	530		110 J		50 J		57 J	66 J
Benzo(g,h,i)perylene	210 J		120 J		51 J		69 J	79 J
Benzo(k)fluoranthene	380 J		120 J		47 J		60 J	72 J
Butylbenzylphthalate								
Carbazole								
Chrysene	580		160 J		65 J		79 J	93 J
Di-n-butylphthalate								
Dibenz(a,h)anthracene	81 J							
Dibenzofuran								
Diethylphthalate								
Dimethyl phthalate								
Fluoranthene	550		200 J		64 J	61 J	82 J	98 J
Fluorene								
Indeno(1,2,3-cd)pyrene	260 J		120 J		46 J		65 J	77 J
Naphthalene								
Phenanthrene	210 J		130 J				46 J	53 J
Pyrene	470		210 J		88 J	67 J	110 J	120 J

J - Estimated Value  
K - Biased high  
L - Biased low

Table 2-1  
 Detected Compounds in Site 25 Surface Soil Samples  
 Record of Decision  
 NDWIH, Indian Head, Maryland

Station ID	IS25SO08	IS25SO09	IS25SO10	IS25SO11	IS25SO12	IS25SO13	IS25SO14	
Sample ID	IS25SS080001	IS25SS090001	IS25SS100001	IS25SS110001	IS25SS120001	IS25SS130001	IS25SS140001	IS25SS140001P
Sample Date	07/19/00	07/19/00	07/19/00	07/19/00	07/19/00	07/19/00	07/19/00	07/19/00
Chemical Name								
bis(2-Ethylhexyl)phthalate	610		570					
<b>Total Metals (MG/KG)</b>								
Aluminum	9,980	6,670	5,420	4,290	3,710	4,630	4,600	5,280
Antimony								
Arsenic	8.8	6.5	6.8	4.6	4.4	4.3	5.7	6.1
Barium	70	42.3 J	37.2 J	43.5 J	27.4 J	92.7	46.7 J	49.9 J
Cadmium	1.2 J	0.5 J	0.94 J	0.49 J	0.31 J	0.36 J	0.95 J	0.82 J
Calcium	1,250 J		1,130 J	1,740		2,550	1,100	1,310 J
Chromium	23.4	14	20.3	10.4	9.9	8.5	12.5	15.2
Cobalt	4.1 J	4.8 J	3.4 J	3.1 J	3.3 J	5.1 J	4.7 J	4.9 J
Copper	20.6	7.6	19.6	9.6	6.1	8.1 J	11.1	14.8
Cyanide								
Iron	21,200	17,200	12,600	9,260	9,470	8,880	12,400	13,100
Lead	23.1 K	15 K	24.2 K	14 K	10.5 K	17.5 K	19.9 K	20 K
Magnesium	988 J	531 J	640 J	585 J		654 J	537 J	601 J
Manganese	340	807	228	400	293	461	636 J	556
Mercury	0.1 J		0.064 J	0.081 J		0.12 J	0.073 J	0.091 J
Nickel	6.9 J	3.9 J	6.5 J	4.3 J	3.1 J	4.6 J	4.8 J	5.7 J
Potassium	474 J	442 J	414 J	318 J	247 J	376 J	303 J	387 J
Selenium		1.1 L						
Silver			2 J					1 J
Thallium								
Vanadium	31.7	24.3	20.2	15.1	13.7	17.9	17.6	19.8
Zinc	141 J		95.1 J				92.4 J	
<b>Wet Chemistry (MG/KG)</b>								
% Moisture	23.6	16.8	18.1	23.7	17.9	43.2	22	27
% Solids	79.6	79.8	79.1	83.8	81.5	57.7	78.5	78.3
Total organic carbon (TOC)	23,400	6,180	23,200	7,840	13,900	78,200	16,800	24,300
pH	6.8	6	6.5	6.8	6.6	5	6.2	6.3

J - Estimated Value  
 K - Biased high  
 L - Biased low

Table 2-1  
Detected Compounds in Site 25 Surface Soil Samples  
Record of Decision  
NDWIH, Indian Head, Maryland

