

**Proposed Remedial
Action Plan
For
Site 1 Groundwater (OU 3)**

**Naval Air Station
Joint Reserve Base
Willow Grove, Pennsylvania**



**Naval Facilities Engineering Command
Mid-Atlantic**

**Contract Number N62472-03-D-0057
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April 2008



TETRA TECH

Department of the Navy

Proposed Remedial Action Plan for Site 1 Groundwater (OU 3)

**NAS JRB Willow Grove
Willow Grove, Pennsylvania**



APRIL 2008

NAVY ANNOUNCES PROPOSED REMEDIAL ACTION PLAN

The purpose of this **Proposed Plan** is to present the preferred alternative for an **interim remedial action** at Site 1 Groundwater – The Privet Road Compound at the Naval Air Station Joint Reserve Base (NAS JRB) Willow Grove in Horsham Township, Pennsylvania. The Site 1 groundwater has been designated Operable Unit (OU) 3. This Proposed Plan recommends that limited action, including implementation of institutional controls and periodic groundwater monitoring in conjunction with a review of site conditions and risks every five years, be taken as an interim measure to address risks associated with the groundwater located beneath Site 1. This action is being proposed as an interim action while EPA investigates the off-site source of the groundwater contamination. It is anticipated that an action will be taken to address the off-site source of contamination to the groundwater. Once this is accomplished, a final ROD will be issued addressing the groundwater at Site 1.

Background information for the site and the rationale for choosing the preferred alternative are included in this plan.

This Proposed Plan is issued by the Navy, the lead agency for the **Installation Restoration**

Program (IRP) and Superfund activities at the NAS JRB Willow Grove facility, and by the U.S. Environmental Protection Agency (EPA). The Navy and EPA, in consultation with the Pennsylvania Department of Environmental Protection (PADEP), a support agency for Superfund activities at NAS JRB Willow Grove, will make a final decision on the interim remedial approach for Site 1 after reviewing and considering all information submitted during the

PUBLIC COMMENT PERIOD:

April 16 - May 30, 2008

The Navy and EPA will accept written comments on the Proposed Plan during the public comment period.

PUBLIC MEETING

A public meeting to discuss this Proposed Plan will be held on **Wednesday, April 30, 2008 at 6:00 PM** in the Community Meeting Room at the Horsham Township Public Library, 435 Babylon Road, Willow Grove, Pennsylvania. For directions to the Horsham Township Library, please see the Library's Web site at <http://htl.mclinc.org/index.html> or call them at (215) 443-2609. The meeting date and location will also be published in the *Intelligencer* newspaper.

45-day **Public Comment Period**. The Navy and EPA may modify the preferred interim remedy in the Proposed Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on the interim remedy presented in this Proposed Plan.

The Navy is issuing this Proposed Plan as part of its public participation responsibilities under Sections 113(k), 117(a), and 121(f) of the **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)** and 40 C.F.R. § 300.430(f)(2) of the **National Oil and Hazardous Substances Pollution Contingency Plan (NCP)**.

This Proposed Plan summarizes the findings of the Site 1 – Privet Road Compound **Remedial Investigation (RI)**, outlines the alternatives presented in the **Focused Feasibility Study (FFS)**, identifies the remedial alternative preferred by the Navy and EPA, and explains the reasons for this preference. In addition, this Proposed Plan explains how the public can participate in the decision-making process and provides addresses for the appropriate Navy and EPA contacts.

The Proposed Plan also summarizes information from other documents that are contained in the **Administrative Record** file for this site. The Administrative Record file is available at the Navy's **Information Repository** located at the Horsham Township Public Library, 435 Babylon Road, Horsham, Pennsylvania. The Navy invites the public to review the available materials and to comment on this Proposed Plan during the public comment period.

NOTE: A glossary of relevant technical and regulatory terms is provided at the end of this Proposed Plan. Terms included in the Glossary are initially indicated in **boldface** within the Proposed Plan.

SITE BACKGROUND

NAS JRB Willow Grove is located in Horsham Township, Montgomery County in southeastern Pennsylvania, approximately 20 miles north of the city of Philadelphia. The Base occupies approximately 1,000 acres of flat to slightly rolling terrain and is generally bounded by State Route 611 to the east, State Route 463 to the southwest and Keith Valley Road to the north (Figure 1).

The Privet Road Compound lies within a heavily developed section of the NAS JRB Willow Grove and is located near the eastern boundary of the Base, adjacent to Privet Road between the bowling alley and Johnson Street (Figure 2). The Air Force Reserve Station (ARS) CERCLA site SD-4 (Aircraft Wash Rack/Trickling Filter) lies several hundred feet west of the Privet Road Compound. Although the EPA provides regulatory oversight to the ARS and the NAS JRB Willow Grove as a common Superfund site, the ARS is a separate Department of Defense installation that is operated by the Air Force, and is not part of NAS JRB Willow Grove.

The Privet Road Compound served as a waste transfer station between 1967 and 1975, and was used as an open disposal area where appreciable quantities of waste were burned and buried. The compound is currently a grass covered lot that is approximately ½ acre in size located northeast of the Base bowling alley. The suspected former waste handling area covered more than 2 acres, including the present location of the bowling alley and the parking area. Materials reported to have been disposed at the site include general refuse, sewage sludge, oil and grease emulsion, paint wastes, **Volatile Organic Compounds (VOCs)**, and **Polychlorinated biphenyl (PCB)** fluids from transformers.

NAS JRB Willow Grove obtains its potable water from two deep water supply wells that are located east of Site 1, on the opposite side of Privet Road (Figure 2). The water produced from these wells contains VOCs at concentrations above **Maximum Contaminant Levels (MCLs)**. VOCs are removed by the Base's water treatment (air-stripper) facility. The groundwater VOC treatment system was installed by the Navy to treat contaminated groundwater before distribution and use by Base personnel for potable supplies and fire fighting, and is not part of any CERCLA action.

