

**Proposed Remedial Action Plan  
for  
Site 7- Landfill South of "P" Barricades  
Operable Unit 10**

**Naval Weapons Station Earle  
Colts Neck, New Jersey**



**Naval Facilities Engineering Command  
Mid-Atlantic**

**Contract No. N62472-03-D-0057  
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**August 2010**

Department of the Navy

## Proposed Remedial Action Plan for Operable Unit 10



Naval Weapons Station Earle  
Colts Neck, New Jersey

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### NAVY ANNOUNCES PROPOSED REMEDIAL ACTION PLAN

The Department of the Navy has completed a **Feasibility Study (FS)** for Operable Unit 10 (OU 10) to address Site 7 – Landfill South of “P” Barricades, which is located within the Waterfront area at Naval Weapons Station Earle (NWS Earle), Colts Neck, New Jersey. The FS was completed as part of the Superfund Remedial Program **[Comprehensive Environmental Response, Compensation, and Liability Act, as amended (CERCLA) 42 U.S.C. §§ 9601, et seq.]**.

This **Proposed Remedial Action Plan (Proposed Plan)** is issued by the Navy as the lead agency for Superfund activities at NWS Earle, and by the United States Environmental Protection Agency (EPA). The Navy and EPA, in consultation with the New Jersey Department of Environmental Protection (NJDEP), a support agency for Superfund activities at NWS Earle, will make a final decision on the remedial approach for Site 7 after reviewing and considering all information submitted during the 30-day **Public Comment Period**. The Navy and EPA may modify the preferred remedy based on new information or public comments. Therefore, the public is encouraged to review and comment on the 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 CERCLA 42 U.S.C. §§ 9613(k), 9617(a), and 9621(f) and Part 40 of the Code of Federal Regulations Sections 300.430(f)(2) and (3) of the **National Oil and Hazardous Substances Pollution Contingency Plan (NCP)**.

#### PUBLIC MEETING

A public meeting to discuss the Proposed Plan will be held on **Tuesday, September 14, 2010 at 7:00 PM** at the Monmouth County Library Headquarters, Manalapan, NJ. For directions to the meeting location, please see the Monmouth County Library web site at <http://www.monmouthcountylib.org>. The meeting date and location will also be published in the *Asbury Park Press* newspaper.

The purpose of this Proposed Plan is to present the Navy’s preferred alternative for remedial action at Site 7. The preferred remedy is No Further Action. This Proposed Plan summarizes the findings of the **Remedial Investigation (RI)** conducted at Site 7, outlines the remedial alternatives detailed in the FS report and results from additional groundwater investigations conducted since the FS report was completed, identifies the remedy 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.

This 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 **Information Repository** located in the Monmouth County Library, Eastern Branch, Route 35, Shrewsbury, New Jersey. The Navy invites the public to review the available materials and to comment on this Proposed Plan during the public comment period.

## **SITE BACKGROUND**

NWS Earle is located in Monmouth County, New Jersey, approximately 47 miles south of New York City (Figure 1). The Station consists of two areas, the 10,248-acre Main Base (Mainside area), located inland, and the 706-acre Waterfront area. The two areas are connected by a Navy-controlled right-of-way.

Commissioned in 1943, the facility's primary mission is to supply ammunition to the Atlantic Fleet. An estimated 1,500 people either work or live at NWS Earle.

The Mainside area is located in Colts Neck Township, which has a population of approximately 12,300 people. The surrounding area includes agricultural land, vacant land, and low-density housing. The Mainside area consists primarily of a large area, developed specifically for ordnance handling operations, including production and storage; the area is encumbered by safety related **explosive safety quantity distance (ESQD) arcs**. Other land use in the Mainside area consists of residences, offices, workshops, warehouses, recreational space, open space, and undeveloped land.

The Waterfront area is located in Middletown Township, which has a population of approximately 68,200 people. Land use in this area includes residences, office buildings, recreational areas, open space, and undeveloped land. Approximately 20 percent of the Waterfront area is considered marshland. The surrounding area contains commercial and single-family residential land. The Mainside and Waterfront areas are connected by road and rail through a 10-mile long corridor. Munitions, and other supplies destined for U.S. Navy ships, are transported through this corridor from the Mainside area to the Waterfront area and out to waiting ships at piers located in the Lower Hudson River Bay near Sandy Hook, New Jersey. Site 7, the subject of this Proposed Plan, is located in the Waterfront area (Figure 2).

Site 7, the Landfill South of "P" Barricades is approximately 5 acres in size based on a 1974 EPA Environmental Photographic Interpretation Center photo and a 2009 test pit investigation. From 1965 to 1977, the site was used for disposal of municipal-type solid waste and waste from Waterfront industrial operations. Wastes reportedly consisted of munitions shipping wastes or dunnage (lumber used to secure and space a ship's cargo during transport), shop wastes from the Waterfront Public Works Shop and the Munitions Handling Laboratory (glass, wood, and small quantities of waste paint, thinners, and solvents), and domestic refuse. The landfilled materials were covered with a thin layer of loose sand quarried from the surrounding area.

As shown on Figure 3, the immediate areas surrounding Site 7 are heavily wooded. An unpaved road borders the landfill to the north. Other earthen and grass covered roads are located along the western and southern perimeters of the site. The ground surface slopes downward to the north from approximately 145 feet above mean sea level (msl) near monitoring well 07MW-03 to

approximately 125 feet msl near 07MW-02. Large white pine trees, 20 to 30 feet in height, and grasses cover the site.

Currently, the Navy does not use Site 7 and there are no plans for base closure or realignment that would result in Site 7 being considered for future land use. Groundwater at the site is not currently used and is not expected to be used in the future.

## **REGULATORY STATUS**

In 1990, NWS Earle was placed on the **National Priorities List (NPL)**, which is a list of sites where uncontrolled hazardous substance releases may potentially present serious threats to human health and the environment.

## **STUDIES AND RESULTS**

Potential hazardous substance releases at NWS Earle were addressed in an **Initial Assessment Study (IAS)** in 1983, a **Site Inspection (SI)** in 1986, a Phase I RI in 1991-1992, and a Phase II RI in 1995-1996. These were preliminary investigations to determine the number of sources, compile histories of waste handling and disposal practices at the sites, and acquire data on the types of contaminants present and the potential risks to human health and/or environmental receptors.

### **Initial Assessment Study Results**

The 1983 IAS, which consisted of interviews and on-site observations, did not recommend Site 7 for a confirmation study. No sampling was performed under the IAS investigation.

### **Site Inspection Results**

As part of a base-wide SI conducted in 1986, three monitoring wells (07MW-01, 07MW-02, and 07MW-03) were installed around the perimeter of Site 7 (see Figure 4). Table 1

summarizes the analytical results for the groundwater samples collected as part of the 1986 investigation. Groundwater samples were found to contain acetone and di-n-butylphthalate; however, both compounds were detected at concentrations significantly less than their respective NJDEP **Groundwater Quality Standards (GWQSS)** (acetone - 6,000 micrograms per liter [ $\mu\text{g/L}$ ] and di-n-butyl phthalate - 700  $\mu\text{g/L}$ ). The 1986 investigation was limited to groundwater; the Navy conducted no other sampling.

### **Phase I Remedial Investigation (1991-1992)**

As part of a 1991-1992 RI at NWS Earle, seven test pits were excavated and two additional monitoring wells were installed at Site 7 (see Figure 5). A layer of trash, ranging in thickness from 2.5 to 6 feet, was encountered in five of the seven test pits. The encountered waste consisted of glass, paper, plastic, cans, and other types of household or shipboard-generated waste. Metal scrap, lumber, concrete, bricks, and other construction debris were also encountered. The cover material was thin to nonexistent. No sustained organic vapor readings were detected in any of the test pits. Two soil samples were collected from the test pits and analyzed for full **Target Compound List (TCL)** organic compounds, **Target Analyte List (TAL)** inorganic compounds, and **total petroleum hydrocarbons (TPHs)**. Table 2 summarizes the compounds that were detected in the test pit samples. No compounds were detected at concentrations exceeding current criteria for NJDEP residential direct contact, non-residential direct contact, or impact to groundwater.

Groundwater samples were obtained from the three existing wells and two new wells (07MW-04 and 07MW-05) during three different sampling events: March 1991, October 1991, and November 1991. Samples were submitted for TCL **semivolatile and volatile organic**

**compounds (SVOCs and VOCs)**, drinking water metals, pesticides and PCBs, petroleum hydrocarbons, and landfill indicator parameters. Table 3 summarizes the maximum detected 1991 groundwater results. Several inorganics (beryllium, cadmium, chromium, iron, lead, and manganese) were detected at maximum concentrations exceeding both current criteria [GWQS and **Maximum Contaminant Levels (MCLs)**] and upgradient background concentrations. Two organic chemicals (1,1,2,2-tetrachloroethane and 1,1,2-trichloroethane) were detected in one well at a concentration that exceeded the GWQS, the MCL and the upgradient concentration for each such organic.

### **Phase II Remedial Investigation (1995-1996)**

An RI of 27 sites, including Site 7 was conducted at NWS Earle in 1995, as part of the Navy Environmental Restoration program (ERP). The Phase II RI was initiated in 1995 and completed in July 1996, when the final RI report was released. The Phase II RI at OU 10 included the collection of a wet surface soil sample, and surface water and groundwater samples.

Between June and October 1995, the Navy conducted the following field investigation activities at Site 7:

- Sampling and analysis of one sediment (surface soil) sample (07 SD WET 7-B2).
- Sampling and analysis of one surface water sample (WSSW30).
- Sampling and analysis of groundwater from five existing monitoring wells.
- Measurement of static water levels in the five monitoring wells.

Five groundwater monitoring wells (07MW-01 through 07MW-05) were sampled at Site 7 during the 1995 RI including upgradient well 07MW-03. Each sample was analyzed for TCL and TAL (VOCs and metals) and other water quality parameters. Table 4 presents the results of the

groundwater investigations done between June and October 1995. The majority of samples collected from Site related wells had concentrations for inorganics which were lower than the GWQS and the MCL for each such inorganic. For example, concentrations of most metals in Site 7 groundwater were within the range of background results. Aluminum and iron were detected at concentrations exceeding current criteria and background concentrations. Manganese was detected in one well, less than background concentrations, but exceeding its current GWQS and MCL. Thallium was detected in one well at a concentration exceeding its respective GWQS and MCL.

Only one organic compound (benzene) was detected in one well at a concentration exceeding the GWQS, but less than the MCL.

Sample SD WET7-B2 was collected just north of the landfill boundary at a depth of 0 to 6 inches. The RI Report conservatively compared the sample to sediment concentrations and ecological screening criteria. For purposes of the FS, the sample was compared to background surface soil concentrations (see Table 5). Based on this comparison, only two inorganics (calcium and zinc) were detected in SD WET7-B2 at concentrations exceeding the range of background surface soil concentrations. No organic compounds were detected in sample SD WET7-B2.

A watershed sample, WSSW30, was collected north of Site 7. As detailed in the RI Report, this surface water sample was most closely related to potential runoff and stream recharge originating from Site 7. No organic compounds were detected and all other parameters were found in the range of background surface water concentrations. Table 6 presents the RI surface water sample results and compares them to the range of results for surface water samples collected as background.

Based on the 1995 field investigation, Site 7 is located within the outcrop area of the Red Bank Sand and Navesink aquifer. Groundwater elevation surveys performed in 1995 and 2005 indicate that the direction of shallow groundwater flow in the aquifer at Site 7 is toward the north to Sandy Hook Bay. The closest surface water body is located approximately 1,500 feet west of the site; there are no surface water bodies located downgradient of the site.

