PROPOSED PLAN

Site 57, Building 292 TCE Contamination

U.S. Navy Announces the Site 57 Proposed Plan

Naval Support Facility, Indian Head
Indian Head, Maryland

Introduction

This **Proposed Plan** identifies the **preferred alternative** for a **remedial action** for Building 292 Trichloroethene (TCE) Contamination (Site 57) at Naval Support Facility, Indian Head (NSF-IH) in Indian Head, Maryland. NSF-IH is a Naval Support Activity South Potomac facility within the Naval District Washington Region. The Proposed Plan also provides the rationale for the recommendation of the preferred alternative, based on investigative activities performed at Site 57 to date, and explains how the public can participate in the decision-making process. The location of NSF-IH and Site 57 are shown on Figure 1.

The Department of the Navy (Navy) (the lead agency for site activities) and the United States Environmental Protection Agency (EPA) Region 3 (support agency), in consultation with the Maryland Department of the Environment (MDE), issue this document as part of the public participation responsibilities under Title 40 of the Code of Federal Regulations (CFR), Section 300.430(f)(2). Title 40 CFR 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 in the **Information Repository** for this site.

The Navy and EPA will jointly select the final remedy in consultation with MDE and may modify the preferred alternative or select another **remedy** after reviewing and considering all information and comments submitted during the public **comment period**. 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 included in the glossary are indicated in **bold print** the first time they appear in the Plan.

Mark Your Calendar for the Public Comment Period

Public Comment Period

January 29 to March 1, 2007

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

Wednesday, February 21, 2007 - 5:30 pm to 6:30 pm

Indian Head Senior Center
100 Cornwallis Square
Indian Head, MD

The public comment period will include a public meeting during which the Navy, EPA, and MDE will provide an overview of the site, previous investigative 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 location:

Naval Support Facility, Indian Head
General Library
Building 620 (The Crossroads)
101 Strauss Avenue, Indian Head, MD

Phone: 301-744-4747

Hours:
Mon-Fri 9:00 am – 5:30 pm
Sat/Sun closed

For access to the library, contact Shawn Jorgensen at
301-744-2263

Site History

Site 57 encompasses the area south of Building 292 located in the south-central portion of NSF-IH. The site includes areas of groundwater contamination between Building 292 and Mattawoman Creek to the southeast (Figure 2). Previous operations from the mid-1960s until 1989 involved the use of TCE for vapor degreasing and general cleaning. During the 1970s and 1980s, spent TCE was transferred from a tank inside the building to drums outside the building. The spent TCE meets the EPA definition of a hazardous waste. The drums were reportedly stored on a grass-covered area south of the building. Site 57 also includes Buildings 156 and 496, located approximately 150 feet southwest of Building 292, which were used to store ethyl ether (also known as diethyl ether).

NSF-IH was placed on the **National Priorities List (NPL)** in September 1995. Sites on the NPL are subject to the requirements of the **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)**, also known as **Superfund**, and the NCP.

Site Characteristics

Building 292 is located in a developed portion of NSF-IH in a valley that runs to the southeast for approximately 2,000 feet before it reaches Mattawoman Creek. The area around the building is mostly covered with asphalt and gravel, with some grassy areas. The valley walls are wooded. A road and portions of an abandoned railroad track are located in the valley. A storm sewer from the building area and an unnamed stream also flow down the valley to the creek. Building 292 is still active; however, TCE has not been used at the building since 1989.

Groundwater generally flows down the valley from the building area toward Mattawoman Creek. The depth to **shallow groundwater** ranges from 2.5 to 7 feet below the ground surface. Shallow groundwater discharges to the unnamed stream and Mattawoman Creek. A clay **aquitard** that acts as a confining layer is present at about 35 to 40 feet below the ground surface between the building area and the creek. The aquitard is expected to significantly limit movement of groundwater from the shallow aquifer to deeper aquifers.

Investigation History

Several investigations were conducted at Site 57 between 1994 and 2005. Below is a chronological description of the investigations with a focus on shallow groundwater. Contaminated soil was removed under a non-time-critical removal action conducted in 2006. There are no unacceptable risks to human health or the environment from exposure to surface water or sediment at the site.