Environmental investigations at Site 1 include the **Initial Assessment Study (IAS)**, the **Site Inspection (SI)**, the first and second phases of the RI, additional post-RI investigation of the groundwater, and a soil removal action. The IAS was a Base-wide preliminary study that assessed 17 sites from 1984 through 1988. Based on these findings, SI work was performed on 12 of the 17 sites, including Site 1 in 1989. Remedial Investigation/**Feasibility Study (RI/FS)** activities have subsequently been completed or are underway at eight sites, of which four sites are on Air Force property and four sites are on Navy property, including Site 1. The Phase I RI, performed in 1991, characterized the physical and chemical nature of the four Navy sites and identified data gaps requiring further study. Recommendations for further investigation led to the Phase II activities at Site 1 that began in 1996 and have been reported in the Phase II RI report and Addenda RI reports through 2008. A Focused FS for Site 1 Groundwater was completed in 2008.

Based on the Site 1 Soil Action Memorandum, the Navy performed an interim removal action (IRM) in 1999 for soils contaminated with PCBs. The soils were excavated and removed from a former transformer storage area that was 70 feet by 155 feet in size, and from six nearby smaller areas of

contamination located adjacent to the Privet Road bowling alley. The groundwater sampling program conducted for the RI indicated that the PCBs were limited to the soil and that they did not impact the Site 1 groundwater.

SITE CHARACTERISTICS

The principal contaminants associated with Site 1 groundwater are the VOCs tetrachloroethene (PCE) and trichloroethene (TCE). VOC compounds occur chiefly in the deep monitoring wells and are detected infrequently and at lower concentrations in the shallow monitoring wells. VOCs are absent in the Site 1 soil. An investigation of the Base supply wells conducted by the United States Geological Survey concluded that the deeper intervals of both Navy supply wells contained significantly more VOCs than the shallower intervals. The lack of VOCs in the soil and their low concentrations in the shallow groundwater indicate that the Privet Road Compound is not a significant source of the VOCs detected in Site 1 groundwater and in the Navy supply wells.

The Navy searched for the primary source of the VOCs during the RI by installing monitoring wells at various depths throughout Site 1 and adjacent areas, by determining the directions of groundwater flow, by researching the land use history of all Base property in the vicinity of Site 1, and by reviewing the publicly available environmental data for off-Base properties located nearby along Route 611.

The RI concluded that the hydrogeology of the Site 1 area is complex. No source could be identified for the low-level groundwater VOC concentrations found in shallow groundwater on Navy property in the vicinity of Site 1. These low level concentrations are limited to isolated detections in shallow groundwater and do not represent definable plumes. None of these

isolated detections could account for the levels of contamination detected in the deeper Site 1 monitoring wells or in the Base supply wells. In addition, no significant concentrations of VOCs were found in soil that could have acted as a source of the VOC contaminants in groundwater.

The RI concluded that the most significant groundwater contamination detected at Site 1 does not originate on the Navy Base. An off-Base property located east of Route 611 (near the former Kellett Aircraft manufacturing facility) was identified as the probable source area and origination point for the contaminant plume. From there, the plume travels with groundwater and flows onto the Base property through a combination of both natural flow conditions and through the pumping effects of the Navy supply wells, which capture some of the off-Base groundwater and draw it onto the Base property.

EPA considers the Air Force Wash Rack (ARS Site SD-4) as an additional potential source to VOC contamination beneath Site 1. PCE and TCE are detected in SD-4 groundwater monitoring wells. The Air Force is currently conducting additional RI work to determine the full nature and extent of contamination at Site SD-4.

SCOPE AND ROLE

The four Navy IRP sites at NAS JRB Willow Grove include the following sites and operable units: Site 1 - Privet Road Compound Area (OU 1 for Soil and OU 3 for Groundwater), Site 2 - Antenna Field Landfill (OU 5 for Soil and OU 9 for Groundwater), Site 3 - Ninth Street landfill (OU 6 for Soil and OU 10 for Groundwater), and Site 5 - Fire Training Area (OU 2 for Groundwater and OU 4 for Soil). Remedial actions have been selected and **Records of Decision (RODs)** have been issued for two of these eight operable units. The ROD for OU 1 (Site 1 soil) was signed in September 2006, and

the ROD for OU 4 (Site 5 Soil) was signed in September 2007. This PRAP addresses the proposed interim remedial action for OU 3 (Site 1 groundwater). This action is being proposed as an interim action while EPA investigates the off-site source of the groundwater contamination. It is anticipated that an action will be taken to address the off-site source of contamination to the groundwater. Once this is accomplished, a final ROD will be issued addressing the groundwater at Site 1.

SUMMARY OF SITE RISKS

A baseline human health risk assessment (HHRA) was performed in 1997 for the Phase II RI in order to characterize the potential risks to human receptors under current and potential land uses. A limited, revised update of the HHRA was performed in 2005 to account for changes in risk assessment methodology that had occurred after the performance of the original study.

Summary of Human Health Risk Assessment

Groundwater concentrations were initially compared to EPA MCLs and Region 3 EPA **Risk-Based Concentrations (RBCs)** for tap water in order to be protective of all receptors exposed to groundwater and to identify the chemicals of potential concern (COPCs). Chemicals were eliminated from consideration as a COPC if the maximum detected concentration did not exceed the lesser of the MCL and the RBC screening value determined at a **carcinogenic** risk level of 1×10^{-6} or a **non-carcinogenic Hazard Quotient (HQ)** of 0.1.

The selected COPCs for groundwater are listed in Table 1, and include the VOCs chloroform, carbon tetrachloride, PCE, and TCE, and the metals arsenic, barium, chromium, lead, and

manganese. The results of this screening-level assessment indicated that the potential risks associated with the Site 1 groundwater were above acceptable levels.

The potential receptors evaluated in the initial HHRA included current occupational workers, current adolescent and adult trespassers, future excavation workers, future recreational children, and future residents. The updated HHRA concentrated on the hypothetical residents, since they were identified as the critical receptors in the initial study. The risk evaluation assumed that potential human receptors would be exposed to the COPCs in Site 1 groundwater via ingestion, dermal contact while bathing or showering, and inhalation of airborne vapors while showering.

The quantitative HHRA evaluated each potential receptor under a **reasonable maximum exposure (RME)**. RME incorporates input parameters into the exposure scenarios that are protective of 90 percent of the population.