Station ID	IS25SO15	IS25SO16	IS25SO17	IS25SO18	IS25SO19	IS25SO20	IS25SO21	IS25SO22
Sample ID	IS25SS150001	IS25SS160001	IS25SS170001	IS25SS180001	IS25SS190001	IS25SS200001	IS25SS1800012	IS25SS1900012
Sample Date	07/19/00	07/19/00	07/19/00	07/31/00	07/31/00	10/11/00	10/11/00	10/11/00
Chemical Name								
<b>Volatile Organic Compounds (UG/KG)</b>								
Acetone				2.6 J				
Methyl acetate				2.1 J				
Methylene chloride								
Toluene	1.5 J							
<b>Semi-volatile Organic Compounds (UG/KG)</b>								
2-Methylnaphthalene							44 J	
Acenaphthene							370 J	
Acenaphthylene								
Acetophenone	68 J			68 J	46 J			
Anthracene							440	
Benzaldehyde					59 J	2,400		
Benzo(a)anthracene				52 J			1,300	
Benzo(a)pyrene				54 J			160 J	
Benzo(b)fluoranthene				60 J			1,200	81 J
Benzo(g,h,i)perylene				65 J				
Benzo(k)fluoranthene				66 J			710	
Butylbenzylphthalate							70 J	
Carbazole							200 J	
Chrysene				90 J			1,200	66 J
Di-n-butylphthalate							86 J	
Dibenz(a,h)anthracene							220 J	
Dibenzofuran							180 J	
Diethylphthalate								
Dimethyl phthalate							96 J	
Fluoranthene	51 J			95 J		39 J	2,300	87 J
Fluorene							290 J	
Indeno(1,2,3-cd)pyrene				68 J			210 J	
Naphthalene							92 J	
Phenanthrene				45 J			2,300	59 J
Pyrene	65 J			120 J			990	95 J

J - Estimated Value  
K - Biased high  
L - Biased low

Table 2-1  
Detected Compounds in Site 25 Surface Soil Samples  
Record of Decision  
NDWIH, Indian Head, Maryland

Station ID	IS25SO15	IS25SO16	IS25SO17	IS25SO18	IS25SO19	IS25SO20	IS25SO21	IS25SO22
Sample ID	IS25SS150001	IS25SS160001	IS25SS170001	IS25SS180001	IS25SS190001	IS25SS200001	IS25SS1800012	IS25SS1900012
Sample Date	07/19/00	07/19/00	07/19/00	07/31/00	07/31/00	10/11/00	10/11/00	10/11/00
<b>Chemical Name</b>								
bis(2-Ethylhexyl)phthalate				51 J		450	340 J	
<b>Total Metals (MG/KG)</b>								
Aluminum	4,150	5,350	5,270	9,030	4,920	8,290	6,910	5,020
Antimony							1.5 K	
Arsenic	7.2	3.7	5.1	6.5	4.4	21.4	23.8	5.9
Barium	43.7 J	84.1	25.8 J	42.2 J	36.2 J	27.9 J	46 J	45.7 J
Cadmium	0.46 J	0.48 J	0.21 J		2.5	0.092 J	3.7	1.6
Calcium	1,400 J	1,980 J		175 J	270 J		2,020	1,810
Chromium	13.6	9.6	9.9	17.4	9.3	15	31.9	34.9
Cobalt	4.2 J	10 J	4.6 J	5 J	5 J	3.6 J	6.8 J	13.2 J
Copper	8.4	10	6.1 J	6.8	5.4 J	10.2	53.7	11.6
Cyanide							0.22 J	
Iron	10,600	10,600	10,400	15,900 J	9,610 J	12,900	13,100	9,850
Lead	12.9 K	16 K	15.9 K	28.2 K	35 K	25.9 K	90.2 K	29.8 K
Magnesium	487 J	698 J		634 J	529 J	678 J	2,560	6,680
Manganese	568 J	521	270	196 J	619 J	156	348	328
Mercury			0.084 J		0.083	0.091 J	0.095 J	0.093 J
Nickel	4.2 J	8.8 J	3.8 J	5.1 J	5 J	9.5 K	39	120
Potassium	347 J	452 J	388 J	420 J	190 J	379 J	389 J	353 J
Selenium							2.3	1.4 K
Silver						0.9 J	201	8.5
Thallium		1.9 J						
Vanadium	15.9	17.7 J	19.5	29.5	22.7	28.2	27.2	19.5
Zinc				26.8 J	21.3 J	44.2 J	196 J	56.4 J
<b>Wet Chemistry (MG/KG)</b>								
% Moisture	33.7	43.8	22	20	25.8	11.1	18.5	27.6
% Solids	70.1	70.6	76.1	79.2	77.4			
Total organic carbon (TOC)	21,100	33,300	20,200	15,700	23,900			
pH	6.6	6.3	4.2	4.7	4.7			