#### **April 2005 Groundwater Investigation**

Groundwater samples were collected at Site 7 in April 2005 and were analyzed for certain inorganics and VOCs that had previously been identified as **chemicals of potential concern (COPCs)** based on the RI risk assessment (see following section). Results from the 2005 sampling are included in Table 7.

The 2005 sampling results indicated that aluminum was not detected in four of the five site monitoring wells. The aluminum concentration detected in sidegradient well 07MW-05 exceeded the GWQS. Iron was detected in only two wells, 07MW-04 and 07MW-05, at concentrations that exceeded the GWQS. The iron concentration detected in well 07MW-04 was lower than the concentration detected in sidegradient well 07MW-05. Manganese was present in upgradient well 07MW-03 and well 07MW-02 at concentrations that exceeded the GWQS. The manganese concentration detected in well 07MW-02 was significantly lower than the manganese concentration detected in the upgradient well (07MW-03). Thallium, which was detected in one well during the Phase II RI, was not detected in any of the April 2005 groundwater samples.

No organic compounds were detected at concentrations that exceeded their relevant GWQS and MCL. Groundwater was the only medium sampled during the April 2005 investigation.

#### **July 2009 Groundwater Investigation**

At the request of the NJDEP, the Navy conducted an additional groundwater investigation to define the vertical extent and presence of certain VOCs immediately adjacent to, and downgradient of the landfill. In July 2009, the Navy completed one soil boring and two groundwater sampling borings using direct push technology. Three discrete groundwater samples were collected from each Hydropunch® boring and analyzed for benzene, chlorobenzene, chloroform, and 1,1,2-trichloroethane, contaminants which had previously been detected in site groundwater. Benzene and chloroform had also been identified as the principal COPCs in the 1995 human health risk assessment (see below). The results indicated that none of the analyzed compounds were present in site groundwater at levels which exceeded either the GWQS or the MCL. Benzene and chloroform were the only compounds detected at estimated concentrations slightly above their respective method detection limits, but below their relevant GWQS and MCL (Table 8). Based on the project objectives outlined in the NJDEP and EPA approved Sampling and Analysis Plan for Site 7 Groundwater (2009), it was concluded that no further sampling for organic compounds in Site 7 groundwater was warranted.

#### **SUMMARY OF SITE RISKS**

As part of the Phase II RI, a human health risk assessment and an ecological risk screening were performed for Site 7. The exact procedures used for the human health risk assessment and ecological risk screening are presented in the RI Report (July 1996). The process used for the assessment of human health risk is summarized as “What is Risk and How is it Calculated?” on the following page. Laboratory analytical results from remedial activities in the SI and Phase I RI were used to direct the sampling activities in the Phase II RI.

Only data from the Phase II RI was used to calculate human health or ecological risks as presented in the RI Report. At the request of EPA, since the RI human health risk assessment was performed several years ago, the Navy performed a review of the human health risks based on current EPA risk assessment guidelines and risk factors. This review found several minor changes that would affect the Site 7 risk calculations, but none of the major conclusions of the human health risk assessment were affected using current guidelines and factors.

### **Summary of Human Health Risk Assessment**

The objectives of the human health risk assessment were to estimate the actual or potential risks to human health resulting from the presence of site-related contamination in groundwater and sediment and to provide the basis for determining the need for remedial measures for these media in the FS. To assess these risks, the potential receptors considered for this site were possible future industrial, residential, and recreational receptors. A future industrial receptor was defined as an adult who is assumed to work at NWS Earle in the future. The future residential receptor was defined as a person who will live in a residence at or near NWS Earle in a hypothetical future scenario. This receptor would reside at the residence for 30 years, 0 through 6 years as a child and the remaining 24 years as an adult. The future recreational receptor was defined as a child living in a future residence at or near NWS Earle that wades in surface water/sediment present at NWS Earle. The exposure scenarios listed below were assumed for the potential receptor populations outlined above:

- Ingestion of groundwater as a drinking water source.
- Dermal contact with groundwater while bathing/showering by a resident or hand washing by an industrial worker.

### **WHAT IS RISK AND HOW IS IT CALCULATED?**

#### Human Health Risk Assessment:

A Superfund baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these under current- and future-land uses. A four-step process is utilized for assessing site-related human health risks for reasonable maximum exposure scenarios.

*Hazard Identification:* In this step, the COPCs at the site in various media (*i.e.*, soil, groundwater, surface water, and air) are identified based on such factors as toxicity, frequency of occurrence, and fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation.

*Exposure Assessment:* In this step, the different exposure pathways through which people might be exposed to the contaminants in air, water, soil, etc. identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of and dermal contact with contaminated soil and ingestion of and dermal contact with contaminated groundwater. Factors relating to the exposure assessment include, but are not limited to, the concentrations in specific media that people might be exposed to and the frequency and duration of that exposure. Using these factors, a "reasonable maximum exposure" scenario, which portrays the highest level of human exposure that could reasonably be expected to occur, is calculated.

*Toxicity Assessment:* In this step, the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure and severity of adverse effects are determined. Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or other non-cancer health hazards, such as changes in the normal functions of organs within the body (*e.g.*, changes in the effectiveness of the immune system). Some chemicals are capable of causing both cancer and non-cancer health hazards.

*Risk Characterization:* This step summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site risks for all COPCs. Exposures are evaluated based on the potential risk of developing cancer and the potential for non-cancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a  $10^{-4}$  cancer risk means a "one-in-ten-thousand excess cancer risk"; or one additional cancer may be seen in a population of 10,000 people as a result of exposure to site contaminants under the conditions identified in the Exposure Assessment. Current Superfund regulations for exposures identify the range for determining whether remedial action is necessary as an individual excess lifetime cancer risk of  $10^{-4}$  to  $10^{-6}$ , corresponding to a one-in-ten-thousand to a one-in-a-million excess cancer risk. For non-cancer health effects, a "hazard index" (HI) is calculated. The key concept for a non-cancer HI is that a "threshold" (measured as an HI of less than or equal to 1) exists below which non-cancer health hazards are not expected to occur. The goal of protection is to lower the cancer risk to less than  $10^{-6}$  and HI to less than 1.0. Chemicals that exceed a  $10^{-4}$  cancer risk or an HI of 1 are typically those that will require remedial action at the site and are referred to as Chemicals of Concern or COCs in the final remedial decision of Record of Decision.

- Inhalation of contaminants in groundwater released by vaporization occurring during showering.
- Incidental ingestion of surface water and sediment by a recreational child.
- Dermal contact with surface water and sediment by a recreational child.

Potential human health risks were categorized as **carcinogenic risk** or **noncarcinogenic hazard**. Cancer risks were estimated as the probability that an individual exposed to the contaminated media originating from the site might eventually develop cancer, assuming a specified duration of exposure and a daily intake of contaminated media. A hypothetical increase in carcinogenic risk caused by site exposure should ideally not exceed EPA's established target acceptable risk range of  $1 \times 10^{-6}$  to  $1 \times 10^{-4}$  or a one-in-one-million to one-in-ten-thousand chance for excess cancer risk. 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 under the conditions identified in the exposure assessment. If several substances are present, each is assumed to have an additive contribution to the lifetime cancer risk estimated for an individual.

The potential for contaminant exposures to cause adverse noncancer health effects is evaluated by assuming a specified duration of exposure and a daily intake of contaminated media for a hypothetical individual. For each substance, the estimated daily dose is divided by the reference level considered protective against adverse effects. This ratio, called the **hazard quotient (HQ)**, indicates whether or not adverse noncancer health effects can be ruled out, given exposure to a single chemical. Note that adverse health effects from exposures to multiple substances associated with noncancer health effects are considered additive if their health effects involve the same organ system(s) of the body, and is expressed as the **hazard**

**index (HI)**, which represents the total of the individual HQs. If the HI does not exceed the reference benchmark of 1 for any target organ, then adverse noncancer effects are unlikely.

At Site 7, cancer risks and noncancer hazards were estimated based on assuming receptor activity patterns that would represent the highest exposure that is reasonably expected to occur for the predicted amount and duration of exposure to contaminants at the site, which is referred to as **Reasonable Maximum Exposure (RME)**. The RME cancer risk associated with future residential groundwater exposure ( $5.3 \times 10^{-6}$ ) is within the  $1 \times 10^{-6}$  to  $1 \times 10^{-4}$  EPA target acceptable risk range. 1,1,2-trichloroethane (via ingestion), benzene (via ingestion) and chloroform (via inhalation during showering) are the principal COPCs that contributed for the residential exposure scenario. The RME cancer risk associated with sediment exposure ( $2.0 \times 10^{-7}$ ) is below the  $1 \times 10^{-6}$  to  $1 \times 10^{-4}$  target acceptable risk range. The RME cancer risk associated with future industrial groundwater exposure ( $1.1 \times 10^{-5}$ ) is within the  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$  target acceptable risk range. Beryllium (via ingestion) is the principal COPC that contributed to the cancer risk for this exposure scenario.

RME estimates for noncarcinogenic hazard yielded an HI that exceeded 1 for substances associated with the future residential groundwater ingestion exposure scenario. Thallium was the principal COPC responsible for HIs in the range of 2.8 to 3.0 for the target organs skin, kidney, liver, and central nervous system (ingestion exposures contributed the significant portion of the risk) in the original 1996 RI risk assessment. Actual exposure to thallium is expected to be low however, as thallium was detected in only one well during the 1995 Phase II RI and was not detected in any well samples taken in April 2005.

RME estimates for noncarcinogenic hazard for future recreational sediment exposure (0.0075)

and future industrial groundwater exposure (0.47) were below the benchmark threshold HI (1.0). Adverse noncarcinogenic effects are not expected when the HI is below 1.

At Site 7, the underlying groundwater is not used as a potable water supply, and there are no plans for base closure or realignment that would result in Site 7 being considered for future residential land use. Therefore, the residential use (and exposure of residents to groundwater at the Site) is not a RME scenario.

#### **Review of Potential Impacts of New or Changed (Since 1995) Methods and Applicable or Relevant and Appropriate Requirements (ARARs) on the Human Health Risk Assessment**

Recent changes in risk assessment methods include updates to exposure factors, dermal guidance, and methods for estimating statistical exposure point concentrations (EPCs) via upper confidence limits. In addition, toxicity factors published in EPA's Integrated Risk Information System and other peer-reviewed sources have been revised.

For the reevaluation of the risk assessment, which is included in Appendix D of the FS report, groundwater COPCs were screened against risk-based benchmarks. Groundwater COPC risks were qualitatively reevaluated using the latest toxicity factors. Compared to the risks presented in the original RI report, the HQ for thallium would still exceed 1, but the value increases by a factor of 1.5. The sum of groundwater cancer risks from 1,1,2-trichloroethane, benzene, and chloroform would increase by a factor of 2.5, but would still be within the target acceptable risk range.

As noted previously, actual exposure to thallium is expected to be low as thallium was detected in only one well during the 1995 Phase II RI and

was not detected in any well samples taken in April 2005.

Using current guidance for exposure assumptions and toxicity factors applied to sediment exposure, the estimated risks would still be below the target acceptable risk range, but the revised HQ and cancer risk would be slightly increased, compared to the original RI report.

In conclusion, the updated human health risk assessment methods, guidance, and toxicity factors were used to reevaluate exposure to Site 7 groundwater and sediment. Several minor changes were identified that would impact the Site 7 RI report's risk calculations, but none of the major conclusions of the human health risk assessment would be affected.