Excess lifetime cancer risks were determined for each receptor by multiplying a daily dose by the chemical-specific cancer slope factor. Cancer slope factors have been developed by EPA from epidemiological or animal studies to reflect a conservative "upper bound" of the risk posed by potentially carcinogenic compounds. According to the NCP, the maximum acceptable carcinogen risk range for site-related exposure is 1×10^{-6} to 1×10^{-4} . This represents the increased chance of contracting cancer from being exposed to contaminants at this site as explained in "Step 3" in the box to the right.

Non-carcinogenic risks are presented in the form of HQs, which are determined by dividing the daily dose of a chemical by the published reference doses (RfDs). RfDs have been

WHAT IS A HUMAN HEALTH RISK ASSESSMENT AND HOW IS IT CALCULATED?

A human health risk assessment estimates the baseline risk, an estimate of the likelihood of health problems occurring if no cleanup action is taken at a site. To estimate the baseline risk at a site, the Navy performs the following four-step process:

- Step 1: Analyze Contamination
- Step 2: Estimate Exposure
- Step 3: Assess Potential Health Dangers
- Step 4: Characterize Site Risk

In **Step 1**, the Navy looks at the concentrations of contaminants found at a site as well as past scientific studies describing the effects these contaminants have had on people (or animals, when human studies are unavailable). Comparisons between site-specific concentrations and concentrations reported in past studies help the Navy to determine which contaminants are most likely to pose threats to human health.

In **Step 2**, the Navy considers the different ways that people might be exposed to the contaminants identified in Step 1, the concentrations that people might be exposed to, and the potential frequency (how often) and length of exposure. Using this information, the Navy calculates a "reasonable maximum exposure" (RME) scenario that portrays the highest level of human exposure that could reasonably be expected to occur.

In **Step 3**, the Navy uses the information from Step 2 combined with information on the toxicity of each chemical to assess potential health risks. The Navy considers two types of risk: (1) cancer risk and (2) noncancer risk. The likelihood of any kind of cancer resulting from a contaminated site is generally expressed as an upper bound probability; for example, a "1 in 10,000 chance." In other words, for every 10,000 people who could be exposed, one extra cancer may occur as a result of exposure to site contaminants. This is expressed in scientific notation as 1×10^{-4} . An extra cancer case means that one more person could get cancer than normally would be expected from all other causes. For noncancer health effects, the Navy calculates a "hazard index." The key concept here is that a "threshold level" (measured usually as a hazard index of 1) exists above which noncancer health effects are predicted.

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

developed by EPA and represent a level to which an individual may be exposed that is not expected to result in any deleterious effect. An HQ of less than or equal to 1.0 indicates that a receptor's dose of a single contaminant is less than or equal to the RfD and that adverse non-carcinogenic effects from that chemical are unlikely. The HQs for each COPC that the receptor is assumed to be exposed to via a specific pathway are summed to yield the **Hazard Index (HI)** for that pathway. A total HI is then calculated for each receptor by summing the pathway-specific HIs.

The RME cancer risks and non-cancer hazard indices are summarized in Table 2. The HHRA results indicated that the estimated RME incremental lifetime carcinogenic risk (ILCR) for the lifetime resident (2×10^{-4}) exceeded EPA's cancer risk range. Arsenic and PCE were the major contributors to the ILCR for the lifetime resident.

The RME non-carcinogenic risk for adult residents (HI = 1) was equal to the acceptable value. The HI for child residents (HI = 3) exceeded unity, although the HIs for the individual target organs were all less than unity.

Summary of Ecological Risk Assessment

An ecological risk assessment (ERA) was performed for each IRP site during the RI to characterize the potential risks from site-related contaminants to the ecological receptors (the flora and fauna) that inhabit the installation.

There are no ecological risks associated with the Site 1 groundwater because the groundwater does not discharge to the surface in the vicinity of the site or interact with any surface water bodies. There are no ecological receptors exposed to Site 1 groundwater. Consequently,

WHAT IS AN ECOLOGICAL RISK ASSESSMENT AND HOW IS IT CALCULATED?

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

Ecological risk assessment includes three steps:

- Step 1: Problem Formulation
- Step 2: Analysis
- Step 3: Risk Characterization

The problem formulation includes:

- Compiling and reviewing existing information on the site habitat, plants, and animals that are present
- Evaluating how plants and animals may be exposed
- Identifying and evaluating area(s) where site-related chemicals may be found
- Evaluating potential movement of chemicals in the environment
- Evaluating routes of exposure (for example, ingestion)
- Identifying receptors (plants and animals that could be exposed)
- Identifying exposure media (soil, air, water)
- Developing how the risk will be measured for all complete pathways (determining the risk where plants and/or animals can be exposed to chemicals)

In **Step 2**, the potential exposures to plants and animals are estimated and the concentrations of chemicals at which an effect may occur are evaluated.

In **Step 3**, all of the information identified in the first two steps is used to estimate the risk to plants and animals. Also included is an evaluation of the uncertainties (potential degree of error) that are associated with the predicted risk evaluation and their effects on the conclusions that have been made.

the potential for ecological impacts from site-related contaminants is negligible.

REMEDIATION GOALS AND OBJECTIVES

Site 1 groundwater does not currently pose a threat to public health because the site is under military control and the water drawn from the

Navy supply wells is treated by air stripping to remove VOCs. The future plans for Site 1 after Base closure, however, are not known. It is possible that residential or commercial land development could lead to the unrestricted use of groundwater and potentially expose the users to the groundwater contaminants. The HHRA concluded that under a future residential land use scenario, the exposure to contaminated groundwater through ingestion, dermal contact, and inhalation would pose potential carcinogenic risks exceeding EPA's target risk range for the lifetime resident.

The **remedial action objective** for Site 1 groundwater is to protect the health of future groundwater users by preventing their contact with groundwater that is contaminated with VOCs at concentrations greater than the regulatory benchmark levels, which are listed in Table 3.

To protect future Site 1 occupants, the Navy plans to implement deed restrictions which will prohibit the use of untreated groundwater drawn from the site. These restrictions are discussed more fully in the next section.

The Navy is proposing this interim action to implement LUCs to prevent exposure to the groundwater contamination to protect human health until the contamination, which originates at an off-Base location, is addressed directly.

REMEDIAL ALTERNATIVES CONSIDERED

The purpose of the alternatives development and screening process was to assemble an appropriate range of possible remedial options to address potential risks related to VOC-contaminated groundwater at Site 1.