J - Estimated Value  
K - Biased high  
L - Biased low

Table 2-2  
 Detected Compounds in Site 25 Subsurface Soil Samples  
 Record of Decision  
 NDWIH, Indian Head, Maryland

Station ID	IS25SO01	IS25SO04	IS25SO07	IS25SO20		IS25SO21	IS25SO22
Sample ID	IS25SB010203	IS25SB040203	IS25SB070203	IS25SB200203	IS25SB200203P	IS25SB180203	IS25SB190203
Sample Date	10/11/00	10/11/00	10/11/00	10/11/00	10/11/00	10/11/2000	10/11/00
<b>Chemical Name</b>							
<b>Volatile Organic Compounds (UG/KG)</b>							
Tetrachloroethene				1.8 J			
Trichloroethene				3.1 J			
<b>Semi-volatile Organic Compounds (UG/KG)</b>							
Pyrene			130 J				
<b>Total Metals (MG/KG)</b>							
Aluminum	13,400	10,700	11,000	11,400	12,300	15,000	11,400
Antimony		1.1 K	0.86 K	0.85 K	1.4 K	0.98 K	0.76 K
Arsenic	6.9	5.5	5.7	5.9	7.5	7.6	5.6
Barium	34.8 J	23 J	24.5 J	24.8 J	26.8 J	37.2 J	35.6 J
Cadmium	0.18 J	0.092 J	0.12 J	0.14 J	0.075 J	0.17 J	0.32 J
Calcium						333 J	
Chromium	22.6	13.7	13.4	17.2	19	17.5	18.2
Cobalt	2.8 J	2.7 J	3.2 J	2.7 J	2.9 J	3.1 J	3.1 J
Copper	13.6	10.8	12.5	11.5	12.7	11.7	9.1
Iron	30,100	21,100	22,800	25,100	27,000	22,100	19,400
Lead	11.1 K	10.3 K	10.4 K	10.3 K	10.7 K	10.7 K	11.9 K
Magnesium	380 J	349 J	434 J	354 J	405 J	531 J	496 J
Manganese	71.5	76	103	81.2	87.1	71.4	99.5
Mercury				0.075 J	0.064 J	0.1 J	
Nickel	5.8 K	5.3 K	6.5 K	5.1 K	6.1 K	5.8 K	7.4 K
Potassium	592 J	677 J		529 J	551 J		399 J
Selenium	1.9 K	1.4 K	2.1	1.4 K	1.5 K	1.4 K	1.1 K
Silver						18.3	4.8
Vanadium	43.3	30.1	30.9	36.8	39.5	35.5	32.7
Zinc	26.6 J	23.2 J	26.9 J	23.8 J	26.5 J	34.4 J	27.4 J
<b>Wet Chemistry (MG/KG)</b>							
% Moisture	16.1	17.5	16.5	16.8	17	16.2	15.8

J - Estimated Value  
 K - Biased high  
 L - Biased low

Table 2-3  
 Detected Compounds in Site 25 Monitoring Well Samples (Rounds 1 and 2)  
 Record of Decision  
 NDWIH, Indian Head, Maryland