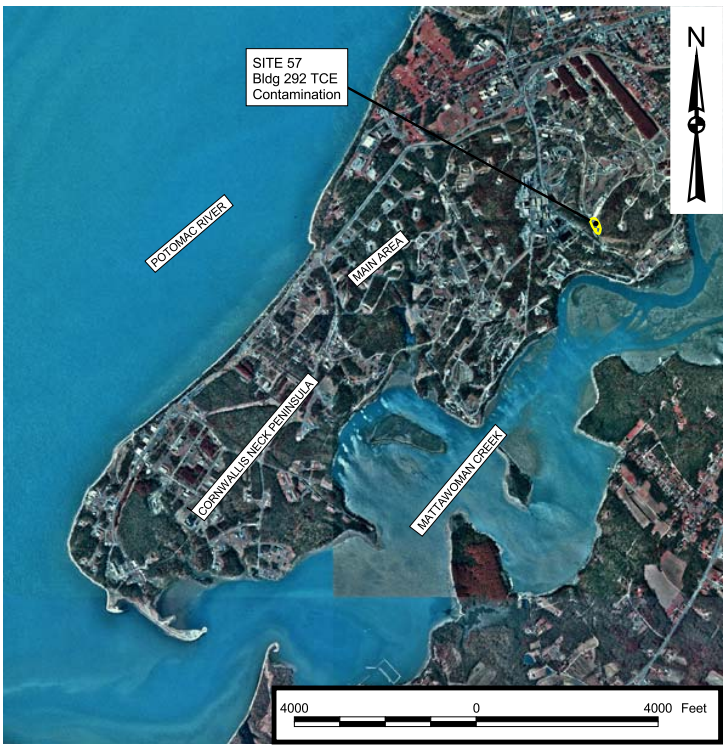

Figure 1. NSF-IH, Indian Head, Maryland

Sewer Sampling (1994) and Soil-Gas Survey (1995)

Samples from the storm sewer were collected in response to a solvent odor. TCE was detected in samples from manholes located near Building 292 and about 1,300 feet downstream of the building but was not detected upstream from the building.

A **soil-gas** survey was conducted in and around the former drum storage area. High concentrations of TCE were detected near where the drums were filled and stored. As a result, soil, groundwater, and sewer water samples were collected. TCE was detected at concentrations as high as 840,000 parts per billion (ppb) in a soil sample and 370,000 ppb in a groundwater sample. Lower concentrations of other **volatile organic compounds (VOCs)** and **TCE degradation products** including cis-1,2-dichloroethene (cDCE) and vinyl chloride (VC) were also detected.

Removal Action (1998)

In 1998, the Navy completed a removal action to address infiltration of TCE-contaminated groundwater into the storm sewer. A video survey of the storm sewer was conducted, and approximately 700 feet of storm sewer were relined to inhibit the accelerated migration of TCE.

RI (1998 and 1999)

Soil, shallow groundwater, surface water, and sediment samples were collected during the RI in 1998 and 1999. Groundwater monitoring wells were installed in the upper portion

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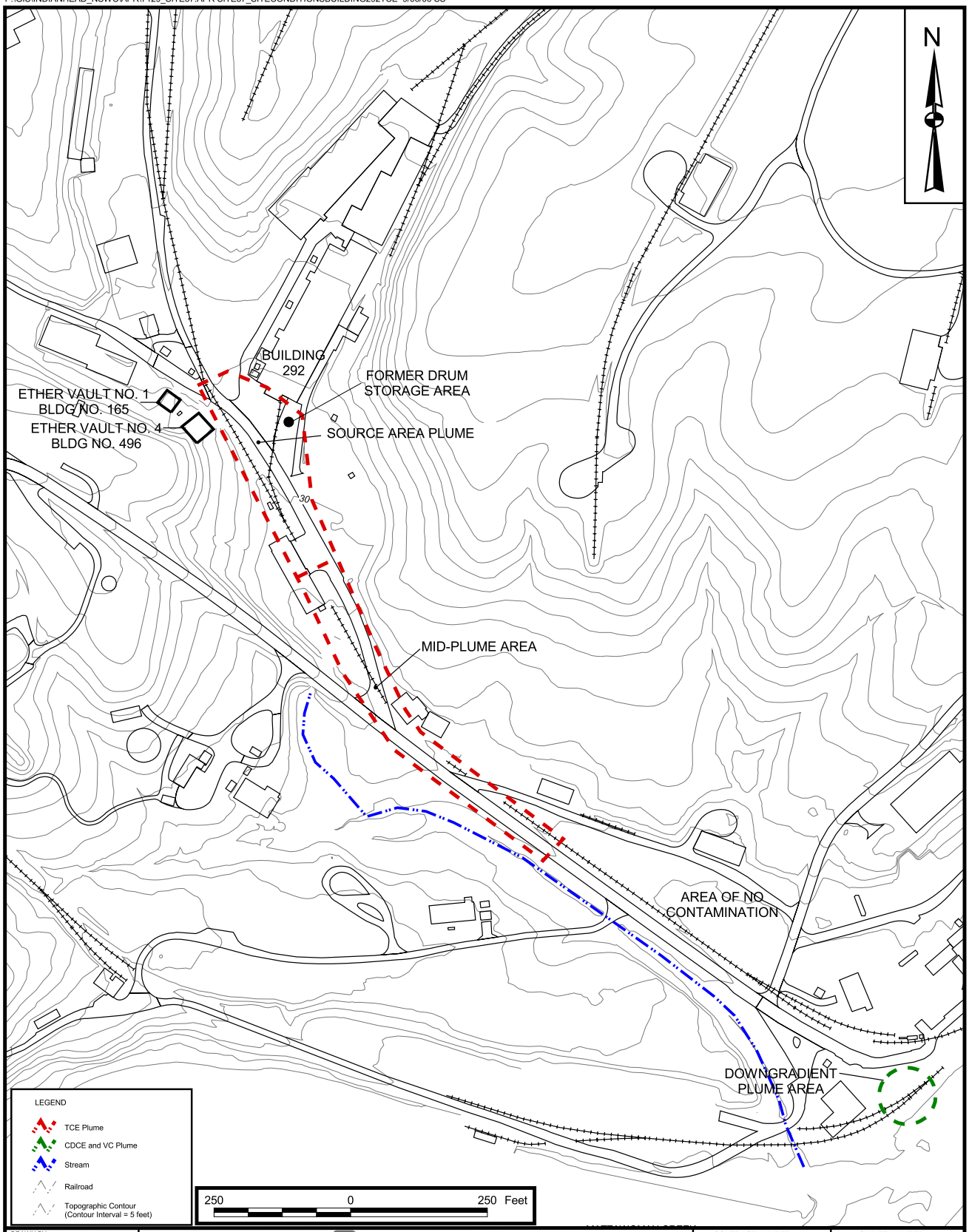