#### **Summary of Ecological Risk Assessment**

As part of the Phase II RI, an ecological risk assessment was conducted by performing risk screening-level assessments as Tier 1 of the three-tiered approach in accordance with guidance from EPA. Ecological risks were estimated using HQs, where an HQ exceeding 1 is considered an indicator of potential concern. Arsenic was the only inorganic compound detected in a moist soil sample collected north of the site that exceeded its **ecological screening value (ESV)**, but the HQ was indicative of low potential risk. For purposes of the Phase II RI, the moist soil sample was conservatively treated as a sediment sample. No organic compounds were detected in the site sample. Aluminum and vanadium were conservatively retained as final COPCs since no suitable ESVs were available, but both of these metals were present at concentrations lower than background.

The results of the Phase II RI sampling and the 1993 RI/FS (i.e., Phase I) sampling suggest that potential risks to ecological receptors at Site 7 are insignificant. Results of the Phase II RI

groundwater sampling investigation indicate that groundwater has been impacted by some site-related contaminants and downgradient migration is possible. Surface water is not present near the site in the direction of groundwater flow, and hence, groundwater-to-surface water contaminant migration is not a concern. The nearest surface water north of the site was sampled as part of the NWS Earle watershed sampling program and was found to contain nothing potentially related to Site 7. The only compound found in the watershed sample WSSW30, at a concentration above any conservative ARAR or to be considered (TBC) guidance was 0.069 µg/L of mercury. Although loose sand has been placed on the landfill, some runoff of contaminants from site soils to adjacent surface soils is possible, mainly to the north, since the site slopes heavily in that direction. However, no organics were detected and no inorganics exceeded the ESVs in the collected sample, suggesting no significant overland migration. This also suggests that contaminant concentrations in surface soils in the landfill are most likely insignificant. Therefore, it was concluded that significant overland migration of contaminants from Site 7 does not appear to be occurring, no waterways exit the area, and groundwater is not expected to migrate the extensive distances to the nearest surface water. For these reasons, contaminant inputs to the watershed from Site 7 do not appear to be possible. Watershed samples were taken several hundred yards away, but again, no drainageways connect Site 7 and those waterways.

As part of the finalization of the FS, potential risks to plants, soil invertebrates, mammals, and birds resulting from exposure to chemicals in the surface soil were evaluated by comparing chemical concentrations to **Ecological Soil Screening Levels (Eco-SSLs)** developed by EPA. As presented in Table 9, only two metals (lead and vanadium) were detected at concentrations that slightly exceeded their

#### 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.

respective avian Eco-SSLs. However, the detected concentrations of lead and vanadium were less than the maximum detected concentrations of these metals in the background samples. In fact, all of the metals detected in the moist soil sample were detected at greater concentrations in background soil samples except zinc, which was not detected at

a concentration that exceeded any of the Eco-SSLs. Therefore, any potential risks from these metals are within background risks.

### **COPCS AND COMPARISON TO 2005 AND 2009 GROUNDWATER RESULTS**

Results from the baseline human health risk assessment for future residential groundwater exposure scenario were within EPA's target acceptable risk range for RME calculated cancer risks. The principal COPCs that were identified in the risk calculation were 1,1,2-TCA, benzene and chloroform. None of these compounds were detected at levels exceeding EPA MCLs or NJDEP GWQs during either the April 2005 or July 2009 sampling events. For the RME for noncarcinogenic future residential groundwater risk, thallium was identified as the principal COPC contributing to unacceptable risk. Thallium had been detected in one well during the 1995-1996 Phase II RI. Thallium was not detected in any of the five site monitoring wells during the April 2005 groundwater sampling event.

### **REMEDATION GOALS AND OBJECTIVES**

The overall objective for the remediation of CERCLA sites is to protect human health and the environment from current or future risks posed by the site. Based on the baseline human health risk assessment, the ecological risk assessment, the RI results, the April 2005 and July 2009 groundwater sampling events, and the current and future use of the site, the Navy and EPA, with concurrence from the NJDEP, have determined that a CERCLA remedial action is not warranted for Site 7.

### **REMEDIAL ALTERNATIVES CONSIDERED**

The Navy, in agreement with the EPA and NJDEP, concurs that a CERCLA remedial action is not warranted at Site 7. Therefore, based on

the RI/FS process, no further action is proposed for Site 7.

### **State and Community Acceptance**

The state of New Jersey supports the preferred alternative for Site 7. Community acceptance of the preferred alternative will be evaluated at the conclusion of the public comment period and will be described in the **Record of Decision (ROD)**. Public comments on this Proposed Plan will help address state acceptance and community acceptance.

### **COMMUNITY PARTICIPATION**

**The Navy solicits written comments from the community on the Proposed Plan for Site 7 – Landfill South of “P” Barricades (OU 10).** The Navy has set a public comment period from **August 20, 2010 through September 19, 2010** to encourage public participation in the decision process for Site 7 (OU 10).

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 7:00 p.m. on Tuesday, September 14, 2010 and will be held at the Monmouth County Library Headquarters, 125 Symmes Drive, Manalapan, New Jersey.**

Comments received during the public comment period will be summarized and responses will be provided in the **Responsiveness Summary** section of the ROD. The ROD is the document that will present the Navy's decision for Site 7 (OU 10).

**To send written comments, contact:**

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**Please note that all comments must be submitted and postmarked on or before September 19, 2010.**

## GLOSSARY OF TERMS

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

**Administrative Record:** A compilation of information established for all CERCLA sites made available to the public at the start of the Remedial Investigation (RI) for remedial actions, or at the time of Engineering Evaluation/Cost Analysis (EE/CA) for removal actions. Information in the Administrative Record supports the selected remedy for the remedial actions and removal actions.

**Applicable or Relevant and Appropriate Requirements (ARARs):** The federal, state, and local environmental rules, regulations, and criteria that must be met by the selected cleanup action under CERCLA.

**Carcinogenic Risk:** Cancer risks are expressed as a number reflecting the increased chance that a person will develop cancer if exposed to chemicals or substances. For example, EPA's acceptable risk range for Superfund hazardous waste sites is  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ , meaning there is 1 additional chance in 10,000 ( $1 \times 10^{-4}$ ) to 1 additional chance in 1 million ( $1 \times 10^{-6}$ ) that a person will develop cancer.

**Comprehensive Environmental Response, Compensation and Liability Act (CERCLA):** The Federal statute enacted in 1980 and amended in 1986 by the Superfund Amendments and Reauthorization Act (SARA) that establishes a comprehensive, statutory framework for identifying, investigating, and cleaning up releases of hazardous substances to the environment. CERCLA authorizes the President to take response actions when a release or the threat of a release is discovered. Through Executive Order 12580, signed in January 1987, the President directs the Secretary of Defense to implement investigation and cleanup measures in consultation with U.S.

Environmental Protection Agency for releases of hazardous substances from facilities under the jurisdiction of the Secretary.

**Chemicals of Potential Concern (COPCs):** Contaminants found in site-specific media, deemed by the human health risk assessment estimation calculation rules to be a compound potentially contributing to human health risk. Chemicals are selected to represent site contamination.

**Ecological Screening Value (ESV):** Contaminant levels associated with a low probability of unacceptable risks to ecological receptors, which are used by the U.S. Environmental Protection Agency to screen contaminated sites for further investigation.

**Ecological Soil Screening Level (Eco-SSL):** Soil concentration protective of terrestrial organisms, unacceptable adverse effects should not occur to ecological receptors at or below this value.

**Explosive Safety Quantity Distance Arcs (ESQD):** A restrictive design and land use criterion for military explosives safe handling and operational controls to ensure personnel and facilities maintain sufficient separation from potential explosive hazards.

**Feasibility Study (FS):** Based on data collected during the remedial investigations, options for final cleanup actions or remediation are developed and evaluated. The most feasible option that satisfies the applicable or relevant and appropriate requirements for mitigating confirmed environmental contamination is then recommended. The FS is divided into two phases – initial screening of alternatives of alternatives, and detailed analysis of

alternatives. The detailed analysis considers the following nine criteria required by the NCP: 1) Overall protection of Human Health and the Environment, 2) Compliance with ARARs, 3) Long-Term Effectiveness and Permanence, 4) Reduction of Toxicity, Mobility, and Volume through Treatment, 5) Short-Term Effectiveness, 6) Implementability, 7) Cost, 8) Community Acceptance, and 9) State Acceptance.

**Groundwater Quality Standards (GWQS):** New Jersey promulgated groundwater quality requirements per N.J.A.C. 7:9-6.

**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. Exceedances of an HQ of 1 are associated with an increased level of concern about adverse non-cancer health effects.

**Information Repository:** Collections of site information that include items, which are related to the site, but may or may not be suitable for incorporation in the administrative record.

**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.

**Maximum Contaminant Level (MCL):** Maximum allowable amount of a given contaminant in drinking water as established by EPA. This is an enforceable standard.

**Maximum Contaminant Level Goal (MCLG):** The level of a contaminant in drinking water below which there is no known or expected risk to health. These are established by EPA and allow for a margin of safety but are non-enforceable public health goals.

**National Priorities List (NPL):** The list, compiled by EPA pursuant to CERCLA section 105, of uncontrolled or abandoned hazardous substance releases in the U.S. that are priorities for long-term remedial evaluation and response. The NPL is a compilation of sites scoring 28.5 or higher on the EPA HRS or HRS2. EPA is required to update the NPL at least once a year. A site must be on the NPL to receive money from the Trust Fund for remedial action.

**Noncarcinogenic Hazard:** 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.

**Proposed Remedial Action Plan (Proposed Plan):** A listing of proposed alternatives to remedy or mitigate risks identified for purposes of cleaning up a contaminated site.

**Public Comment Period:** A time for the public to review and comment on various documents and actions taken by the Navy, EPA, or NJDEP. 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.

**Reasonable Maximum Exposure (RME):** Cancer risks and non-cancer hazards to the Reasonably Maximally Exposed Individual were

estimated based on assuming receptor activity patterns that would represent the highest exposure that is reasonably expected to occur for the predicted amount and duration of exposure to contaminants at the site, which is referred to as Reasonable Maximum Exposures.

**Record of Decision (ROD):** The official term used by CERCLA and the NCP for the documentation of a final remedial response action decision at a NPL site.

**Remedial Action Objective (RAO):** the RAO provides the basis for developing criteria for the implementation of the Remedial Action Plan.

**Remedial Investigation (RI):** A detailed study that includes media sampling to determine the nature and extent of contamination at a site. The RI emphasizes data collection and site characterization including sampling and monitoring as necessary to gather sufficient information to determine the necessity for remedial action and to support the evaluation of remedial alternatives. The RI includes a health assessment, which estimates risks to human health and the environment as a result of the contamination. The RI also provides site-specific information for the FS.

**Responsiveness Summary:** A summary of oral and/or written public comments received during a comment period on key documents, and the response to those comments.

**Semivolatile Organic Compounds (SVOCs):** A class of organic compounds that do not readily evaporate under atmospheric conditions.

**Site Inspection (SI):** An on-site investigation to determine whether there is a release or potential release and the nature of the associated threats. The SI consists of limited sampling and analysis designed to verify the findings of the Preliminary Assessment. The data collected must also support the decision to continue to the RI/FS

phase or remove the site from further investigation.

**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.

**Target Analyte List (TAL):** List of routine organic compounds included in the EPA Contract Laboratory Program.

**Target Compound List (TCL):** List of routine metals included in the EPA Contract Laboratory Program.

**Total Petroleum Hydrocarbons (TPHs):** Laboratory analysis that measures petroleum-related compounds in total, rather than as individual compounds.