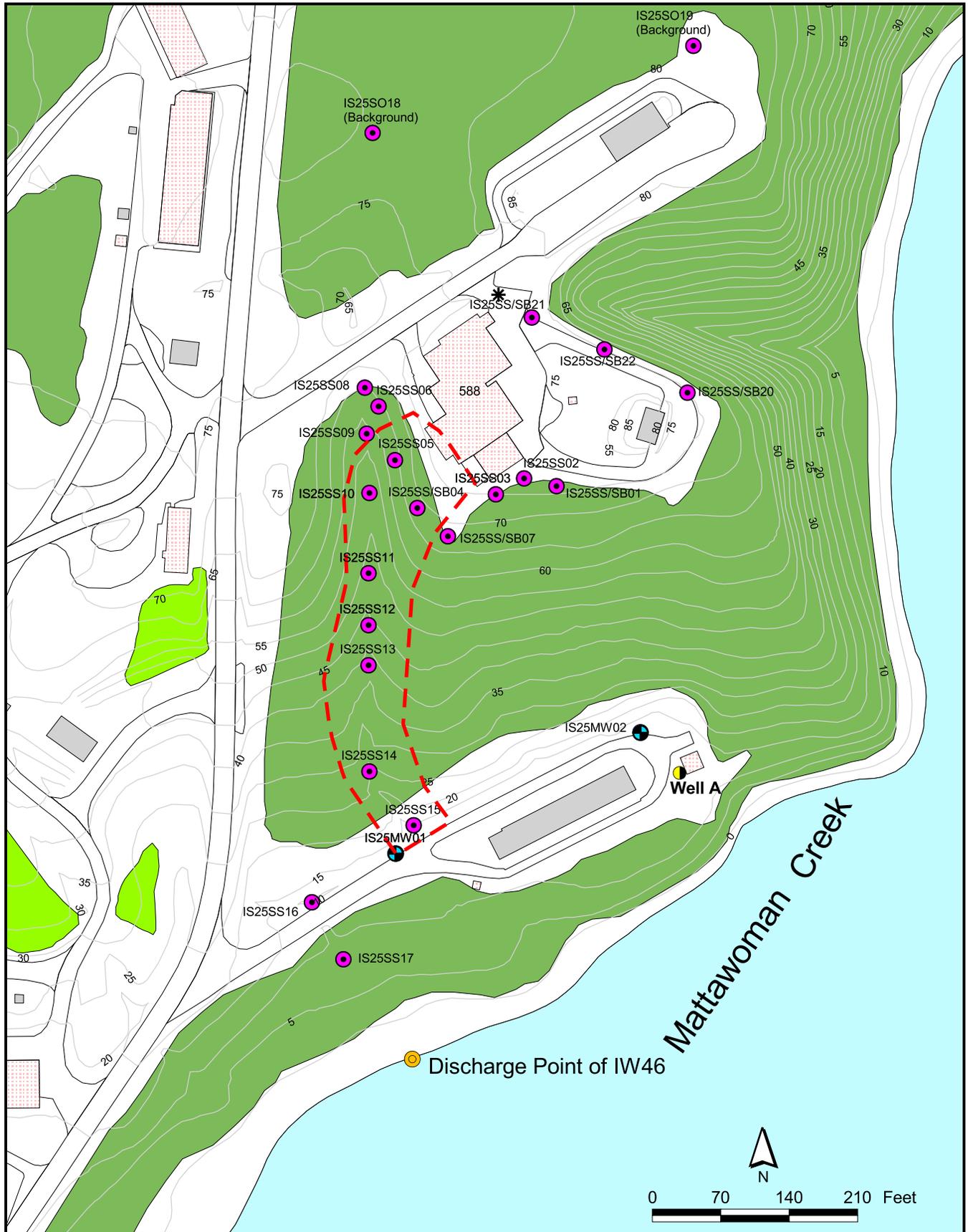
Station ID	IS25MW01	IS25MW02
Sample ID	IS25MW011000	IS25MW021000
Sample Date	10/24/00	10/24/00
<b>Chemical Name</b>		
<b>Volatile Organic Compounds (UG/L)</b>		
1,1,2-Trichloro-1,2,2- trifluoroethane		3.6 J
<b>Total Metals (UG/L)</b>		
Aluminum	292	
Barium	352	98.8 J
Beryllium	2.4 J	
Calcium	11,300	9,460
Cobalt	64.7	28.5 J
Copper	4 J	
Iron	111	1,160
Magnesium	11,400	5,380
Manganese	2,040	343
Nickel	28.8 J	5 J
Potassium	3,160 J	5,540
Sodium	120,000	23,100
Vanadium		0.94 J
Zinc	77.7	
<b>Dissolved Metals (UG/L)</b>		
Aluminum	301	
Barium	369	95.3 J
Beryllium	2.5 J	
Calcium	11,700	9,200
Cobalt	68.2	40.5 J
Copper	4.4 J	
Iron		1,120
Magnesium	11,900	5,220
Manganese	2,110	332
Nickel	29 J	5.8 J
Potassium	3,290 J	5,350
Sodium	125,000	22,200
Vanadium		0.97 J
Zinc	81.5	