DRAWN BY K. PEILA DATE 2/28/06	Tetra Tech NUS, Inc.	CONTRACT NUMBER 2194	OWNER NUMBER 007
CHECKED BY K. TURNBULL DATE 9/06/06	SITE CONDITIONS MAP SITE 57 - BUILDING 292 TCE CONTAMINATION NAVAL SUPPORT FACILITY, INDIAN HEAD INDIAN HEAD, MARYLAND	APPROVED BY K. TURNBULL DATE 7/20/06	
COST/SCHEDULE-AREA		APPROVED BY — DATE —	
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Figure 2. Site 57 Map

(near the groundwater surface) and lower portion (above the aquitard) of the surficial **aquifer**. The following is a summary of the nature and extent of shallow groundwater contamination:

- Minimal organic contamination was present upgradient of Building 292.
- TCE and several other chlorinated VOCs were detected in downgradient samples. TCE and cDCE were typically detected with the greatest frequency and at the greatest concentrations. The maximum concentrations were generally found just south of Building 292. However, definitive patterns of contamination could not be established.
- The VOC diethyl ether was frequently detected. The greatest concentrations were found near a vault formerly used for ether storage.
- Bis(2-ethylhexyl)phthalate was the only **semivolatile organic compound (SVOC)** detected, and it was detected at only one location. Pesticides and polychlorinated biphenyls (PCBs) were not detected. Nitrocellulose was the only explosive detected, and it was detected at only one location.
- The detected concentrations of metals did not appear to vary greatly between upgradient and downgradient or upper and lower portions of the aquifer.

The RI concluded that chemicals have migrated from the area where drums were stored to downgradient shallow groundwater. The key **contaminants** were TCE, its degradation products cDCE and VC, and diethyl ether.

Pre-FS Investigation (2001)

The pre-FS investigation was conducted to fill data gaps, to refine the investigation team's understanding of the nature and extent of soil and groundwater contamination, and to provide additional information on subsurface physical characteristics. Temporary and permanent monitoring wells were installed, soil and groundwater samples were collected, and aquifer testing was conducted. Based on the results of the investigation, shallow groundwater was divided into five areas (Figure 2), as follows:

- The upgradient area is northwest of Building 292. Concentrations of chlorinated VOCs were generally less than 5 ppb, with a few exceptions.
- The source area begins near Building 292 and extends approximately 400 feet down the valley. The chemicals detected most frequently and at the greatest concentrations were TCE, cDCE, and diethyl ether. The maximum concentrations of TCE (12,000 ppb) and cDCE (620 ppb) were detected near where the drums of spent TCE were stored. The maximum concentration of diethyl ether (4,800 ppb) was detected near Building 496, which was an ether storage vault.
- The mid-plume area is southeast of the source area and extends approximately 500 feet down the valley. The chemicals detected in this area were similar to those detected in the source area but generally at lower concentrations. The maximum concentrations were as follows: TCE (480 ppb), cDCE (150 ppb), and diethyl ether (570 ppb).
- Farther southeast of the mid-plume area is a zone where minimal or no groundwater contamination was detected. This area extended approximately 600 feet down the valley from the mid-plume area.
- The downgradient area is near Mattawoman Creek. The extent of contamination in this area was not as well defined as in the source area and mid-plume area. Only one permanent monitoring well had been installed in this area at the time of this investigation. Chemicals detected at the greatest concentrations were cDCE (1,400 ppb) and VC (1,500 ppb). Concentrations of TCE (11 ppb) and diethyl ether (800 ppb) were lower.

In-Situ Bioremediation Pilot Study (2003)

The field-scale pilot study was conducted to evaluate **in-situ bioremediation** of TCE and other VOCs detected in groundwater. A hydrogen release compound was injected into the groundwater in the source area to establish conditions favorable for bioremediation that would reduce contaminant concentrations. Groundwater samples were collected for 6 months after the initial treatment.

Over the 6-month pilot study duration, TCE concentrations decreased by as much as 98 percent. The concentrations of the cDCE and VC increased, as expected, because they are intermediate degradation products of bioremediation of TCE. Under favorable conditions, the chemicals injected would continue to be effective beyond the pilot study duration and would result in further reduction of chemical concentrations, including cDCE and VC.

Comprehensive Groundwater Sampling (2004 and 2005)

Groundwater sampling was conducted in 2004 and 2005 to evaluate contaminant concentration trends and to further evaluate the zone where minimal or no groundwater contamination was detected in 2001. The previous comprehensive sampling was conducted in 2001, and concentrations could have changed since then because of natural conditions and/or the bioremediation pilot study. During the 2005 investigation, a video survey of a section of the storm sewer that was not relined in 1998 was conducted. Based on the results, shallow groundwater was divided into the same areas as for the 2001 investigation, as follows:

- Conditions in the upgradient area had not changed significantly since 2001.