In this process, technically feasible technologies were combined to form remedial alternatives that

would protect human health and the environment. These remedial alternatives were developed in accordance with the NCP and are detailed in the Site 1 Groundwater (OU 3) FFS.

Alternative 1 - No Action

The no action alternative was developed as the baseline case, as required by the NCP. Under this alternative, no remedial actions would be taken. The only activity conducted under this alternative would be a review of site conditions and risks every five years.

Alternative 2 – Land Use Controls and Periodic Groundwater Monitoring

Under this alternative, Land Use Controls (LUCs) would be implemented to protect human health and the environment by preventing exposure to contaminated groundwater.

Because contaminants remain onsite, a review of site conditions and risks would be conducted every five years, as required by the NCP. Additionally, periodic groundwater sampling would be conducted to ensure the Navy and regulatory agencies have the data necessary to evaluate and maintain the protectiveness of the remedy.

EVALUATION OF ALTERNATIVES

As part of the FFS, the two remedial alternatives were evaluated using nine criteria, as established by the NCP.

(1) Overall protection of human health and the environment

Alternative 2 would provide greater protection of human health and the environment than Alternative 1 because additional actions including implementation of LUCs and

groundwater monitoring would prevent exposure to contaminated groundwater.

(2) Compliance with ARARs

Because this proposed action is an interim action, it is not necessary to achieve ARARs at this time, as long as ARARs will be attained by the final remedy, in accordance with CERCLA Section 121(d)(4)(A) and the NCP at Section 300.430(f)(1)(ii)(C)(1). Neither Alternative 1 nor Alternative 2 would comply with ARARs for attainment of groundwater quality criteria because no action would be taken to reduce contaminant concentrations in groundwater beneath the site. However, since the Site is not the source of the contamination in the deep aquifer, it would not be feasible or appropriate to attempt to clean up this aquifer at this location. EPA is investigating the off-site source of groundwater contamination with the intent of addressing the contamination at the source.

(3) Long-term effectiveness and permanence

Alternative 1 would provide no additional protection of human health or the environment. Alternative 2 offers better long-term protection through the use of controls that place limitations on the use of contaminated groundwater. Periodic monitoring proposed under Alternative 2 ensures that the Navy and regulatory agencies will have the data necessary to evaluate and maintain the protective features of this interim remedy. The long-term protectiveness of the remedy will be more appropriately analyzed at the time of issuance of a final ROD for this Site.

(4) Reduction of toxicity, mobility, and volume through treatment

Neither Alternative 1 nor Alternative 2 would reduce groundwater contamination through treatment. Until the (off-Base) groundwater

contamination source has been remediated, the reduction of groundwater contamination through natural processes would be expected to continue.

(5) Short-term effectiveness

Since no active response actions would be implemented under Alternative 1, no additional short-term impacts would be anticipated. Implementation of groundwater use restrictions and monitoring under Alternative 2 would immediately prevent exposure to contaminated groundwater.

(6) Implementability

Alternative 1 would be the easiest to implement since it includes no response activities. The LUCs and periodic monitoring proposed under Alternative 2 would be readily implemented through the design and establishment of land use controls and through subsequent monitoring and enforcement.

(7) Cost

Alternative 2 would be more expensive to implement than Alternative 1 because of the requirement for design and monitoring of LUCs and periodic groundwater monitoring under Alternative 2.

(8) State concurrence

The state of Pennsylvania Department of Environmental Protection (PADEP) has been a partner in the development and review of the remedial action decision-making process. Formal agreement from PADEP (in the form of a concurrence letter) on this Proposed Plan will be issued before the interim ROD is finalized.

(9) Community Acceptance

This criterion will be addressed following the receipt of public comments on this proposed plan, and will be discussed in the responsiveness summary in the Interim ROD that will document the selection of an interim remedial action for OU 3.

THE NAVY'S PROPOSED REMEDY

The Navy proposes an interim remedy for Site 1 groundwater that would include the implementation of institutional controls and periodic groundwater monitoring performed in conjunction with a review of the effectiveness of this remedy every five years. Land use restrictions would be incorporated into local Base Instruction to restrict the use of site groundwater prior to the closure of the Base and transfer of the property. The restrictions would be protective of human health for future users by preventing unacceptable risks resulting from direct exposure to contaminated groundwater.

In the event that the affected property is transferred to another federal agency, this institutional control would be included in the Department of Defense Form 1354, Transfer and Acceptance of Military Real Property. This agreement transfers care and custody of real property owned by the Department of Defense to other federal agencies. The receiving agency would be bound by the same environmental restrictions as the Navy. These restrictions will be identified in an Environmental Summary Document, which will be incorporated by reference into the transfer agreement.

In the event that the affected property is transferred to a non-Federal entity, then the institutional controls would consist of deed restrictions that would prohibit the use of untreated groundwater.

Since the groundwater contaminants would remain at Site 1, a review of site conditions and risks will be conducted every five years, as required by CERCLA.

COMMUNITY PARTICIPATION

Community acceptance of the preferred alternative will be evaluated at the conclusion of the public comment period and will be described in the Interim ROD.

The Navy solicits written comments from the community on the Proposed Plan for Site 1 – Privet Road Compound Groundwater (OU 3). The Navy has set a public comment period from **April 16 through May 30, 2008** to encourage public participation in the decision process.

The Navy will hold a public meeting during the comment period. At the public meeting, the Navy, with input from EPA, will present the Proposed Plan, and solicit both oral and written questions. **The public meeting is scheduled for 6:00 p.m. on Wednesday, April 30, 2008 and will be held in the Community Meeting Room of the Horsham Township Public Library.** The Horsham Township Public Library is located at 435 Babylon Road, Willow Grove, Pennsylvania.

Comments received during the public comment period will be summarized and responses will be provided in the Responsiveness Summary section of the Interim ROD. The ROD is the document that will present the Navy's decision for Site 1 groundwater.

To send written comments, or to obtain further information, contact:

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NAS JRB Willow Grove
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Phone (215) 443-6937

For further information, contact:

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Email: Cunningham.Lisa@epa.gov

Please note that all comments must be submitted and postmarked on or before May 30, 2008.