**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.





## **TABLES**

**TABLE 1  
SITE 7 GROUNDWATER ANALYTICAL RESULTS  
1986 SITE INSPECTION  
NWS EARLE, COLTS NECK, NEW JERSEY**

| Sample ID:<br>Duplicate:<br>Sample Date:<br>Well Installation Date: | NJDEP<br>GWQS <sup>(1)</sup> | EPA<br>MCLs <sup>(2)</sup> | SITE WELLS |           |           | UPGRADIENT WELL |
|---|------------------------------|----------------------------|------------|-----------|-----------|-----------------|
|   |                              |                            | 07MW001    | 07MW002   | 07MW002B  | 07MW003         |
|   |                              |                            | July 1986  | July 1986 | July 1986 | July 1986       |
|   |                              |                            | 3/4/1986   | 3/5/1986  | 3/5/1986  | 1/24/1986       |
| <b>SOLUBLE INORGANICS (µg/L)</b>                                    |                              |                            |            |           |           |                 |
| Antimony  | 6                            | 6                          | ND         | ND        | ND        | ND              |
| Arsenic   | 0.02                         | 10                         | ND         | ND        | ND        | ND              |
| Beryllium   | 1                            | 4                          | ND         | ND        | ND        | ND              |
| Cadmium   | 4                            | 5                          | ND         | ND        | ND        | ND              |
| Chromium  | 70                           | 100                        | ND         | ND        | ND        | ND              |
| Copper  | 1,300                        | 1,300                      | ND         | ND        | ND        | ND              |
| Lead  | 5                            | 15                         | ND         | ND        | ND        | ND              |
| Mercury   | 2                            | 2                          | ND         | ND        | ND        | ND              |
| Nickel  | 100                          | ---                        | ND         | ND        | ND        | ND              |
| Selenium  | 40                           | 50                         | ND         | ND        | ND        | ND              |
| Silver  | 40                           | 100                        | ND         | ND        | ND        | ND              |
| Thallium  | 0.5                          | 2                          | ND         | ND        | ND        | ND              |
| Zinc  | 2,000                        | 5,000                      | 30         | 30        | ND        | 90              |
| <b>SEMIVOLATILES (µg/L)</b>   |                              |                            |            |           |           |                 |
| Di-n-butylphthalate   | 700                          | ---                        | 54         | ND        | ND        | ND              |
| <b>VOLATILES (µg/L)</b>   |                              |                            |            |           |           |                 |
| Acetone   | 6,000                        | ---                        | 22         | 380       | 141       | ND              |
| Methylene Chloride <sup>(3)</sup>                                   | 3                            | 5                          | 7 J        | 9 J       | 11        | 6 J             |
| <b>PESTICIDES/PCBS (µg/L)</b>                                       |                              |                            |            |           |           |                 |
| Total Pesticides  | ---                          | ---                        | ND         | ND        | ND        | ND              |
| <b>TPH (µg/L)</b>   |                              |                            |            |           |           |                 |
| Total Petroleum Hydrocarbons  | None Noticeable              | ---                        | ND         | ND        | ND        | ND              |
| <b>MISCELLANEOUS PARAMETERS (µg/L)</b>                              |                              |                            |            |           |           |                 |
| Total Organic Carbon  | ---                          | ---                        | 1.73       | 6.51      | 1.42      | 2.15            |
| Total Organic Halides   | ---                          | ---                        | 23         | 18        | 12        | 18              |

J -- Value is considered estimated due to exceedance of technical quality control criteria or because result is less than the Contract Required Quantitation Limit (CRQL).

ND -- Not detected. Detection limit was not reported.

--- No criteria are available.

Shaded values exceed either the NJDEP GWQS or the EPA MCLs.

**Bolded values exceed the upgradient well value.**

<sup>(1)</sup> New Jersey Department of Environmental Protection Groundwater Quality Standards, July, 2008.

<sup>(2)</sup> EPA National Drinking Water Standards Maximum Contaminant Levels, June 2003.

<sup>(3)</sup> Methylene chloride was detected in the field blank at a concentration of 11 ug/L as per the 1986 Interim Report; therefore, the samples results were not highlighted as exceedences.

**TABLE 2**  
**DATA SUMMARY OF POSITIVE ANALYTICAL RESULTS**  
**SITE 7 TEST PIT SOILS**  
**NWS EARLE, COLTS NECK, NEW JERSEY**

| Sample ID:                              | NJDEP<br>RDCSCC <sup>(1)</sup> | NJDEP<br>NRDCSCC <sup>(2)</sup> | NJDEP<br>IGWSCC <sup>(3)</sup> | 07-001-T001 | 07-001-T001-D | 07-007-T001 |
|---|--------------------------------|---------------------------------|--------------------------------|-------------|---------------|-------------|
| Duplicate:                              |                                |                                 |                                |             | 07-001-T001   |             |
| <b>TOTAL INORGANICS (mg/kg)</b>         |                                |                                 |                                |             |               |             |
| Aluminum                                | ---                            | ---                             | ---                            | 7260        | 7634          | 5740        |
| Arsenic                                 | 20                             | 20                              | ---                            | 11.9        | 11.4          | 18.3        |
| Barium                                  | 700                            | 47,000                          | ---                            | 14.2        | 14.9          | 8.4         |
| Beryllium                               | 1                              | 1                               | ---                            | 0.32        | 0.39          | 0.31        |
| Calcium                                 | ---                            | ---                             | ---                            | 165         | 170           | 146         |
| Chromium                                | 240                            | 6,100                           | ---                            | 24.3        | 23.8          | 22.3        |
| Cobalt                                  | ---                            | ---                             | ---                            | 1.3         | 1.3           | U           |
| Copper                                  | 600                            | 600                             | ---                            | 3.1         | 3.04          | 3.3         |
| Iron                                    | ---                            | ---                             | ---                            | 15200       | 15331         | 11600       |
| Lead                                    | 400                            | 600                             | ---                            | 13.8        | 11.5          | 6           |
| Magnesium                               | ---                            | ---                             | ---                            | 555         | 559           | 358         |
| Manganese                               | ---                            | ---                             | ---                            | 15.1        | 16.9          | 6.2         |
| Nickel                                  | 250                            | 2,400                           | ---                            | 1.4         | 1.2           | 0.94 U      |
| Potassium                               | ---                            | ---                             | ---                            | 733         | 769           | 500         |
| Selenium                                | 63                             | 3,100                           | ---                            | 0.56        | 0.61          | 0.5         |
| Sodium                                  | ---                            | ---                             | ---                            | 162         | 152           | 54          |
| Vanadium                                | 370                            | 7,100                           | ---                            | 36.1        | 34.4          | 26.1        |
| Zinc                                    | 1,500                          | 1,500                           | ---                            | 13.3        | 16.9          | 10.2        |
| <b>SEMIVOLATILES (µg/kg)</b>            |                                |                                 |                                |             |               |             |
| Di-n-butylphthalate                     | 5,700                          | 10,000                          | 100                            | 360 U       | NR            | 49 J        |
| Bis(2-ethylhexyl)phthalate              | 49                             | 210                             | 100                            | 90 J        | NR            | 110 J       |
| <b>PETROLEUM HYDROCARBONS (mg/kg)</b>   |                                |                                 |                                |             |               |             |
| Petroleum Hydrocarbons                  | ---                            | ---                             | ---                            | 19          | NR            | 0.005 U     |
| <b>MISCELLANEOUS PARAMETERS (mg/kg)</b> |                                |                                 |                                |             |               |             |
| Nitrate                                 | ---                            | ---                             | ---                            | 0.81        | NR            | 0.65        |
| Nitrite                                 | ---                            | ---                             | ---                            | 0.64        | NR            | U           |

Data Qualifiers:

J -- Value is considered estimated due to exceedance of technical quality control criteria or because result is less than the Contract Required Quantitation Limit (CRQL).

U -- Value is a non-detected result as reported by the laboratory.

NR -- Analysis not requested.

--- No criteria are available.

Shaded values exceed the NJDEP RDCSCC, NRDCSCC, or IGWSCC.

**TABLE 3**  
**SITE 7 GROUNDWATER ANALYTICAL RESULTS**  
**1991 PHASE I RI MAXIMUM DETECTED CONCENTRATIONS**  
**NWS EARLE, COLTS NECK, NEW JERSEY**

| Sample ID:<br>Well Installation Date:  | NJDEP<br>GWQS <sup>(1)</sup> | EPA<br>MCLs <sup>(2)</sup> | SITE WELLS          |                     |                      |                      | UPGRADIENT WELL      |
|--|------------------------------|----------------------------|---------------------|---------------------|----------------------|----------------------|----------------------|
|  |                              |                            | 07MW001<br>3/4/1986 | 07MW002<br>3/5/1986 | 07MW004<br>2/28/1991 | 07MW005<br>2/27/1991 | 07MW003<br>1/24/1986 |
| <b>TOTAL INORGANICS (µg/L)</b>         |                              |                            |                     |                     |                      |                      |                      |
| Aluminum                               | 200                          | ---                        | 27800               | 2000                | 13300                | 7800                 | 10400                |
| Arsenic                                | 0.02                         | 10                         | 40                  | 0.9 U               | 98.8                 | 196                  | 2.6                  |
| Barium                                 | 6000                         | 2000                       | 152                 | 36.5                | 234                  | 416                  | 44                   |
| Beryllium                              | 1                            | 4                          | 1.3                 | 0.6 U               | 0.9                  | 0.6                  | 0.6 U                |
| Cadmium                                | 4                            | 5                          | 6.9                 | 5 U                 | 5.6                  | 8                    | 5 U                  |
| Calcium                                | ---                          | ---                        | 1600                | 4900                | 5800                 | 5900                 | 1700                 |
| Chromium                               | 70                           | 100                        | 248                 | 10.7                | 226                  | 289                  | 33                   |
| Cobalt                                 | ---                          | ---                        | 13                  | 5.4                 | 9.4                  | 12                   | 14                   |
| Copper                                 | 1300                         | 1300                       | 140                 | 25                  | 102.2                | 160                  | 28.5                 |
| Iron                                   | 300                          | 300                        | 353000              | 14500               | 198000               | 282000               | 48200                |
| Lead                                   | 5                            | 15                         | 156                 | 5.2                 | 122                  | 150                  | 10.7                 |
| Magnesium                              | ---                          | ---                        | 2700                | 1400                | 4300                 | 5600                 | 2100                 |
| Manganese                              | 50                           | 50                         | 619                 | 160                 | 520                  | 682                  | 146                  |
| Mercury                                | 2                            | 2                          | 0.34                | 0.2 U               | 0.22                 | 1.9                  | 0.2 U                |
| Nickel                                 | 100                          | ---                        | 42                  | 5.1                 | 24                   | 23                   | 5.5                  |
| Potassium                              | ---                          | ---                        | 3200                | 1100                | 3200                 | 2600                 | 3100                 |
| Selenium                               | 40                           | 50                         | 3.9                 | 1.1 U               | 1.7                  | 1.1 U                | 1.1 U                |
| Sodium                                 | 50000                        | ---                        | 4400                | 27700               | 6895                 | 18800                | 5000                 |
| Vanadium                               | ---                          | ---                        | 59                  | 3.2                 | 62                   | 18                   | 56                   |
| Zinc                                   | 2000                         | 5000                       | 481                 | 86.5                | 312.5                | 464                  | 58.2                 |
| <b>SEMIVOLATILES (µg/L)</b>            |                              |                            |                     |                     |                      |                      |                      |
| 2,2'-Oxybis(1-chloropropane)           | 300                          | ---                        | 10 U                | 10 U                | 10 U                 | 1 J                  | 11 U                 |
| Benzoic Acid                           | 30000                        | ---                        | 51 U                | 3 J                 | 52 U                 | 50 U                 | 54 U                 |
| <b>VOLATILES (µg/L)</b>                |                              |                            |                     |                     |                      |                      |                      |
| 1,1,1,2-Tetrachloroethane              | 1                            | ---                        | 12 U                | 5 U                 | 100 U                | 8                    | 5 U                  |
| 1,1,2-Trichloroethane                  | 3                            | 5                          | 5 U                 | 5 U                 | 100 U                | 26                   | 5 U                  |
| 1,2-Dichloroethane                     | 0.3                          | 5                          | 5 U                 | 5 U                 | 5 U                  | 1 J                  | 5 U                  |
| 1,2-Dichloroethene                     | 70                           | 70                         | 5 U                 | 5 U                 | 5 U                  | 4 J                  | 5 U                  |
| 2-Butanone                             | 300                          | ---                        | 26 U                | 10 U                | 200 U                | 88                   | 10 U                 |
| Acetone                                | 6000                         | ---                        | 10000 E             | 640 E               | 1100                 | 2700 E               | 87 B                 |
| Chlorobenzene                          | 50                           | 100                        | 5 U                 | 5                   | 5 U                  | 5 U                  | 5 U                  |
| Chloroform                             | 70                           | ---                        | 1 JB                | 5 U                 | 5 U                  | 5 U                  | 5 U                  |
| Methylene Chloride                     | 3                            | 5                          | 4 JB                | 3 JB                | 2 JB                 | 2 J                  | 2 JB                 |
| <b>PESTICIDES/PCBS (µg/L)</b>          |                              |                            |                     |                     |                      |                      |                      |
| Heptachlor                             | 0.008                        | 0.4                        | 0.056 U             | 0.01 J              | 0.051 U              | 0.063 U              | 0.069 U              |
| <b>MISCELLANEOUS PARAMETERS (mg/L)</b> |                              |                            |                     |                     |                      |                      |                      |
| Ammonia-n                              | 3                            | ---                        | 0.1 U               | 2.1                 | 0.1 U                | 0.1 U                | 0.13                 |
| Carbonaceous Bod-5 Day                 | ---                          | ---                        | 8.1                 | 1.2                 | 4.35                 | 8.6                  | 8.1                  |
| Chemical Oxygen Demand                 | ---                          | ---                        | 170                 | 58.1                | 188.5                | 323                  | 103                  |
| Chloride                               | 250                          | 250                        | 11.8                | 27.8                | 15.55                | 28.2                 | 9.7                  |
| Nitrite/nitrate                        | 10                           | 1                          | 0.52                | 2.2                 | 0.3                  | 0.27                 | 0.29                 |
| Phosphate                              | ---                          | ---                        | 0.61                | 0.52                | 1.195                | 1.4                  | 1                    |
| Sulfate                                | 250                          | 250                        | 10                  | 38.7                | 21.75                | 44                   | 33.9                 |
| Turbidity (NTUs)                       | ---                          | ---                        | 553                 | 1160                | 2005                 | 3580                 | 1160                 |