- The southern limit of the source area plume had receded since 2001. The conditions also changed in the pilot study area. TCE concentrations decreased significantly where the bioremediation chemicals were injected; however, the maximum TCE concentration detected in 2005 (34,000 ppb) in a new sample collected just upgradient of the pilot study area was greater than the maximum TCE concentration detected in 2001. The TCE concentrations immediately upgradient and downgradient of this location were much lower (about 500 to 900 ppb). The addition of bioremediation chemicals caused localized increases in the concentrations of cDCE and VC in the pilot study area. Concentrations of TCE, cDCE, and VC decreased from 2001 levels downgradient of the pilot study area. In general, contaminant concentrations were greater in the upper portion of the aquifer than in the lower portion. Field testing did not indicate the presence of **dense non-aqueous-phase liquid (DNAPL)** in the source area; however, it may be present based on the high TCE concentration in the sample collected just upgradient of the pilot study area.

- The chemicals detected in the mid-plume area were similar to those detected in the source area but generally at lesser concentrations. The chemical concentrations decreased slightly from those detected in 2001. Similar concentrations were detected in the upper and lower portions of the aquifer.

- Additional wells were installed downgradient of the mid-plume area where minimal groundwater contamination was detected in 2001. The results from the 2004 and 2005 sampling indicated that there is still a relatively large area of uncontaminated groundwater between the mid-plume area and the downgradient area discussed below.

- In 2001, the main contaminants in the downgradient area were cDCE and VC, which were only detected at one location. Additional wells were installed in this area in 2005; however, cDCE and VC were not detected in these wells. Concentrations decreased since 2001. The concentration of cDCE decreased to approximately 200 ppb in 2004 and 2005. Concentrations of VC decreased to 850 ppb in 2004 and to 400 ppb in 2005.

FS (2006)

The purpose of the FS was to develop and evaluate potential remedial alternatives to address groundwater contamination. The development of alternatives required identifying the objectives of the remedial action, identifying potential technologies to satisfy the objectives, screening of technologies to eliminate those that would not be effective or implementable, assembling effective and implementable technologies into remedial alternatives, and evaluating the alternatives.

Principal Threats

Based on the results of the investigations, studies, and sampling conducted to date, the shallow groundwater at Site 57 does not constitute a principal threat waste as defined by the NCP. 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.

Scope and Role of the Action

The Proposed Plan addresses the evaluation of the preferred alternative for shallow groundwater at Site 57. It does not include or directly impact any other sites at NSF-IH. In 2006, contaminated soil was excavated from Site 57 and transported to an off-site landfill for disposal under a non-time-critical removal action. There are no remaining risks to human health or the environment associated with contaminated soil.

The purpose of the Proposed Plan is to present the remedial alternatives considered and the preferred alternative that the Navy and EPA, in consultation with MDE and taking into account public input, propose to select to prevent unacceptable exposure to shallow groundwater contaminants.

Summary of Site Risks

As part of the RI/FS, the Navy conducted a **baseline risk assessment** to determine the current and future effects of detected chemicals on human health and the environment. It is the current judgment of the Navy, EPA, and MDE that the preferred alternative identified in this Proposed Plan, or one of the other acceptable remedial alternatives identified in this Proposed Plan, is necessary to protect human health or welfare or the environment from actual or threatened releases of **hazardous substances** into the environment at Site 57.

Human Health Risks

The human health risk assessment assumed industrial and hypothetical residential land use and hypothetical use of shallow groundwater as a source of drinking water. The risk assessment conducted for the RI included the following receptors and exposure pathways:

- Current and future full-time employees exposed to surface soil.

- Future construction workers exposed to surface and subsurface soil, shallow groundwater, surface water, and sediment.

- Hypothetical future residents exposed to surface and subsurface soil, shallow groundwater, surface water, and sediment.

There were no unacceptable risks to human receptors from exposure to surface water and sediment. The soil removal action eliminated unacceptable risks to human health from exposure to surface and subsurface soil. The remainder of this section only discusses risks from exposure to shallow groundwater.

An incremental cancer risk is estimated for a potential cancer-causing chemical based on how much of the chemical is present and its strength as a cancer-causing agent. Estimated potential site-related risks greater than 1.0E-4 (1 in 10,000) are considered unacceptable. At this risk level, the risk that a male will get cancer would increase from 50 percent (natural lifetime average cancer risk for a male without site-related exposure) to a maximum of 50.01 percent. In addition, the risk that a female will get cancer would increase from 33 percent (natural lifetime average cancer risk for a female without site-related exposure) to 33.01 percent. The only unacceptable estimated incremental cancer risks at Site 57 were for hypothetical future child residents (1.2E-3 or about 1 in 1,000) and hypothetical future adult residents (2.3E-3 or about 2 in 1,000). These potential risks were estimated based on exposure to the maximum concentrations of TCE and VC in shallow groundwater and use of shallow groundwater as a source of drinking water. Future residential use is unlikely for Site 57.