TERMS USED IN THE PROPOSED PLAN

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

Administrative Record: An official compilation of site-related documents, data, reports, and other information that are considered important to the status of and decisions made relative to a Superfund site. The public has access to this material.

Carcinogenic Risk: A type of risk resulting from exposure to chemicals that may cause cancer in one or more organs.

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

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA): A federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA). The Act created a trust fund, known as the Superfund, to investigate and clean up abandoned or uncontrolled hazardous substance facilities.

Feasibility Study (FS): Report identifying and evaluating alternatives for addressing the contamination present at a site or group of sites.

Focused Feasibility Study (FFS): This is an FS analysis prepared to identify and evaluate a limited range of remedial alternatives considered for immediate action.

Hazard Index (HI): The sum of chemical-specific Hazard Quotients. An HI greater than 1 is considered to indicate the likelihood that adverse non-cancer health effects may occur.

Hazard Quotient (HQ): A comparison of the level of exposure to a substance in contact with the body per unit time to a chemical-specific Reference Dose, at which no deleterious effects are expected to occur, to evaluate potential non-cancer health effects. Exceedence of an HQ of 1 is associated with an increased level of concern about adverse non-cancer health effects.

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

Initial Assessment Study (IAS): Preliminary investigation usually consisting of review of available data and information on a site, interviews, and a non-sampling site visit to observe areas of potential waste disposal and migration pathways.

Installation Restoration Program (IRP): Navy program to restore old waste sites for reuse and to protect human health and the environment.

Interim Remedial Action: An action taken as an interim solution to protect human health and the environment until a final remedy is selected to address contamination at a particular site.

Maximum Contaminant Levels (MCLs): The maximum permissible level of a contaminant in water delivered to any user of a public water system. MCLs are established by EPA and are enforceable standards.

Noncarcinogenic Risk: A type of risk resulting from the exposure to chemicals that may cause systemic human health effects but not cancer.

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

Polychlorinated Biphenyls (PCBs): Class of organic compounds formerly used widely in industrial applications, including as an insulating fluid in electrical equipment. PCBs are persistent and do not readily biodegrade, and they may bioaccumulate in animal tissue.

Preliminary Remediation Goals (PRGs): Set of remediation cleanup goals for individual contaminants agreed upon by the Navy, EPA and PADEP, usually based on various risk-based concentrations and/or site-specific risk assessment.

Proposed Plan: A public participation requirement of CERCLA and the NCP in which the lead agency summarizes the preferred cleanup strategy and rationale. This agency also reviews the alternatives presented in the detailed analysis of the feasibility study, if prepared. The Proposed Plan may be prepared either as a fact sheet or as a separate document. In either case, it must actively solicit public comment on all alternatives under consideration.

Reasonable Maximum Exposure (RME): Human health risk assessment calculation approach using 90th percentile receptor risk behavior patterns to estimate a conservative expectation of receptor risk.

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

Remedial Action Objective: Medium-specific or operable unit-specific goals for protecting human health and the environment.

Remedial Investigation (RI): Study that determines the nature and extent of contamination at a site.

Restoration Advisory Board (RAB): An advisory group for the site restoration process with members from the public, the Navy, and the regulatory agencies. The purpose of the RAB is to gain effective input from stakeholders on cleanup activities and increase installation responsiveness to the community's environmental restoration concerns.

Risk Based Concentration (RBC): Risk-based concentrations are established by EPA Region III and are associated with specific levels of risk. These concentrations have been developed for both industrial and residential scenarios and incorporate both the ingestion and inhalation pathways.

Site Inspection (SI): Sampling investigation with the goal of identifying potential sources of contamination, types of contaminants, and potential migration of contaminants. The SI is conducted prior to the RI.

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

Volatile Organic Compounds (VOCs): A class of carbon-based chemicals commonly referred to as solvents that are characterized by their ability to evaporate readily at common ambient conditions of temperature and atmospheric pressure.

FOR FURTHER INFORMATION

MAILING LIST

If you did not receive this Proposed Plan in the mail and wish to be placed on the mailing list for future information pertaining to this site, please fill out, detach, and mail this form to:

Commanding Officer
NAS JRB Willow Grove
Bldg 78, Environmental Division
Attn: Hal Dusen
Willow Grove, PA 19090