Data Qualifiers:

- B -- Positive result is considered to be an artifact of blank contamination, and should not be considered present.
- E -- Concentration exceeded the calibration range of the instrument.
- J -- Value is considered estimated due to exceedance of technical quality control criteria or because result is less than the Contract Required Quantitation Limit (CRQL).
- U -- Value is a non-detected result as reported by the laboratory.
- NA -- No result is available/applicable for this parameter in this sample.
- No criteria are available.

Shaded values exceed the screening criteria.

**Bolded values exceed the upgradient well concentrations.**

NTU -- Nephelometric Turbidity Unit

mg/L -- milligrams per liter

µg/L -- micrograms per liter

<sup>(1)</sup> New Jersey Department of Environmental Protection Groundwater Quality Standards, July, 2008.

<sup>(2)</sup> EPA National Drinking Water Standards Maximum Contaminant Levels, June 2003.

**NOTE:** The maximum concentration of three rounds were screened against criteria for each well location. Field duplicate results were averaged. If one field duplicate result was non-detect, the maximum concentration was used.

Database source file: H:\EARLE\SITE 7\PRAP TABLE 3\SITE7\_SQL.DBF data retrieved on: 03/06/09

**TABLE 4**  
**SUMMARY OF 1996 RI DETECTED COMPOUNDS IN GROUNDWATER COMPARED TO BACKGROUND AT SITE 7**  
**NWS EARLE, COLTS NECK, NEW JERSEY**

| SUBSTANCE                              | NJDEP GWQS <sup>(1)</sup> | EPA MCLs <sup>(2)</sup> | BACKGROUND <sup>(3)</sup> |                             | SITE-RELATED |               |               |              |    |
|--|---------------------------|-------------------------|---------------------------|-----------------------------|--------------|---------------|---------------|--------------|----|
|  |                           |                         | FREQUENCY OF DETECTION    | RANGE OF POSITIVE DETECTION | 07 GW 01     | 07 GW 02      | 07 GW 04      | 07 GW 05     |    |
| <b>INORGANICS (µg/L)</b>               |                           |                         |                           |                             |              |               |               |              |    |
| Aluminum                               | 200                       | ---                     | 2 / 2                     | 242 - 393                   | 174          | <b>557</b> J  | 320           | <b>1850</b>  |    |
| Barium                                 | 6,000                     | 2,000                   | 2 / 2                     | 42.2 - 50.2                 | 11.9         | 24.2          | 26.8          | <b>112</b>   |    |
| Beryllium                              | 1                         | 4                       | 1 / 2                     | 0.40                        | 0.11 U       | 0.11 U        | 0.11 U        | <b>0.66</b>  |    |
| Calcium                                | ---                       | ---                     | 2 / 2                     | 1460 - 5870                 | 916          | 1480          | 1050          | 1330         |    |
| Chromium, total                        | 70                        | 100                     | 1 / 2                     | 14.8 - 14.8                 | 1.0 U        | 1.0 U         | 1.9           | 1.0          | U  |
| Cobalt                                 | ---                       | ---                     | 2 / 2                     | 8.4 - 28.2                  | 1.6          | 0.85          | 1.0           | 6.9          |    |
| Copper                                 | 1,300                     | 1,300                   | NOT DETECTED              | -                           | 0.77 U       | <b>1.8</b>    | <b>1.7</b>    | 0.77         | U  |
| Iron                                   | 300                       | 300                     | 2 / 2                     | 298 - 706                   | <b>913</b>   | 145           | <b>561</b>    | 63.7         |    |
| Lead                                   | 5                         | 15                      | NOT DETECTED              | -                           | <b>2.3</b>   | 1.5 U         | 1.5 U         | 1.5          | UJ |
| Magnesium                              | ---                       | ---                     | 2 / 2                     | 1800 - 2120                 | 723          | 594           | 1990          | <b>6920</b>  |    |
| Manganese                              | 50                        | 50                      | 2 / 2                     | 192 - 246                   | 19.0         | 48.9          | 15.2          | <b>63.7</b>  |    |
| Mercury                                | 2                         | 2                       | 1 / 2                     | 0.047                       | 0.0050       | 0.033         | 0.017         | <b>0.34</b>  | J  |
| Nickel                                 | 100                       | ---                     | 2 / 2                     | 3.4 - 11.3                  | 4.2          | 1.2           | 3.1           | 4.8          |    |
| Potassium                              | ---                       | ---                     | 2 / 2                     | 714 - 2110                  | 941          | 1400          | 1140          | 1950         |    |
| Sodium                                 | 50,000                    | ---                     | 2 / 2                     | 4710 - 7760                 | 4240         | <b>20600</b>  | 7040          | <b>17800</b> |    |
| Thallium                               | 0.5                       | 2                       | NOT DETECTED              | -                           | <b>4.0</b>   | 3.6 U         | 3.6 U         | 3.6          | U  |
| Vanadium                               | ---                       | ---                     | 1 / 2                     | 1.4                         | 0.83         | 0.61 U        | 0.71          | 0.61         | U  |
| Zinc                                   | 2,000                     | 5,000                   | 2 / 2                     | 5.0 - 8.8                   | 1.6 U        | 1.6 U         | 1.6 U         | <b>13.4</b>  |    |
| <b>ORGANICS (µg/L)</b>                 |                           |                         |                           |                             |              |               |               |              |    |
| 1,1,2-Trichloroethane                  | 3                         | 5                       | NOT DETECTED              | -                           | 10.0 U       | 10.0 U        | 10.0 U        | <b>1.0</b>   | J  |
| 1,2-Dichloroethene (total)             | 70                        | 70                      | NOT DETECTED              | -                           | 10.0 U       | 10.0 U        | 10.0 U        | <b>4.0</b>   | J  |
| Benzene                                | 0.2                       | 5                       | NOT DETECTED              | -                           | 10.0 U       | <b>1.0</b> J  | 10.0 U        | 10.0 U       |    |
| Chlorobenzene                          | 50                        | 100                     | NOT DETECTED              | -                           | 10.0 U       | <b>11.0</b>   | 10.0 U        | 10.0 U       |    |
| Chloroform                             | 70                        | ---                     | NOT DETECTED              | -                           | 10.0 U       | 10.0 U        | <b>2.0</b> J  | 10.0 U       |    |
| <b>MISCELLANEOUS PARAMETERS (mg/L)</b> |                           |                         |                           |                             |              |               |               |              |    |
| Ammonia nitrogen                       | 3                         | ---                     | NOT DETECTED              | -                           | 1.0 U        | <b>0.90</b> J | 1.0 U         | 1.0          | U  |
| Biochemical oxygen demand              | ---                       | ---                     | 2 / 2                     | 0.80 - 1.9                  | 1.3 J        | <b>2.0</b>    | 0.70 J        | 0.90         | J  |
| Chemical oxygen demand                 | ---                       | ---                     | 2 / 2                     | 4.0 - 5.0                   | 2.0 J        | <b>28.0</b>   | <b>11.0</b>   | 4.0          | J  |
| Chloride                               | 250                       | 250                     | 2 / 2                     | 8.0 - 10.0                  | 9.0          | <b>27.0</b>   | <b>13.0</b>   | <b>25.0</b>  |    |
| Nitrate nitrogen                       | 10                        | ---                     | 2 / 2                     | 1.3 - 1.6                   | 0.50 U       | 0.15 J        | 0.50 U        | 0.50         | U  |
| Sulfate                                | 250                       | 250                     | 2 / 2                     | 9.0 - 10.0                  | 7.0          | <b>25.0</b>   | <b>13.0</b>   | <b>44.0</b>  |    |
| Total organic carbon                   | ---                       | ---                     | 2 / 2                     | 0.8 - 0.8                   | 1.0 U        | <b>9.0</b>    | <b>0.90</b> J | <b>2.0</b>   |    |

J -- The identification of the analyte is acceptable; the reported value is an estimate.

U -- Analyte included in the analysis, but not detected at or above the quantitation limit.

UJ -- The analyte was not detected at or above the quantitation limit. The quantitation limit is an estimate.

Shaded value exceeds the NJDEP GWQS or USEPA MCLs.

**Bolded value exceeds background concentration.**

<sup>(1)</sup> New Jersey Department of Environmental Protection Groundwater Quality Standards, July, 2008.

<sup>(2)</sup> EPA National Drinking Water Standards Maximum Contaminant Levels, June 2003.

<sup>(3)</sup> Background wells include BG GW 03 and 07 GW 03.