Station ID	IS25MW01	IS25MW02	
Sample ID	IS25MW010202	IS25MW020202P	IS25MW020202
Sample Date	02/26/02	02/26/02	02/26/02
<b>Chemical Name</b>			
<b>Total Metals (UG/L)</b>			
Barium	243	110 J	98.6 J
Beryllium	1.8 J		
Calcium	7,420	7,790	7,100
Cobalt	44.4 J	6.2 J	5.7 J
Iron	161	1,030	1,000
Magnesium	7,510	5,300	4,720 J
Manganese	1,470	262	239
Nickel	17 J		
Potassium	2,430 J	5,060	4,850 J
Sodium	84,900	20,800	19,000
Zinc	47.7	25.2	26.1
<b>Dissolved Metals (UG/L)</b>			
Barium	215	104 J	94.9 J
Beryllium	1.6 J		
Calcium	7,050	7,760	7,140
Cobalt	41 J	6 J	5.7 J
Iron	60.4 J	423	338
Magnesium	7,200	5,180	4,750 J
Manganese	1,410	268	242
Nickel	13.8 J		
Potassium	2,230 J	5,090	4,700 J
Sodium	81,400	20,700	19,200
Zinc	33.7		

J - Estimated Value  
 K - Biased high  
 L - Biased low



Figure 2-1  
Facility Map  
Record of Decision  
NDWIH, Indian Head, Maryland



**LEGEND**

- Soil Sample
- Monitoring Wells
- Potable Water Well
- NPDES Industrial Wastewater Outfall
- Approximate IR Site Boundary
- Buildings
- Demolished Buildings
- Topographic Contours (Five foot)
- Wooded Areas