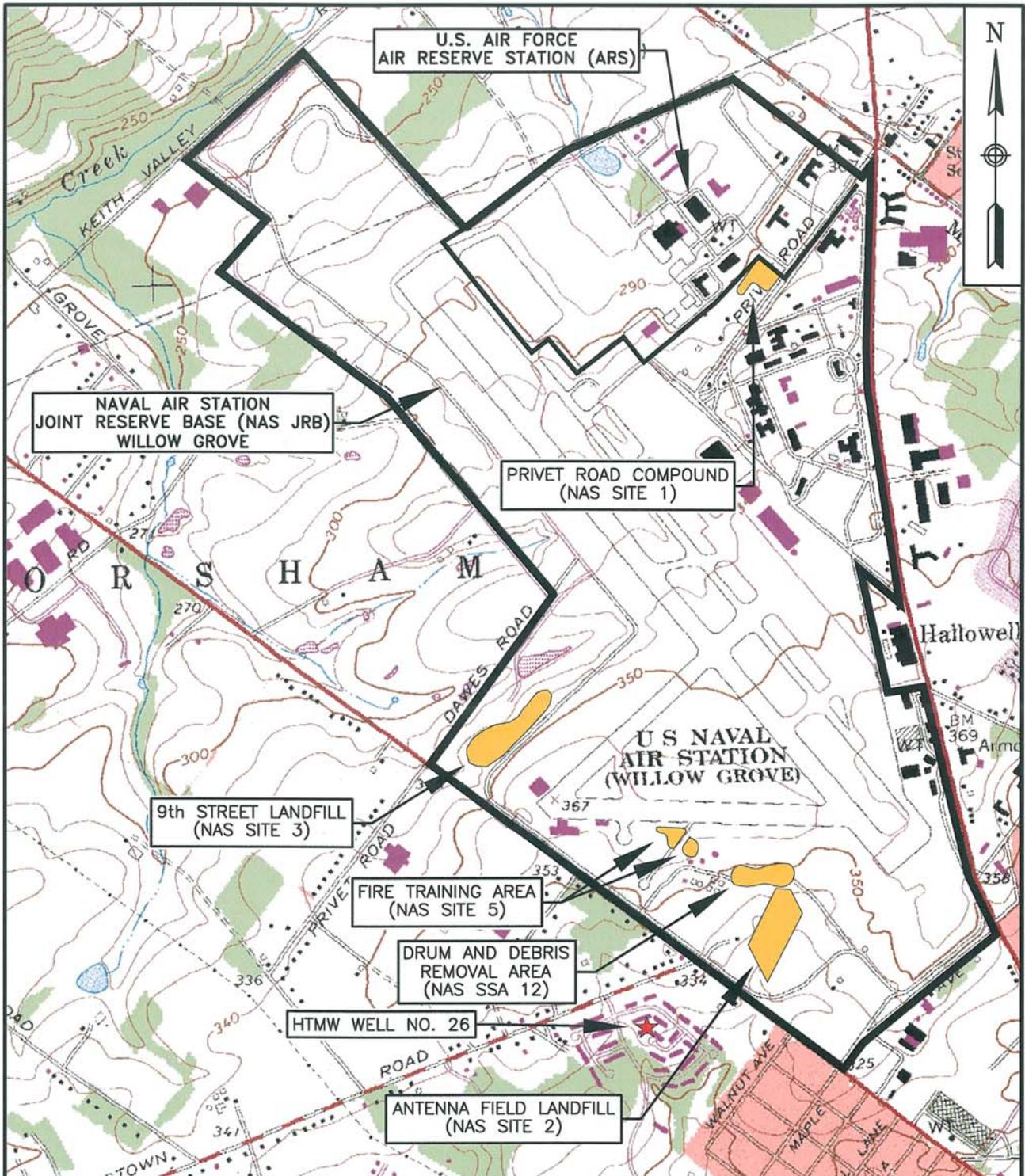
Name: _____

Affiliation: _____

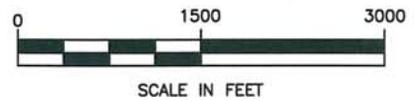
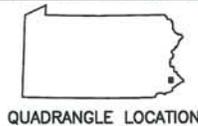
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FIGURES

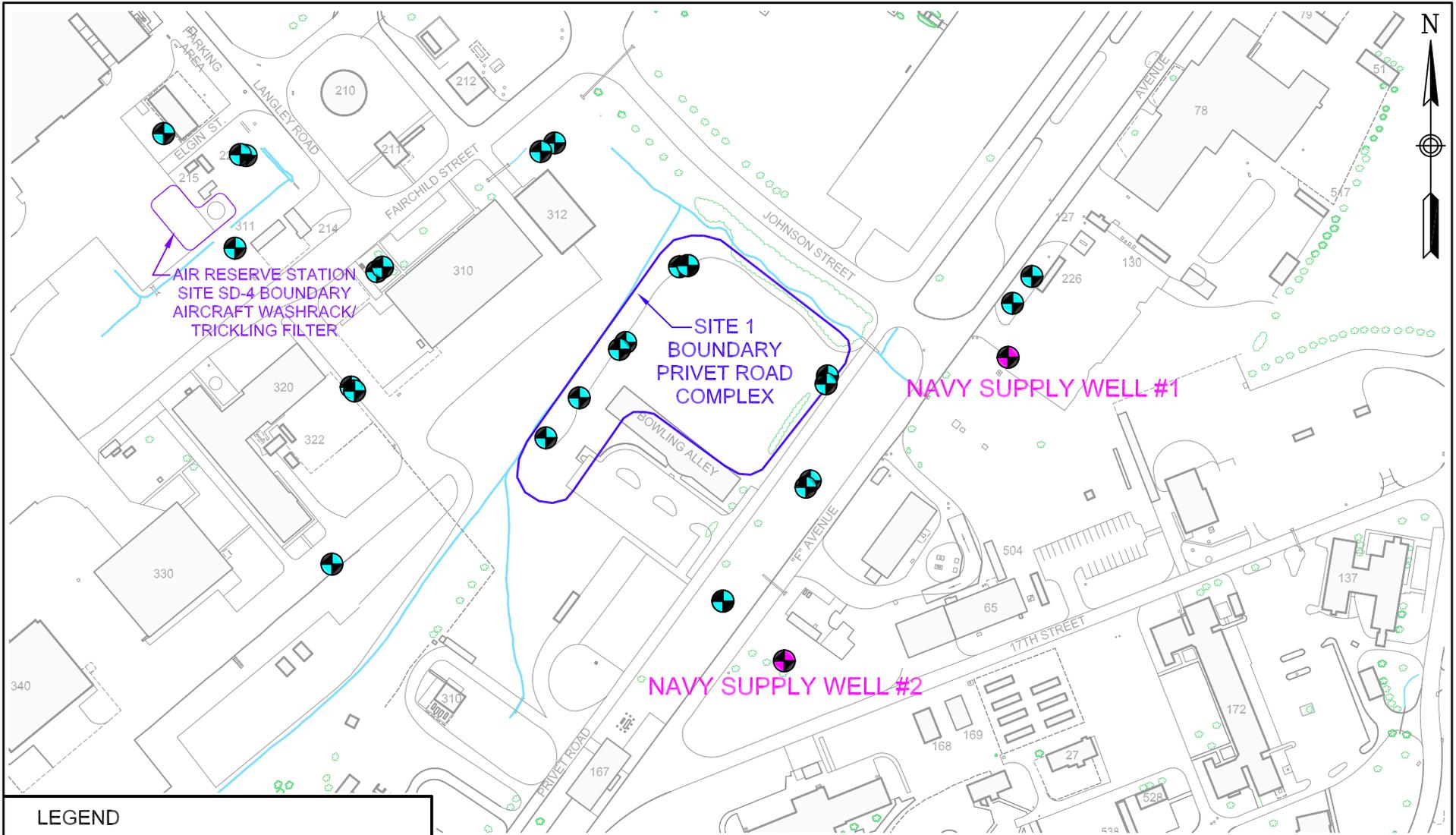


BASE MAP IS A PORTION OF THE AMBLER, PA U.S.G.S. 7.5 MINUTE QUADRANGLE MAP, DATED 1963, PHOTOREVISED IN 1983.