The concentrations of chemicals found at Site 57 producing potential harmful effects other than cancer were compared to reference concentrations (highest concentrations not causing harmful effects) to calculate a **Hazard Quotient (HQ)**. For example, if the chemical concentration results in a daily intake of 250 ppb per day and the reference concentration is 100 ppb per day, the HQ would be 2.5. An HQ greater than 1.0 (a conservative benchmark) is considered to be unacceptable. The only unacceptable noncancer risks at Site 57 were for hypothetical future child residents (HQ of 12) and hypothetical future adult residents (HQ of 5.5). These estimated potential risks were based on exposure to the maximum concentrations of cDCE, diethyl ether, and TCE in shallow groundwater and use of shallow groundwater as a source of drinking water.

These risk assessments were based on current reasonable maximum exposure scenarios and were developed by taking into account various conservative assumptions about the frequency and duration of an individual's exposure to shallow groundwater and the toxicity of the chemicals detected in shallow groundwater.

Ecological Risks

Potential risks to ecological receptors from exposure to surface soil were eliminated with the removal of contaminated soil. There were no unacceptable risks to ecological receptors from exposure to surface water and sediment in the unnamed stream or Mattawoman Creek. Ecological receptors cannot be directly exposed to shallow groundwater.

There are no endangered species or critical habitats at Site 57.

Remedial Action Objectives

The remedial action objectives (RAOs) for shallow groundwater at Site 57 are as follows:

- Prevent exposure to groundwater contaminated at concentrations greater than preliminary remediation goals (PRGs) (as explained below).
- Prevent or minimize further migration of the shallow groundwater contaminant plume.
- Restore groundwater to its expected beneficial use.

Summary of Remedial Alternatives

Remedial alternatives for shallow groundwater at Site 57 are presented below. More detailed descriptions of the alternatives can be found in the FS Report. The preferred alternative is Alternative 3 – In-Situ Bioremediation.

Common Elements

All the alternatives, except the no-action alternative, include **land use controls (LUCs)** to eliminate or reduce exposure pathways. Use of shallow groundwater as a source of **potable water** would not be permitted until PRGs are achieved. The PRGs are based on **Maximum Contaminant Levels (MCLs)** and/or concentrations that do not pose an unacceptable risk. A LUC **Remedial Design** would need to be prepared to document the restrictions. Consistent with expectations set out in the Superfund regulations, none of the remedies rely exclusively on LUCs to achieve protectiveness.

For all alternatives except the no-action alternative, shallow groundwater monitoring in accordance with an approved long-term monitoring plan would be conducted to ensure the effectiveness of the remedy and to confirm that groundwater contaminant migration is not occurring at unacceptable concentrations. Additional monitoring wells may be installed, as needed.

At least every 5 years, a site review would be conducted to evaluate the results from shallow groundwater monitoring, to evaluate the site status, and to determine whether further action is necessary. The site review would be required for all alternatives, except the no-action alternative, because they would allow contaminants to remain at the site in excess of

levels that allow for unlimited use and unrestricted exposure until PRGs are attained.

The times to achieve RAOs were estimated assuming that significant amounts of DNAPL are not present. If DNAPL is present at the site at significant concentrations, it may act as a continuing source of groundwater contamination and could result in longer times to achieve RAOs. The area where contaminated soil was removed in 2006 is where most of the DNAPL would have been expected to be found. However, an unknown amount of DNAPL may remain.

Alternative 1 – No Action

Estimated Capital Cost: $0
Estimated Annual Operation and Maintenance (O&M) Cost: $0
Estimated ***Net Present Worth****: $0*
Estimated Construction Timeframe: None

Regulations governing the Superfund program require that the no-action alternative be evaluated solely for the purpose of establishing a baseline for comparison. Under this alternative, the Navy would take no action at the site to prevent exposure to shallow groundwater contamination.

Alternative 2 – Monitored Natural Attenuation

Estimated Capital Cost: $9,700
Estimated Annual O&M Cost: $45,000 plus $15,000 every 5 years
Estimated Net Present Worth: $604,000
Estimated Construction Timeframe: 1 month
Estimated Time to Achieve RAOs: 70 years

This alternative would utilize natural physical, chemical, and biological processes (i.e., natural attenuation) to reduce contaminant concentrations in shallow groundwater.

Alternative 3 – In-Situ Bioremediation

Estimated Capital Cost: $541,000 plus $182,000 for retreatment of the source area in Year 3
Estimated Annual O&M Cost: $54,000 (Years 1 and 2), $53,000 (Years 3 to 6), $50,000 (Years 7 to 30) plus $15,000 every 5 years
Estimated Net Present Worth: $1,358,000
Estimated Construction Timeframe: 2 months
Estimated Time to Achieve RAOs: 2 years for the downgradient area, 6 years for the source area, and 30 years for the mid-plume area

This alternative would use a combination of in-situ bioremediation and natural attenuation to treat contaminated shallow groundwater. Chemicals and/or nutrients would be injected into the shallow groundwater in the source area near Building 292 and the downgradient area near Mattawoman Creek. The chemicals and nutrients would stimulate naturally occurring bacteria to increase the rate of bioremediation. The addition of specialized bacteria may also be needed. Contaminated groundwater in the mid-plume area, which is located between the source and downgradient areas, would be allowed to naturally attenuate. It is anticipated that a second injection event would be needed in the source area 3 years after the initial injection.