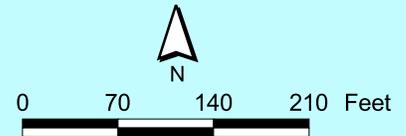
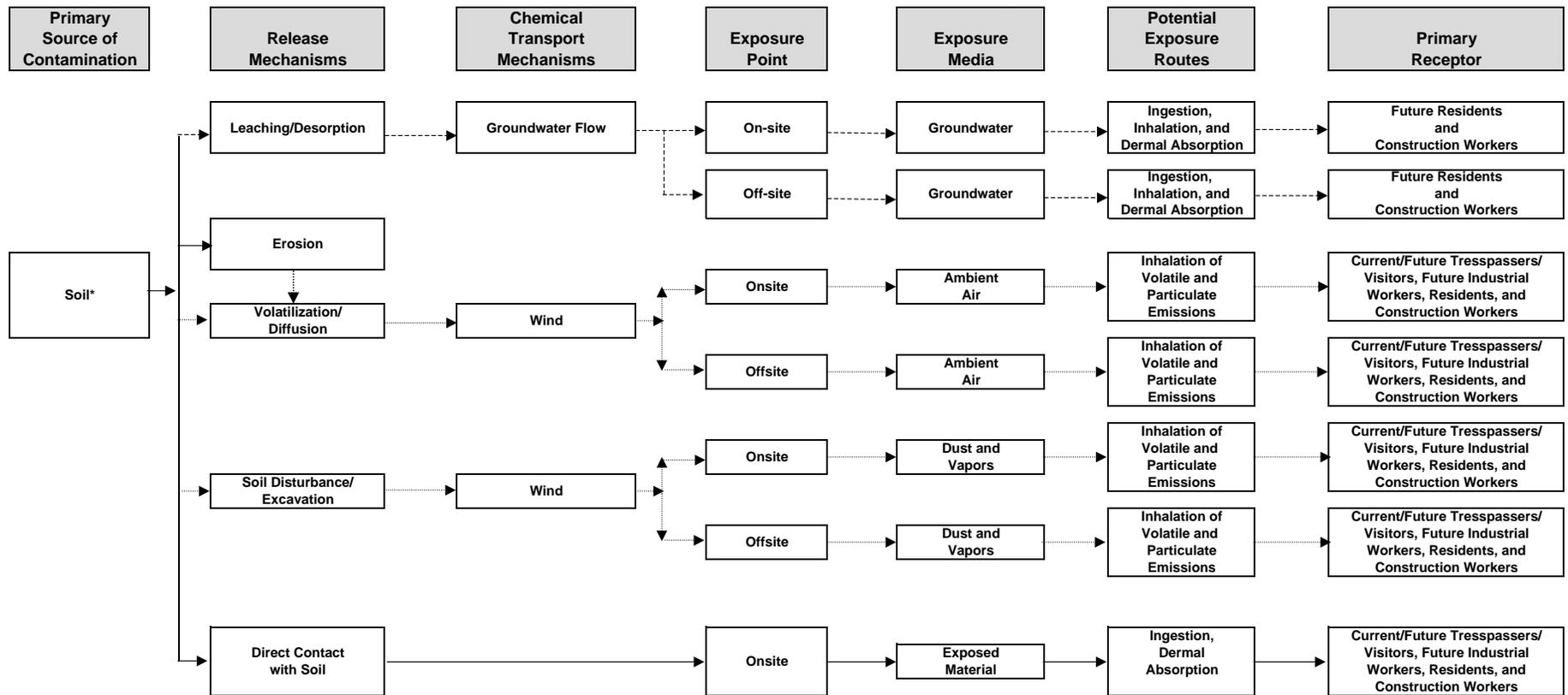


Figure 2-2  
 Site 25 Topography and Sampling Locations  
 Record of Decision  
 NDWIH, Indian Head, Maryland



\* Current scenario is for surface soil and future scenarios are for surface and subsurface soil combined.

- Complete Pathway
- - - - - Incomplete Pathway
- · · · · Pathway not evaluated because no CPOCs identified

Figure 2-3  
 Conceptual Exposure Model for Potential Human Exposures-Site 25  
 Record of Decision  
 NDWIH, Indian Head, Maryland

## SECTION 3

# Responsiveness Summary

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The Responsiveness Summary is a concise and complete summary of significant comments received from the public and includes responses to these comments. The Responsiveness Summary was prepared after the public comment period which ended on June 28, 2004, in accordance with guidance in "Community Relations in Superfund: A Handbook" (OSWER Directive 9320.3B, January 1992). The Responsiveness Summary provides the decision maker with information about the views of the community. It also documents how the Navy, EPA, and MDE considered public comments during the decision-making process and provides answers to major comments.

## 3.1 Overview

The Proposed Plan, as presented to the public, identified that no remedial action is necessary to protect human health and the environment.

## 3.2 Background on Community Involvement

The public comment period for the no further action decision for Site 25 began on May 28, 2004, and ended on June 28, 2004. A public meeting was held on June 17, 2004, at the Indian Head Senior Center, 100 Cornwallis Square, Indian Head, Maryland, to accept oral and written comments on this decision.

## 3.3 Summary of Comments Received During the Public Comment Period and Navy Responses

No significant comments were received during the public comment period.