LOCATION OF RI SITES
 NAS JRB WILLOW GROVE
 WILLOW GROVE, PENNSYLVANIA

SCALE AS NOTED	
FILE 2192GM02.DWG	
REV 0	DATE 01/18/08
FIGURE NUMBER FIGURE 1	



LEGEND

-  MONITORING WELL LOCATION
-  NAVY SUPPLY WELL LOCATION



SCALE IN FEET



TETRA TECHNUS, INC.

MONITORING WELL LOCATION MAP
 SITE 1 – PRIVET ROAD
 NAS JRB WILLOW GROVE
 WILLOW GROVE, PENNSYLVANIA

SCALE
 AS NOTED

FILE
 2192GM01.DWG

REV DATE
 0 01/18/08

FIGURE NUMBER
 FIGURE 2

TABLES

**TABLE 1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - GROUNDWATER
SITE 1 - PRIVET ROAD COMPOUND
NASJRB WILLOW GROVE, PENNSYLVANIA**

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration ⁽¹⁾	Maximum Concentration ⁽¹⁾	Units	Sample with Maximum Concentration	Frequency of Detection	Range of Nondetects ⁽²⁾	Concentration Used for Screening ⁽³⁾	Above Background Concentration ⁽⁴⁾	EPA Region 3 RBCs for Tap Water ⁽⁵⁾	MCL ⁽⁶⁾	COPC Flag	Rationale for Contaminant Deletion or Selection ⁽⁷⁾	
Site 1	Volatile Organic Compounds														
	71-55-6	1,1,1-Trichloroethane	0.5 J	6	ug/L	10MW27	2/25	10	6	NA	320 N	200	No	BSL	
	75-34-3	1,1-Dichloroethane	0.2 J	0.8 J	ug/L	10MW27-D	2/25	10	0.8	NA	90 N	NA	No	BSL	
	75-35-4	1,1-Dichloroethane	0.1 J	4	ug/L	10MW27	2/25	10	4	NA	35 N	7	No	BSL	
	56-23-5	Carbon Tetrachloride	0.2 J	0.2 J	ug/L	10MW27-D	1/25	1 - 10	0.2	NA	0.16 C	5	Yes	ASL	
	67-66-3	Chloroform	0.1 J	0.2 J	ug/L	10MW27, 10MW28	2/25	10	0.2	NA	0.15 C	80	Yes	ASL	
	127-18-4	Tetrachloroethene	2 J	36	ug/L	01MWNW1 19970708	8/25	1 - 10	36	NA	0.1 C	5	Yes	ASL	
	540-59-0	Total 1,2-Dichloroethene	0.2 J	5 J	ug/L	01MW07I 19970627	3/25	1 - 10	5	NA	5.5 N	NA	No	BSL	
	79-01-6	Trichloroethene	0.1 J	37	ug/L	01MW07I 19970627	16/25	10	37	NA	0.026 C	5	Yes	ASL	
	Semi-Volatile Organic Compounds														
	117-81-7	Bis(2-Ethylhexyl)Phthalate	2 J	2 J	ug/L	10MW28	1/2	6 - 9	2	NA	4.8 C	6	No	BSL	
	Inorganics														
	7429-90-5	Aluminum	19.1	3430	ug/L	01MW05S 19910923-F	6/18	8.6 - 135	3430	NA	3700 N	NA	No	BSL	
	7440-36-0	Antimony	0.81 K	0.98	ug/L	10MW27	2/18	45	0.98	NA	1.5 N	6	No	BSL	
	7440-38-2	Arsenic	3.6	4.2	ug/L	01MWNW1B 19911007	2/18	0.85 - 3.2	4.2	NA	0.045 C	10	Yes	ASL	
	7440-39-3	Barium	15	474	ug/L	10MW28	15/18	20 - 155	474	NA	260 N	2000	Yes	ASL	
	7440-41-7	Beryllium	0.16	4	ug/L	5 SAMPLES	7/18	0.05 - 9	4	NA	7.3 N	4	No	BSL	
	7440-70-2	Calcium	12300	56500	ug/L	10MW28	18/18	---	56500	NA	NA	NA	No	NUT	
	7440-47-3	Chromium	1.3	18	ug/L	01MW05I 19910923-F	3/18	7 - 11	18	NA	11 N ⁽⁶⁾	100 ⁽⁹⁾	Yes	ASL	
	7440-48-4	Cobalt	10	17	ug/L	01MW05S 19910923-F	2/18	0.15 - 10	17	NA	73 N	NA	No	BSL	
	7440-50-8	Copper	0.49	37	ug/L	01MW05S 19910923-F	3/18	6 - 35	37	NA	150 N	1300 ⁽¹⁰⁾	No	BSL	
	7439-89-6	Iron	23.6	576 J	ug/L	01MW02I 19910924	4/18	14.6 - 177	576	NA	1100 N	NA	No	BSL	
	7439-92-1	Lead	1	18	ug/L	01MW04I 19910923	11/18	0.5 - 1	18	NA	15 ⁽¹¹⁾	MCL ⁽¹²⁾	Yes	ASL	
	7439-95-4	Magnesium	3780	27500	ug/L	01MWNW1A 19911007-D	18/18	---	27500	NA	NA	NA	No	NUT	
	7439-96-5	Manganese	2.3	981	ug/L	01MW05S 19910923-F	14/18	1 - 2	981	NA	73 N ⁽¹²⁾	NA	Yes	ASL	
	7440-02-0	Nickel	3.1	26	ug/L	01MW04S 19910923-F	4/18	12 - 26	26	NA	73 N	NA	No	BSL	
	7440-09-7	Potassium	1490 J	38700	ug/L	01MW05I 19910923-F	11/18	2140	38700	NA	NA	NA	No	NUT	
	7782-49-2	Selenium	1.1	1.2	ug/L	10MW27-D	2/16	0.85 - 20	1.2	NA	18 N	50	No	BSL	
	7440-23-5	Sodium	9840	28500	ug/L	01MW06S 19910924-F	18/18	---	28500	NA	NA	NA	No	NUT	
	7440-62-2	Vanadium	0.58	0.58	ug/L	10MW28	1/9	0.12 - 4	0.58	NA	3.7 N	NA	No	BSL	
	7440-66-6	Zinc	2	187	ug/L	10MW27	7/18	2 - 47	187	NA	1100 N	NA	No	BSL	