**TABLE 5  
OCCURRENCE AND DISTRIBUTION OF INORGANICS IN SITE 7 SURFACE SOIL  
NWS EARLE, COLTS NECK, NEW JERSEY**

| SUBSTANCE                 | BACKGROUND <sup>(1)</sup> |                             | SITE-RELATED           |                |
|---------------------------|---------------------------|-----------------------------|------------------------|----------------|
|                           | FREQUENCY OF DETECTION    | RANGE OF POSITIVE DETECTION | FREQUENCY OF DETECTION | 07 SD WET 7-B2 |
| <b>INORGANICS (mg/kg)</b> |                           |                             |                        |                |
| Aluminum                  | 5 / 5                     | 1710 - 5310                 | 1 / 1                  | 2770           |
| Arsenic                   | 5 / 5                     | 1.3 - 14.4                  | 1 / 1                  | 11.7           |
| Barium                    | 5 / 5                     | 1.6 - 31.0                  | 1 / 1                  | 8.6            |
| calcium                   | 5 / 5                     | 39.3 - 519                  | 1 / 1                  | 568            |
| Chromium                  | 5 / 5                     | 7.4 - 59.5                  | 1 / 1                  | 13.2           |
| Copper                    | 5 / 5                     | 1.0 - 8.4                   | 1 / 1                  | 3.6            |
| Iron                      | 5 / 5                     | 3700 - 62500                | 1 / 1                  | 10000          |
| Lead                      | 5 / 5                     | 1.8 - 39.4                  | 1 / 1                  | 19.6           |
| Magnesium                 | 5 / 5                     | 64.4 - 619                  | 1 / 1                  | 243            |
| Mangeneses                | 5 / 5                     | 3.1 - 214                   | 1 / 1                  | 38.1           |
| Potassium                 | 5 / 5                     | 69.0 - 792                  | 1 / 1                  | 332            |
| Sodium                    | 5 / 5                     | 17.1 - 86.2                 | 1 / 1                  | 28.7           |
| Vanadium                  | 5 / 5                     | 10.6 - 64.0                 | 1 / 1                  | 19.3           |
| Zinc                      | 5 / 5                     | 1.1 - 27.6                  | 1 / 1                  | 33.7           |

Notes:

Shaded - compound exceeds background concentration.

- (1) Background samples from BG SB 01-00, BG SG 02-00, BG SB 03-00, and BG SB 04-00. A duplicate sample was taken from BG SG 02-00.
- J The identification of the analyte is acceptable; the reported value is an estimate.
- NA Not analyzed.

**TABLE 6**  
**SUMMARY OF 1996 RI DETECTED COMPOUNDS IN SURFACE WATER COMPARED TO BACKGROUND AT SITE 7**  
**NWS EARLE, COLTS NECK, NEW JERSEY**

| SUBSTANCE                              | BACKGROUND <sup>(1)</sup> |                             | SITE-RELATED |
|--|---------------------------|-----------------------------|--------------|
|  | FREQUENCY OF DETECTION    | RANGE OF POSITIVE DETECTION | WS SW 30     |
| <b>INORGANICS (µg/L)</b>               |                           |                             |              |
| Aluminum                               | 3 / 3                     | 265 - 384                   | 94.8         |
| Barium                                 | 3 / 3                     | 16.3 - 34.0                 | 15.4         |
| Beryllium                              | 2 / 3                     | 0.22 - 0.33                 | 0.11 U       |
| Calcium                                | 3 / 3                     | 462 - 10100                 | 3470         |
| Cobalt                                 | 3 / 3                     | 0.81 - 1.9                  | 0.93         |
| Copper                                 | 2 / 3                     | 1.1 - 9.8                   | 0.77 U       |
| Iron                                   | 3 / 3                     | 160 - 702                   | 801          |
| Lead                                   | 1 / 3                     | 4.4                         | 1.5 U        |
| Magnesium                              | 3 / 3                     | 369 - 2770                  | 3450         |
| Manganese                              | 3 / 3                     | 14.0 - 55.5                 | 41.4         |
| Mercury                                | 2 / 3                     | 0.023 - 0.028               | 0.069 J      |
| Nickel                                 | 3 / 3                     | 2.1 - 7.1                   | 1.2          |
| Potassium                              | 2 / 3                     | 251 - 1850                  | 695          |
| Sodium                                 | R                         |                             | 5890         |
| Zinc                                   | 3 / 3                     | 7.6 - 29.4                  | 62           |
| <b>MISCELLANEOUS PARAMETERS (mg/L)</b> |                           |                             |              |
| Biochemical oxygen demand              | 3 / 3                     | 1.90 - 3.0                  | 3.00         |
| Chemical oxygen demand                 | 3 / 3                     | 4.0 - 29.0                  | 4.0 J        |
| Total hardness                         | 3 / 3                     | 4.0 - 38.0                  | 25.0         |
| Total organic carbon                   | 3 / 3                     | 0.40 - 9                    | 0.9 J        |
|  |                           |                             |              |

Notes:

Shaded - compound exceeds background concentration.

- (1) Background samples from BG SW 01, BG SW 02, and BG SW 04.  
 J The identification of the analyte is acceptable; the reported value is an estimate.  
 R Positive result is considered rejected based on exceedance of data validation quality control criteria.

**TABLE 7  
APRIL 2005 DATA SUMMARY OF INORGANIC AND ORGANIC  
ANALYTICAL RESULTS  
NWS EARLE SITE 7 - GROUNDWATER SAMPLES  
NWS EARLE, COLTS NECK, NEW JERSEY**

| Sample ID:               | NJDEP<br>GWQS <sup>(1)</sup> | EPA<br>MCLs <sup>(2)</sup> | SITE WELLS |          |          |            |             | UPGRADIENT WELL |
|--------------------------|------------------------------|----------------------------|------------|----------|----------|------------|-------------|-----------------|
|                          |                              |                            | MW7-01     | DUP-01   | MW7-02   | MW7-04     | MW7-05      | MW7-03          |
| Sample Date:             |                              |                            | 04/12/05   | 04/12/05 | 04/12/05 | 04/12/05   | 04/12/05    | 04/12/05        |
| Duplicate:               |                              |                            | DUP-01     | MW7-01   |          |            |             |                 |
| <b>INORGANICS (µg/L)</b> |                              |                            |            |          |          |            |             |                 |
| Aluminum                 | 200                          | ---                        | 105 U      | 121 U    | 503 U    | 114 U      | <b>1710</b> | 302 U           |
| Iron                     | 300                          | ---                        | 414 U      | 507 U    | 340 U    | <b>655</b> | <b>965</b>  | 117 U           |
| Manganese                | 50                           | ---                        | 16 U       | 17.4 U   | 118      | 12.3 U     | 38.8 L      | 914             |
| Thallium                 | 0.5                          | 2                          | 2 U        | 2 U      | 2 U      | 2 U        | 2 U         | 2 U             |
| <b>VOLATILES (µg/L)</b>  |                              |                            |            |          |          |            |             |                 |
| 1,1,2-Trichloroethane    | 3                            | 5                          | 1 U        | 1 U      | 1 U      | 1 U        | 1 U         | 1 U             |
| Benzene                  | 0.2                          | 5                          | 1 U        | 1 U      | 1 U      | 1 U        | 1 U         | 1 U             |
| Chlorobenzene            | 50                           | 100                        | 1 U        | 1 U      | 4.4      | 1 U        | 1 U         | 1 U             |
| Chloroform               | 6                            | ---                        | 1 U        | 1 U      | 1 U      | 0.72 J     | 1 U         | 1 U             |

Data Qualifiers:

J -- Value is considered estimated due to exceedance of technical quality control criteria or because result is less than the Contract Required Quantitation Limit (CRQL).

L -- Value is considered biased low due to exceedance of technical quality control criteria.

U -- Value is a non-detected result as reported by the laboratory.

Shading denotes concentrations that exceed GQS or MCL.

**Bolded value exceeds the upgradient well concentration.**

--- No criteria are available.

<sup>(1)</sup> Values from the NJDEP Ground Water Quality Standards (GWQS) Table 1 and Interim Specific Criteria.

<sup>(2)</sup> Values from the EPA List of Drinking Water Contaminants & Maximum Contaminant Levels (MCLs), July 2002.

**TABLE 8  
OCCURRENCE AND DISTRIBUTION OF SELECTED ORGANIC COMPOUNDS IN DISCRETE  
INTERVAL GROUNDWATER SAMPLES AT SITE 7  
NWS EARLE, COLTS NECK, NEW JERSEY**

|   | <b>Benzene</b> | <b>Chlorobenzene</b> | <b>Chloroform</b> | <b>1,1,2-Trichloroethane</b> |
|---|----------------|----------------------|-------------------|------------------------------|
| <b>NJDEP GWQS</b>                       | 1              | 50                   | 70                | 30                           |
| <b>EPA MCL</b>                          | 5              | 100                  | 100               | 5                            |
| <b>Sample ID</b>                        |                |                      |                   |                              |
| 07HP1-19-20090708                       | 0.16J          | ND                   | 0.32J             | ND                           |
| 07HP1-38-20090708                       | 0.27J          | ND                   | ND                | ND                           |
| 07HP1-50-20090708                       | 0.19J          | ND                   | ND                | ND                           |
| 07HP2-15-20090707                       | ND             | ND                   | ND                | ND                           |
| 07HP2-29-20090707                       | ND             | ND                   | ND                | ND                           |
| DUP-01 (duplicate of 07HP2-29-20090707) | ND             | ND                   | ND                | ND                           |
| 07HP2-48-20090707                       | 0.21J          | ND                   | ND                | ND                           |

Notes: All concentration values in µg/L  
 Nomenclature for Sample ID: 07HP1-19-20090708  
     07HP1 =Site 7 HydroPunch® Boring 1  
     19 = Sample depth below ground  
     20090708 =Sample Date = July 8, 2009

J – Estimated Value  
 ND – not detected

NJDEP GWQS – New Jersey Department of Environmental Protection Groundwater Quality Standard

**TABLE 9  
 ECOLOGICAL SCREENING TABLE  
 SITE 7 - SURFACE SOIL  
 NWS EARLE, COLTS NECK, NEW JERSEY**

| Chemical  | Sample ID #<br>07SDWET7-B2* | Ecological Soil Screening Levels |                       |                   |                   |
|-----------|-----------------------------|----------------------------------|-----------------------|-------------------|-------------------|
|           |                             | Plants                           | Soil<br>Invertebrates | Wildlife          |                   |
|           |                             |                                  |                       | Avian             | Mammal            |
| Aluminum  | 2770                        | NA <sup>(1)</sup>                | NA <sup>(1)</sup>     | NA <sup>(1)</sup> | NA <sup>(1)</sup> |
| Arsenic   | 11.7                        | 18                               | NA                    | 43                | 46                |
| Barium    | 8.6                         | NA                               | 330                   | NA                | 2,000             |
| Chromium  | 13.2                        | NA                               | NA                    | III-26            | III-34            |
|           |                             |                                  |                       | VI-NA             | VI-81             |
| Copper    | 3.6                         | 70                               | 80                    | 28                | 49                |
| Iron      | 10000                       | NA <sup>(2)</sup>                | NA                    | NA                | NA                |
| Lead      | 19.6                        | 120                              | 1,700                 | 11                | 56                |
| Manganese | 38.1                        | 220                              | 450                   | 4300              | 4000              |
| Vanadium  | 19.3                        | NA                               | NA                    | 7.8               | 280               |
| Zinc      | 33.7                        | 160                              | 120                   | 46                | 79                |

Units are mg/kg. Cells are shaded if the screening criteria is exceeded

NA = Not available; data were insufficient to derive an Eco-SSL.