## SECTION 4

# References

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**Appendix A**  
**Glossary**

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# Glossary

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This glossary defines terms used in this Record of Decision (ROD) describing CERCLA activities. The definitions apply specifically to this ROD and may have other meanings when used in different circumstances.

**Administrative Record File:** A file that contains all information used by the lead agency to make its decision in selecting a response under CERCLA. This file is to be available for public review, and a copy is to be established at or near the site, usually at one of the information repositories. Also, a duplicate is filed in a central location, such as regional or state office.

**Aquifer:** An underground formation of materials such as sand, soil, or gravel that can store and supply groundwater to wells and springs.

**Background Concentrations:** Concentrations of chemical compounds or elements in environmental media that are representative of naturally occurring conditions or that may be attributable to historic, widespread human activity.

**Baseline Risk Assessment:** A study conducted as a supplement to a remedial investigation to determine the nature and extent of contamination at a Superfund site and the risks posed to public health and the environment.

**Carcinogen:** A substance that may cause cancer.

**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.

**Community Relations:** The Navy and NDWIH program to inform and involve the public in the Superfund process and respond to community concerns.

**Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA):** Comprehensive Environmental Response, Compensation, and Liability Act (1980), also known as the Superfund Law, as amended by the Superfund Amendments and Reauthorization Act of 1986. CERCLA provides the authority and procedures for responding to releases of hazardous substances, pollutants, and contaminants from inactive hazardous waste disposal sites.

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

**Drinking Water Standards:** Standards for the quality of drinking water that are set forth by EPA and MDE.

**Ecological Receptor:** A plant or animal that may be exposed to a contaminant in the environment.

**Feasibility Study:** See Remedial Investigation and Feasibility Study.

**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 toward its point of discharge.

**Hazardous Substance:** Any material that poses a threat to public health 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 a Superfund site that is made available to the public. Information repositories for NDWIH are at the Charles County Library, La Plata Branch, Charles and Garrett Streets, La Plata, Maryland and the NDWIH General Library, Indian Head Division, Naval Surface Warfare Center, Building 620, 101 Strauss Avenue, Indian Head, Maryland.

**Maximum contaminant Levels (MCLs):** National standards for acceptable levels of contaminants in public drinking water systems. These are legally enforceable standards for supplies of drinking water set by EPA under the Safe Drinking Water Act and by MDE.

**Metals:** Metals are naturally occurring elements in the earth. Arsenic, cadmium, iron, mercury, and silver are examples of metals. Exposure to some metals, such as arsenic and mercury, can have toxic effects. Other metals, such as iron, are essential to the metabolism of humans and animals.

**Monitoring Wells:** Wells drilled at specific locations on or near a site where groundwater can be sampled at selected depths and studied to assess the groundwater flow direction and the types and amounts of contaminants present.

**National Oil and Hazardous Substances Pollution Contingency Plan (NCP):** Federal regulations that provide the organizational structure and procedures for preparing for and responding to discharges of oil and release of hazardous substances, pollutants, or contaminants.

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

**Organic Compounds:** 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.

**Parts per Billion (ppb)/Parts per Million (ppm):** Units commonly used to express low concentrations of contaminants. For example, one ounce of a chemical in a million ounces of water is 1 ppm. One ounce of a chemical in a billion ounces of water is 1 ppb. If one drop of

a chemical is mixed in a competition-size swimming pool, the water will contain about 1ppb of the chemical. Parts per million are equivalent to mg/L and mg/kg. Parts per billion are equivalent to µg/L and µg/kg.

**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.

**Record of Decision (ROD):** An official public document that selects the clean-up alternative(s) which 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 lead agency following the public comment period.

**Remedial Action:** The actual construction or implementation phase that follows the remedial design for the selected clean-up alternative at a site on the NPL.

**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.

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

**Responsiveness Summary:** A summary of 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.

**Re-vegetate:** To replace topsoil, seed, and mulch on prepared soil to prevent wind and water erosion.

**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-government entity.

**Surface Water:** Bodies of water that are above ground, such as rivers, lakes, ponds, and streams.