Footnotes

- 1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
- 2 - Values presented are sample-specific quantitation limits.
- 3 - The maximum detected concentration is used for screening purposes.
- 4 - No background data are available for groundwater.
- 5 - The EPA Region 3 tap water screening level is presented. Value represents the risk based tap water screening level divided by 10 to correspond to a target hazard quotient of 0.1 for noncarcinogens (denoted with a "N" flag), or an incremental cancer risk of 1.0E-6 for carcinogens (denoted with a "C" flag) (USEPA Region III, April 2005).
- 6 - USEPA Primary Drinking Water Standard (USEPA, Winter 2004). The values presented are based on MCLs or SMCLs and are presented for reference purposes only.
- 7 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level.
Chemicals selected as COPCs are indicated by shaded chemical names.
- 8 - The RBC for tap water for hexavalent chromium is presented. The RBC for trivalent chromium is 55,000 ug/L.
- 9 - Value presented is for total chromium.
- 10 - The MCL for this parameter is actually a treatment technique. The SDWA action level (at the tap) has been presented.
- 11 - No RBC is available. The Action Level promulgated under the Safe Drinking Water Act is used for screening purposes.
- 12 - The RBC for tap water calculated using the RfDo for manganese nonfood is presented.

Definitions:

ARAR/TBC = Applicable or Relevant and Appropriate Requirements To Be Considered
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
K = Value estimated with a high bias
MCL = Maximum Contaminant Level
N = Noncarcinogen
NA = Not Applicable/Not Available
RBC = Risk Based Concentration

Rationale Codes:

For selection as a COPC:
ASL = Above Screening Level and site background.

For elimination as a COPC:
BSL = Below Screening Level
NUT = Essential Nutrient

TABLE 2

SUMMARY OF CANCER RISKS AND HAZARD INDICES
 REASONABLE MAXIMUM EXPOSURES
 SITE 1 - PRIVET ROAD COMPOUND
 NASJRB WILLOW GROVE, PENNSYLVANIA

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks > 10 ⁻⁴	Chemicals with Cancer Risks > 10 ⁻⁵ and ≤ 10 ⁻⁴	Chemicals with Cancer Risks > 10 ⁻⁶ and ≤ 10 ⁻⁵	Hazard Index	Chemicals Contributing to an HI > 1
Child Residents	Groundwater	Ingestion	6E-05	--	Tetrachloroethene, Arsenic	Carbon Tetrachloride, Trichloroethene	2	Carbon Tetrachloride, Arsenic, Manganese
		Dermal Contact	1E-05	--	--	Tetrachloroethene	0.2	--
		Inhalation	3E-06	--	--	--	0.03	--
		Total	8E-05	--	Tetrachloroethene, Arsenic	Carbon Tetrachloride, Trichloroethene	3	Carbon Tetrachloride, Arsenic, Manganese
Adult Residents	Groundwater	Ingestion	1E-04	--	Tetrachloroethene, Arsenic	Carbon Tetrachloride, Trichloroethene	1	--
		Dermal Contact	3E-05	--	Tetrachloroethene	--	0.09	--
		Inhalation	--	--	--	--	0.005	--
		Total	1E-04	--	Tetrachloroethene, Arsenic	Carbon Tetrachloride, Trichloroethene	1	--
Lifelong Residents (Child and Adult)	Groundwater	Ingestion	2E-04	--	Tetrachloroethene, Arsenic	Carbon Tetrachloride, Trichloroethene	NA	--
		Dermal Contact	4E-05	--	Tetrachloroethene	Carbon Tetrachloride	NA	--
		Inhalation	--	--	--	Chloroform	NA	--
		Total	2E-04	--	Tetrachloroethene, Arsenic	Carbon Tetrachloride, Chloroform, Trichloroethene	NA	--

**TABLE 3
COMPARISON OF GROUNDWATER CONCENTRATIONS TO REGULATORY CRITERIA
SITE 1- PRIVET ROAD COMPOUND
NASJRB WILLOW GROVE, PENNSYLVANIA**

COC	MAXIMUM DETECTION (ug/l)	LOCATION OF MAX. DETECTION	FEDERAL SDWA (ug/l) ¹	PADEP MSC (ug/l) ²	RBC VALUE (ug/l) ³
Arsenic	4.2	01MWNW1B	10 (MCL)	50 (MCL)	0.045
Barium	474	10MW28	2000 (S)	2000 (S)	260
Chromium	18	01MW05I	100 (MCL)	100(MCL)	11
Lead	18	01MW04I	15 (AL)	5	15 ⁴
Manganese	981	01MW05S	--	--	73
Carbon Tetrachloride	0.2J	10MW27-D	5 (MCL)	5	0.16
Chloroform	0.2J	10MW27, 10MW28	--	100	0.15
PCE	36	10MWNW1	5 (MCL)	5 (MCL)	0.1
TCE	37	01MW07I	5 (MCL)	5 (MCL)	0.026

¹ Federal Maximum Contaminant Levels (MCLs). Source: National Primary Drinking Water Regulations, 40 CFR Parts 141.61 and 141.62. SDWA = Safe Drinking Water Act; S = Secondary MCL; AL = Action Level.

² Pennsylvania Department of Environmental Protection (PADEP) Medium-specific concentrations (MSCs), November 24, 2001 for used aquifers, residential land use, and total dissolved solids (TDS) less than 2,500 ug/l. MCL = Maximum Contaminant Level; H = Lifetime Health Advisory Level; G = Ingestion; N = Inhalation; S = Aqueous solubility cap. With Periodic Updates and Changes.

³ EPA Region 3 Risk-Based Concentrations for Tap Water. Source: EPA Region 3 RBC Table, April 2006. The RBC values for tap water are based on maximum carcinogenic risk of 1E-6 or Hazard Quotient of 1.0.

⁴ No RBC is available. The action Level promulgated under the Safe Drinking Water Act is used for screening purposes.

Bold = Risk-based Compound of Concern for site-related groundwater.
ug/l = microgram per liter.