Alternative 4 – Permeable Reactive Barrier

Estimated Capital Cost: $782,000 plus $334,000 for barrier replacement in Year 15
Estimated Annual O&M Cost: $31,500 plus $15,000 every 5 years
Estimated Net Present Worth: $1,326,000
Estimated Construction Timeframe: 3 months
Estimated Time to Achieve RAOs: 30 years

This alternative would use a combination of a permeable reactive barrier (PRB) and natural attenuation to treat contaminated shallow groundwater. A trench would be excavated near the downgradient portion of the mid-plume area and would extend down to the aquitard. The trench would be filled with a reactive medium such as granular iron to the top of the shallow aquifer. The area between the top of the shallow aquifer and the ground surface would be backfilled with soil, and the excavated area would be restored to existing conditions. As groundwater from the source area and mid-plume area flows through the PRB, a chemical reaction would occur through which the groundwater contaminants are converted into nontoxic byproducts. Contaminated groundwater in the downgradient area near Mattawoman Creek would be allowed to naturally attenuate. It is unclear exactly how long a PRB may be expected to retain its performance; therefore, it was assumed that the reactive medium would need to be replaced after 15 years. Other chemicals or materials such as granular activated carbon may also be effective as the reactive media.

Alternative 5 – Extraction and Treatment

Estimated Capital Cost: $470,000
Estimated Annual O&M Cost: $79,000 plus $15,000 every 5 years
Estimated Net Present Worth: $1,308,000
Estimated Construction Timeframe: 5 months
Estimated Time to Achieve RAOs: 19 years

Under this alternative, groundwater extraction wells would be placed at six locations. The individual extraction rates would range from 5 to 20 gallons per minute (gpm), with a combined pumping rate of approximately 75 gpm. The extraction well locations were selected to capture the entire area of contaminated shallow groundwater in the source, mid-plume, and downgradient areas. Once extracted, the groundwater would be treated on site using **air stripping** and discharged to Mattawoman Creek. Based on the anticipated contaminant

concentrations and flow rate, treatment of air emissions from the air stripper would not be required.

Evaluation of Alternatives

Nine criteria are used to evaluate remedial alternatives individually and in comparison to each other to select a remedy. This section of the Proposed Plan summarizes the relative performance of each alternative with respect to the nine criteria, noting how each compares to the other options under consideration. The detailed analysis of alternatives can be found in the FS Report.

Threshold Criteria

Overall Protection of Human Health and the Environment

This criterion determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through LUCs, engineering controls, or treatment.

All the alternatives, except Alternative 1 (No Action), would provide adequate protection of human health and the environment by eliminating, reducing, or controlling risk through removal, treatment, and/or LUCs. Alternative 3 (In-Situ Bioremediation) and Alternative 4 (PRB) would protect human health by treating some areas of contaminated groundwater in situ and allowing other areas to naturally attenuate. Alternative 5 (Extraction and Treatment) would protect human health by treating the entire area of groundwater contamination. The entire area of groundwater contamination would be allowed to naturally attenuate under Alternative 2.

Alternatives 2, 3, 4, and 5 include groundwater monitoring to confirm the effectiveness of the remedial action, to determine whether contaminants are migrating at unacceptable concentrations, and to evaluate whether future action is required. Restrictions on the use of shallow groundwater as a source of potable water would be imposed for these alternatives until the PRGs are attained.

Because the no-action alternative would not provide adequate protection, it was eliminated from consideration under the remaining eight criteria.

Compliance with Applicable or Relevant and Appropriate Requirements

This criterion evaluates whether the alternative meets federal and state environmental laws, regulations, or other requirements that pertain to the site.

Alternatives 2, 3, 4, and 5 would meet their respective **Applicable or Relevant and Appropriate Requirements (ARARs)** from federal and state safe drinking water regulations, including MCLs and risk-based concentrations.

Primary Balancing Criteria

Long-Term Effectiveness and Permanence

This criterion considers the ability of an alternative to maintain protection of human health and the environment over time.

Because Alternatives 2, 3, 4, and 5 involve some form of active or passive groundwater treatment, they are expected to be effective at decreasing shallow groundwater contaminant concentrations over the long term. The recent soil removal action may have removed some DNAPL; any DNAPL potentially remaining could act as a continuing source of groundwater contamination.

The 2003 pilot study results indicated large reductions in TCE concentrations; however, TCE and its degradation products cDCE and VC remain at concentrations greater than PRGs. It is anticipated that implementation of Alternative 3 would remove the remaining TCE and possibly TCE degradation products. The addition of the proper bacteria to enhance the removal of cDCE and VC could enhance the effectiveness of this alternative.

A treatability study would be needed for Alternative 4 to confirm the long-term effectiveness with respect to the contaminants detected in shallow groundwater.

For Alternative 5, there may be a point at which contaminant concentrations approach a constant value, and contamination is no longer being removed at a significant rate. If a point of ineffectiveness is reached before PRGs are attained, another remedial approach may be required.

For Alternatives 2, 3, 4, and 5, monitoring would be effective in determining the effectiveness of treatment, the rate of contaminant removal, and whether future action is required. These alternatives would rely on LUCs to control exposure to contaminated groundwater until PRGs are attained.