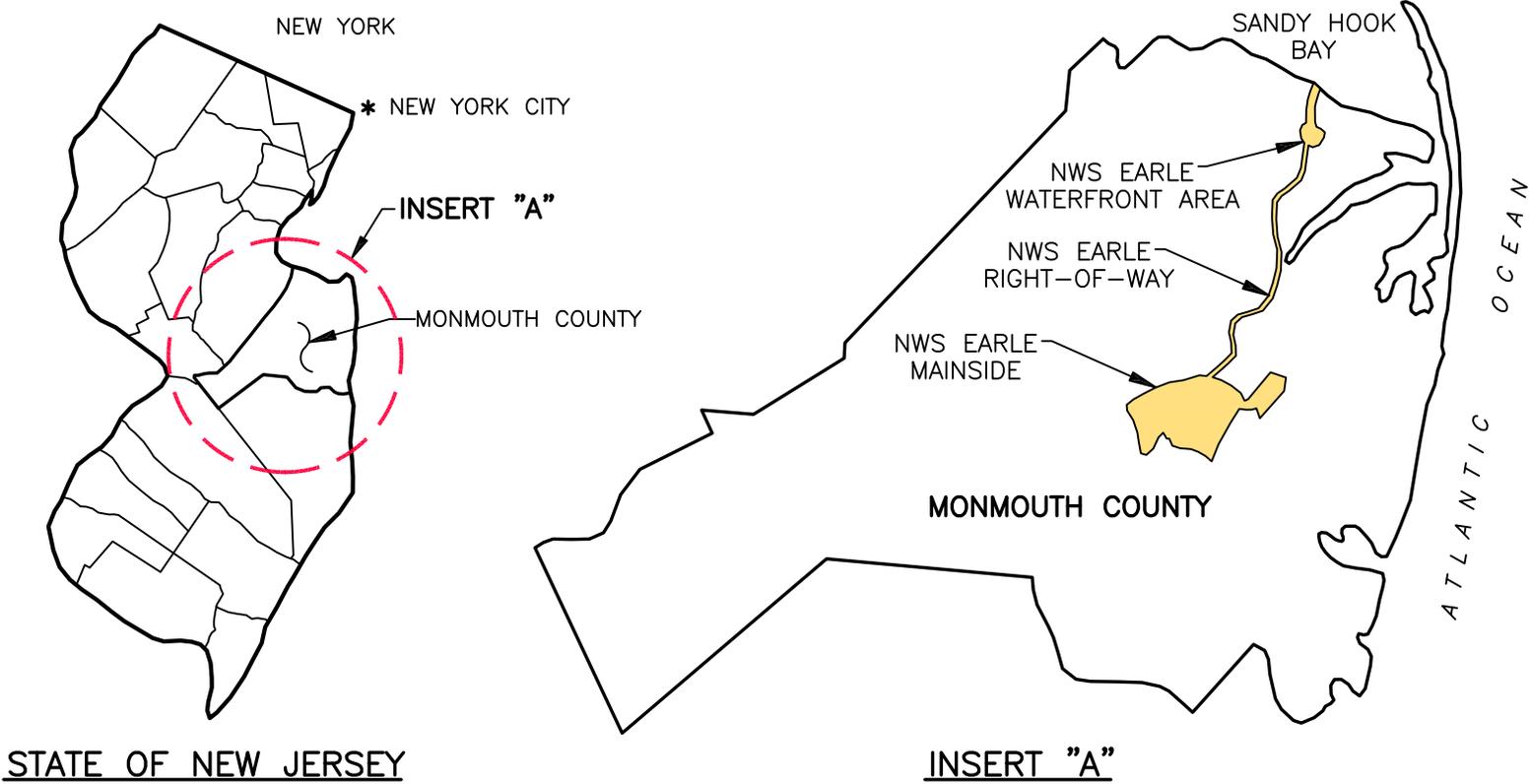
(1) - Aluminum is considered a COPC only when the soil pH is less than 5.5.

(2) - Iron is not expected to be toxic to plants with a soil pH between 5 and 8.

Eco-SSL documents are available on-line at <http://www.epa.gov/ecotox/ecossl/>.

**\*NOTE:** Sample 07SDWET7-B2 was a moist, surface soil sample collected during the 1996 RI from a depth of 0-6 inches just north of the landfill boundary.

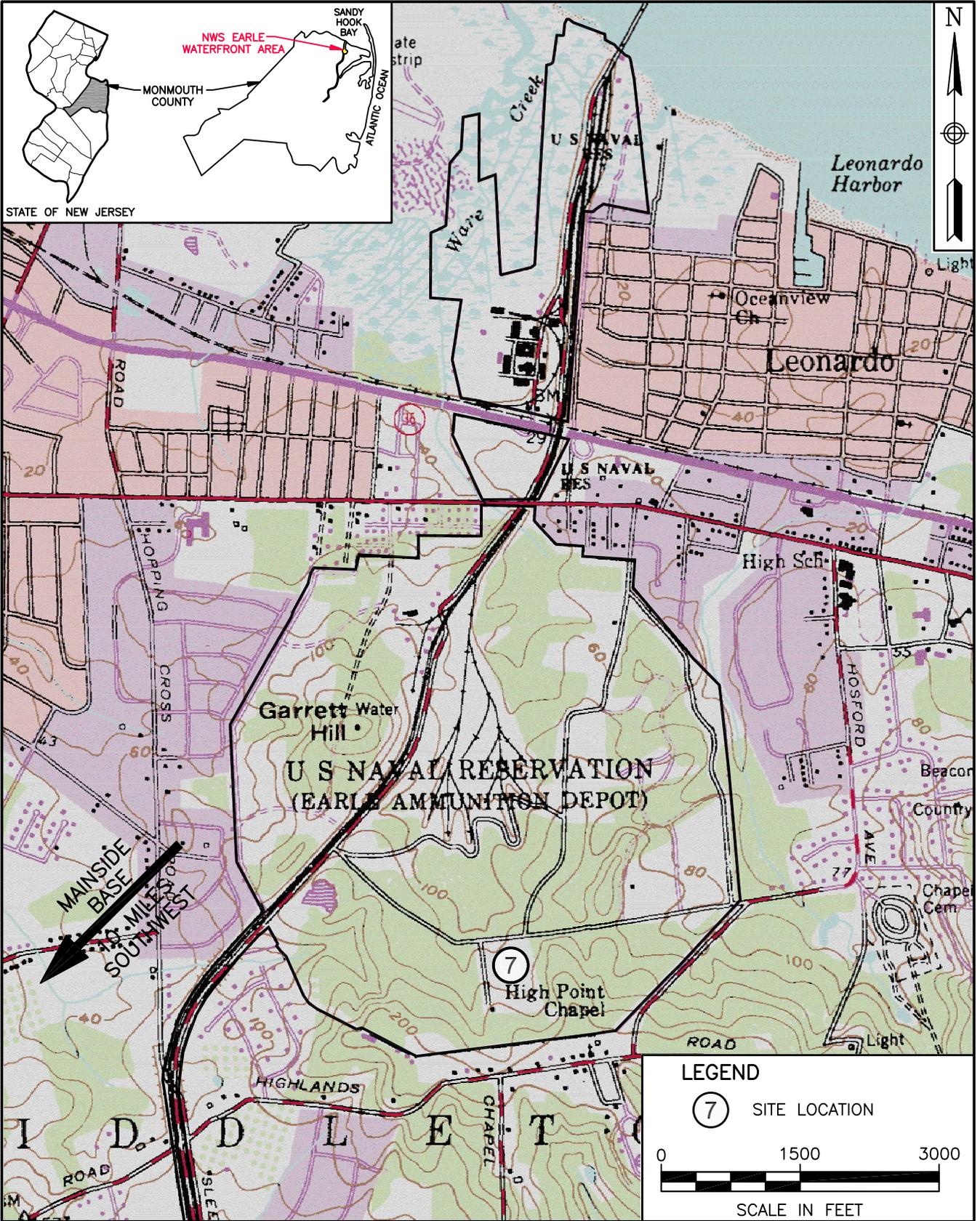
## FIGURES



LOCATION MAP  
 NAVAL WEAPONS STATION EARLE  
 COLTS NECK, NEW JERSEY

|                                  |                  |
|----------------------------------|------------------|
| SCALE<br>NOT TO SCALE            |                  |
| FILE<br>112G00573CM01            |                  |
| REV<br>0                         | DATE<br>05/26/10 |
| FIGURE NUMBER<br><b>FIGURE 1</b> |                  |

112G00573/1510/112G00573CM02.DWG 05/26/10 MKB

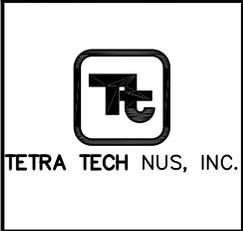


**LEGEND**

(7) SITE LOCATION

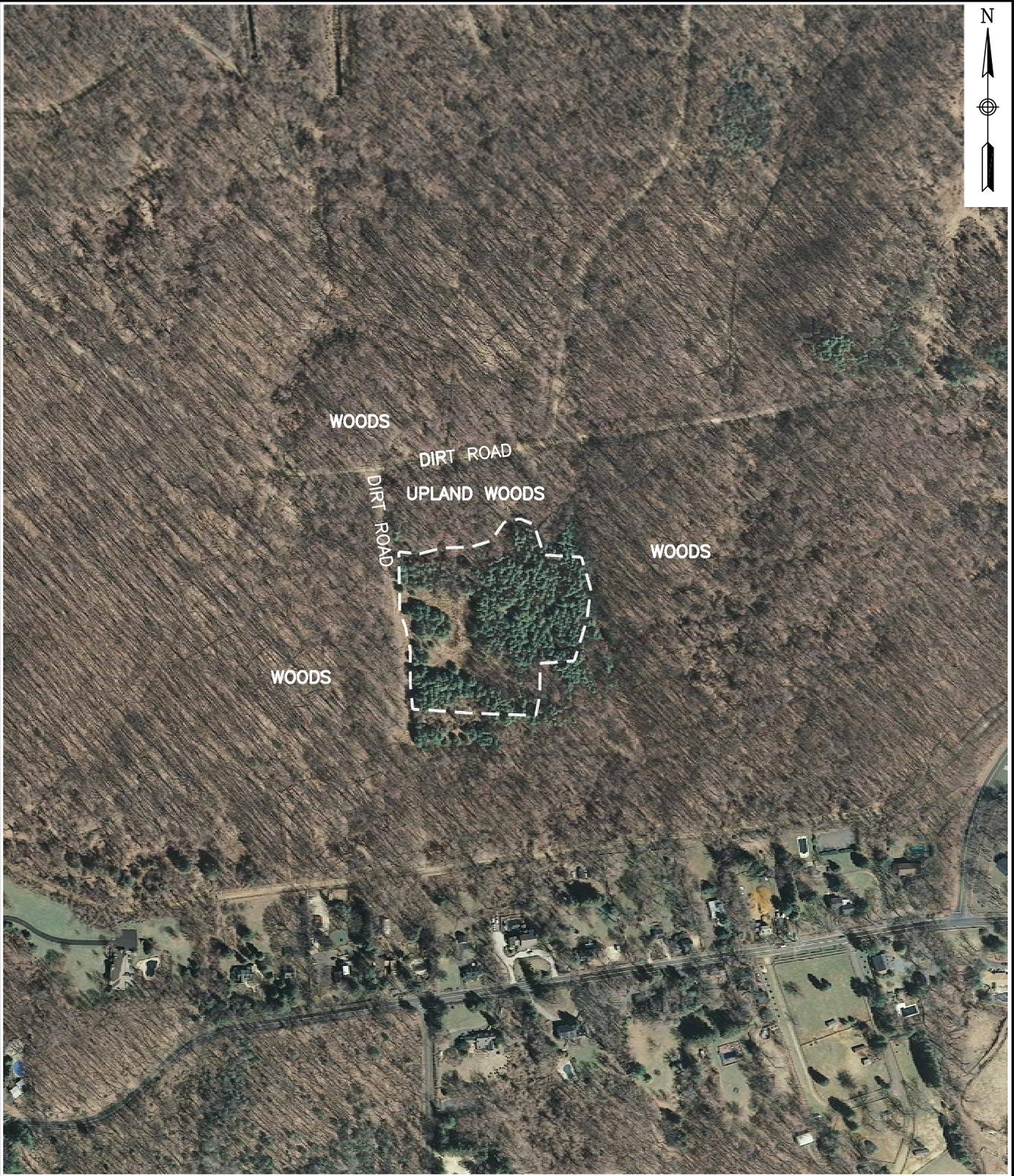
0 1500 3000

SCALE IN FEET



SITE LOCATION  
 WATERFRONT AREA  
 NAVAL WEAPONS STATION  
 COLTS NECK, NEW JERSEY

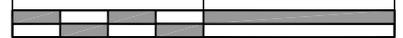
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| SCALE AS NOTED            |               |
| FILE 112G02091CM02        |               |
| REV 0                     | DATE 05/26/10 |
| FIGURE NUMBER<br>FIGURE 2 |               |