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

This criterion evaluates an alternative's use of treatment to reduce harmful effects of principle contaminants, their ability to move in the environment, or the amount of contamination present.

Alternatives 3 and 4 include in-situ biological treatment and a PRB, respectively, to reduce the toxicity of contaminants in shallow groundwater. Alternative 5 includes air stripping to reduce the toxicity of contaminants in shallow groundwater prior to discharge to surface water.

Alternative 2 does not include active treatment to reduce toxicity, mobility, or volume of contaminants but relies on natural biological, chemical, and physical processes to reduce the toxicity of shallow groundwater contaminants.

Short-Term Effectiveness

This criterion considers the length of time needed to implement an alternative and to achieve PRGs. It also considers the risks posed to the community, workers, and environment during implementation (construction).

No risks to the community, on-site workers, or the environment are anticipated for Alternatives 2, 3, 4, and 5. However, activities associated with injection of bioremediation chemicals (Alternative 3), construction of the PRB (Alternative 4), and installation of groundwater extraction wells and associated piping (Alternative 5) would have short-term impacts on local traffic near the site.

Alternative 2 could be implemented within 1 month. The estimated construction durations of Alternatives 3, 4, and 5 are 2 months, 3 months, and 5 months, respectively.

For Alternative 2, groundwater modeling indicated that TCE concentrations could be reduced to PRGs in approximately 70 years. For Alternative 3, bioremediation chemicals would be injected at Year 0 and Year 3, and it could take several years following the second application to attain PRGs. The addition of bacteria to enhance biodegradation could decrease the time to attain PRGs. The time to attain PRGs under Alternative 4 cannot be estimated without additional studies; however, 30 years was assumed for estimating the net present worth. For Alternative 5, groundwater modeling indicated that TCE concentrations would be reduced to PRGs in approximately 19 years. For all alternatives, any DNAPL potentially present following the 2006 soil removal action could be an ongoing source of groundwater contamination that could affect the time needed to attain PRGs.

Implementability

This criterion considers the technical and administrative feasibility of implementing an alternative, including factors such as the relative availability of goods and services.

All technologies are readily available and generally proven. The groundwater use restrictions under Alternatives 2, 3, 4, and 5 can be strictly enforced because the site is located within a military facility.

Care would need to be taken during implementation of Alternatives 3, 4, and 5 because there are underground utilities present, especially near Building 292.

For Alternative 5, the state would need to develop contaminant concentration limits for the discharge of treated groundwater to Mattawoman Creek.

Cost

This criterion includes capital costs, annual O&M costs, and the present-worth cost. Present-worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.

The present-worth costs for Alternatives 3, 4, and 5 are similar and range from $1.31 to $1.36 million. The present-worth cost for Alternative 2 ($0.6 million) is less than one-half these costs.

Modifying Criteria

State Acceptance

At this time, MDE concurs with the preferred alternative; however, state acceptance may be re-evaluated based on comments received during the public comment period and will be described in the ROD for the site.

Community Acceptance

Community acceptance of the preferred alternative will be evaluated after the public comment period and will be described in the ROD for the site.

Summary of the Preferred Alternative

The preferred alternative for cleaning up shallow groundwater at Site 57 is Alternative 3, In-Situ Bioremediation. The preferred alternative was selected over the other alternatives because it is expected to achieve substantial and long-term risk reduction through a combination of treatment, LUCs, and monitoring.

Based on information currently available, the Navy and EPA believe, with concurrence from MDE, that the preferred alternative meets the threshold criteria and provides the best balance of trade-offs with respect to the primary balancing criteria. The Navy expects the preferred alternative to satisfy the following statutory requirements under CERCLA Section 121(b): be protective of human health and the environment, comply with ARARs, be cost effective, and utilize permanent solutions and alternative treatment technologies to the maximum extent practicable.

The preferred alternative can change in response to public comments or new information.

Community Participation

A Restoration Advisory Board (RAB) made up of community members and Navy, federal, and state officials meets several times per year. The RAB is designed to act as the focal point for the exchange of information between the Navy and the local community regarding restoration activities.

The Navy, EPA, and MDE also provide information regarding the cleanup of sites at NSF-IH to the public through public meetings, the Information Repository, and announcements in the *Maryland Independent*. The Navy, EPA, and MDE encourage the public to gain a more comprehensive understanding of the site and the Superfund activities that have been conducted.

The 30-day public comment period is January 29 to March 1, 2007. The public meeting will be held on February 21, 2007 from 5:30 pm to 6:30 pm at the Indian Head Senior Center, 100 Cornwallis Square, Indian Head, Maryland. The location of the Information Repository is provided on Page 1 of this Proposed Plan.

Minutes of the public meeting will be made available to the public through the Information Repository. A **Responsiveness Summary** will be prepared at the conclusion of the comment period to summarize significant comments submitted to the Navy during the comment period. The Responsiveness Summary will also be included in the ROD for Site 57.

For further information, please contact any of the following:

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Written comments can be submitted via mail, e-mail, or fax and should be sent to Mr. Shawn Jorgensen.

Glossary of Terms

Air stripping: A treatment system that removes VOCs from contaminated groundwater by forcing an airstream through the water and causing the VOCs to evaporate and be discharged to the atmosphere.

Applicable or Relevant and Appropriate Requirements (ARARs): The federal and state environmental laws that a selected remedy must meet. These requirements may vary among sites and remedial alternatives.

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

Aquitard: A geological formation that may contain groundwater but is not capable of transmitting significant quantities of it under normal hydraulic gradients. An aquitard could prevent or minimize the vertical migration of contaminants to deeper aquifers.

Baseline risk assessment: A study conducted as a supplement to an RI to determine the risks posed to human health and/or the environment.

Bioremediation: A treatment technology that uses bacteria to consume organic compounds. The bacteria can occur naturally in the subsurface, chemicals and/or nutrients can be added to increase the activity of naturally occurring bacteria, or bacteria can be added to the subsurface.

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 documents in the Information Repository and to review and comment on the Proposed Plan.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): A federal law passed in 1980 and modified in 1986 by the **Superfund Amendments and Reauthorization Act (SARA)**. CERCLA established prohibitions and requirements concerning closed or abandoned hazardous waste sites and created the liability scheme for those responsible for releases of hazardous substances at these sites. An important provision of SARA included federal facilities in the CERCLA process.

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

Dense non-aqueous-phase liquid (DNAPL): Non-aqueous phase liquids such as TCE with a specific gravity greater than 1.0 that can sink through the water column until they reach a confining layer (aquitard). It may take a long time for DNAPL to reach a confining layer because it may adhere to soil particles within the aquifer above the confining layer. It is difficult to remove DNAPL, and it can be an ongoing source of groundwater contamination.

Feasibility Study (FS): See Remedial Investigation/Feasibility Study.

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

Hazard Quotient (HQ): The ratio of the daily intake of a chemical from on-site exposure divided by the reference dose for that chemical. The reference dose represents the highest daily intake of a chemical that is not expected to cause adverse health effects.

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

Information Repository: A file containing information, technical reports, and reference documents regarding an NPL site.

In-Situ: In its natural or original place without being removed from the subsurface.

Land use controls (LUCs): Legal and administrative measures that restrict land use to protect human health and the environment. LUCs ensure that future land uses and on-site activities do not impair the effectiveness of a remedy or expose people to contamination in a manner that poses an unacceptable risk. LUCs are included in the NSF-IH Geographic Information System (GIS).

Maximum Contaminant Levels (MCLs): National standards for acceptable levels of contaminants in public drinking water systems.

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

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

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

Potable water: Water that is safe for drinking and cooking.

Preferred alternative: The remedial action proposed by the Navy and EPA, with state concurrence, to address unacceptable risks to human health and the environment at a CERCLA site.

Proposed Plan: A public participation requirement of CERCLA used to facilitate public involvement in the remedy selection process. The document presents the lead agency's preliminary recommendation concerning how best to address contamination at the site, presents alternatives that were evaluated in the FS, and explains the reasons the lead agency recommends the preferred alternative. The document must actively solicit public review and comment on all alternatives under consideration.

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

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

Remedial Design: The technical analysis and procedures that follow the selection of a remedy for a site and that result in a detailed set of plans and specifications for implementation of the remedial action.

Remedial Investigation/Feasibility Study (RI/FS): Investigations and analytical studies usually performed at a site 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, to establish criteria for cleaning up a site, to identify and screen alternatives for remedial action, and to analyze in detail the technology and costs of the alternatives.

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

Remedy: Action taken to deal with a release or threatened release of hazardous substances that could affect public health or the environment.

Responsiveness Summary: A summary of significant public comments received 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.

Semivolatile organic compound (SVOC): A chemical compound that evaporates slowly at normal temperatures and pressures.

Shallow groundwater: Groundwater that is found just below the ground surface and is not confined or covered by an impermeable layer such as clay.

Soil gas: Gaseous elements and compounds in the small spaces between particles of the earth and soil. Such gases can be moved or driven out under pressure.

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 list, determining their priority, and conducting and/or supervising cleanup and other remedial actions.

Superfund Amendments and Reauthorization Act (SARA): The public law enacted to 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 to the same extent as any non-government entity.

TCE degradation products: If natural conditions in groundwater are suitable or conditions are made suitable by adding special additives, TCE, which has three chlorine atoms, can degrade to other chemical compounds with two, one, or zero chlorine atoms. Key TCE degradation products detected in shallow groundwater at Site 57 are cis-1,2-dichloroethene (cDCE) and vinyl chloride (VC).

Volatile Organic Compound (VOC): A chemical compound that evaporates readily at normal temperatures and pressures.

Please print or type your comments for Site 57 here

Mark Your Calendar for the Public Comment Period

Public Comment Period

January 29 to March 1, 2007

Submit Written Comments

Written comments must be postmarked no later than the last day of the public comment period, which is March 1, 2007. Based on the public comments or on any new information obtained, the Navy and EPA may modify the preferred alternative. The insert page of this Proposed Plan may be used to provide comments, although 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

Wednesday, February 21, 2007
5:30 pm to 6:30 pm

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 investigaton findings, remedial alternatives evaluated, and the preferred alternative; answer questions; and accept public comments on the Proposed Plan.

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