LEGEND

--- APPROXIMATE LANDFILL BOUNDARY

0 400 800

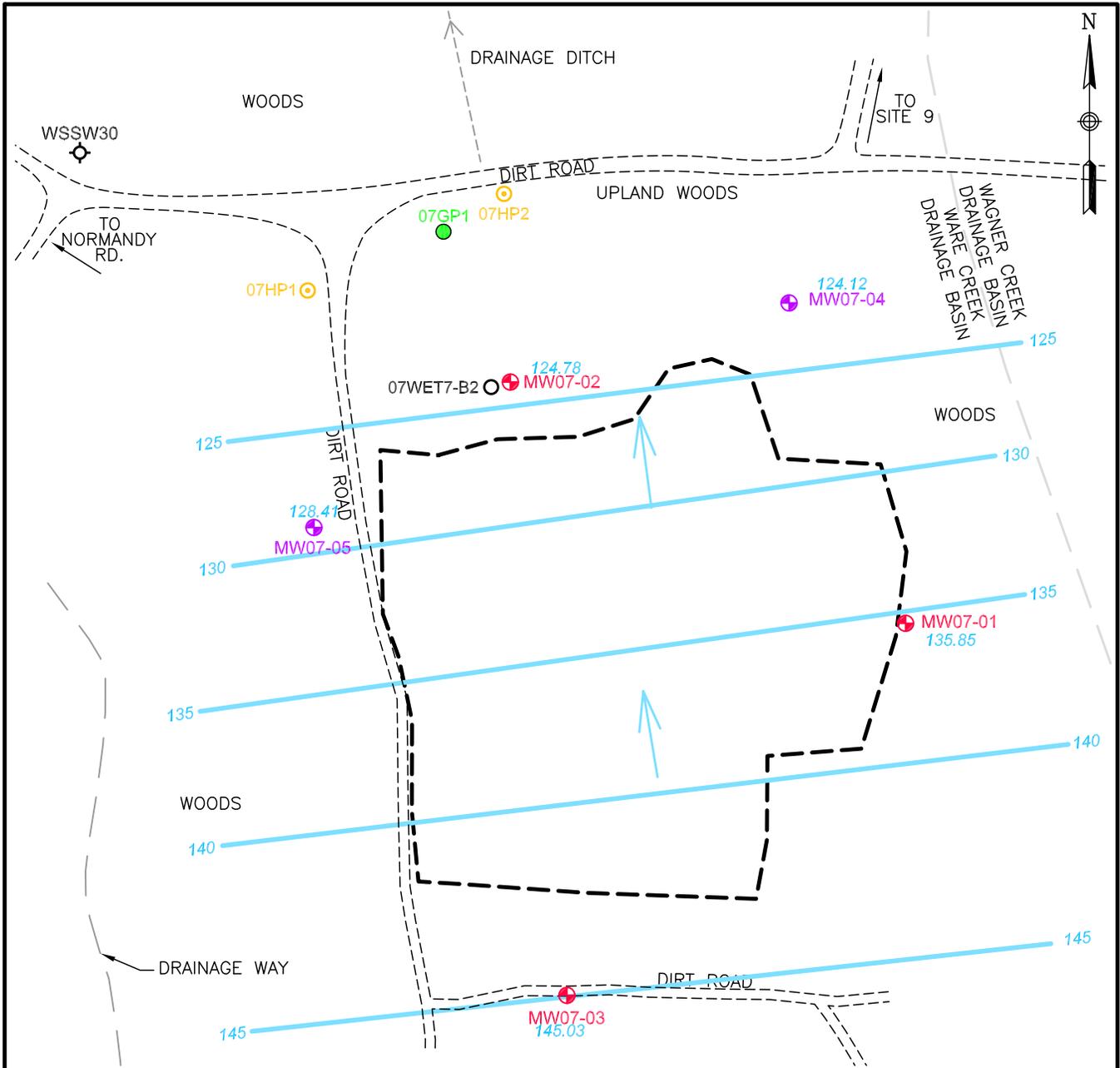


SCALE IN FEET



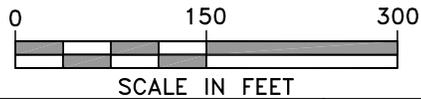
SITE MAP  
SITE 7 - LANDFILL SOUTH OF "P" BARRICADES  
NAVAL WEAPONS STATION EARLE  
COLTS NECK, NEW JERSEY

|                                  |               |
|----------------------------------|---------------|
| SCALE AS NOTED                   |               |
| FILE 112G00573GM01               |               |
| REV 0                            | DATE 05/26/10 |
| FIGURE NUMBER<br><b>FIGURE 3</b> |               |



**LEGEND**

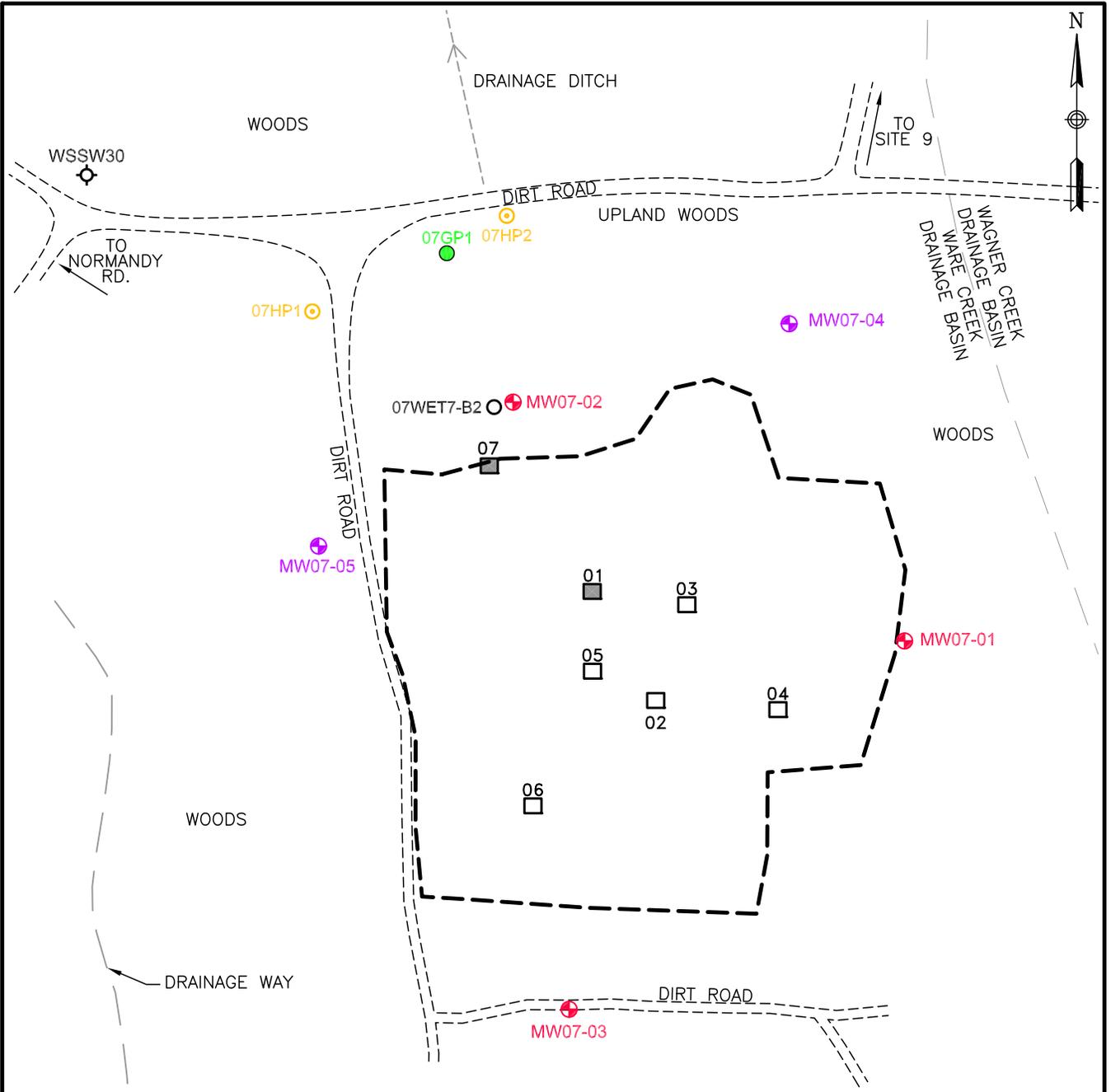
- ⊕ MONITORING WELL LOCATION (1986 SI)
- ⊕ MONITORING WELL LOCATION (1991 PHASE I RI)
- SURFACE SOIL SAMPLE LOCATION (1995 PHASE II RI)
- ⊕ WATERSHED SAMPLE LOCATION (1995 PHASE II RI)
- GEOPROBE LOCATION (2009)
- ⊙ HYDROPUNCH LOCATION (2009)
- APPROXIMATE LANDFILL BOUNDARY
- GROUNDWATER CONTOUR, APRIL 2005
- 135.85 GROUNDWATER ELEVATION, APRIL 2005
- ← GROUNDWATER FLOW DIRECTION, APRIL 2005



TETRA TECH NUS, INC.

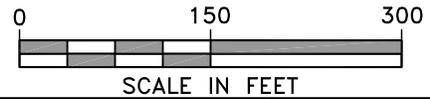
GROUNDWATER MONITORING LOCATIONS  
 SITE 7 – LANDFILL SOUTH OF "P" BARRICADES  
 NAVAL WEAPONS STATION EARLE  
 COLTS NECK, NEW JERSEY

|                 |          |
|-----------------|----------|
| SCALE AS NOTED  |          |
| FILE            |          |
| 112G00573GM02-2 |          |
| REV             | DATE     |
| 0               | 06/06/10 |
| FIGURE NUMBER   |          |
| FIGURE 4        |          |



**LEGEND**

- ⊕ MONITORING WELL LOCATION (1986 SI)
- ⊕ MONITORING WELL LOCATION (1991 PHASE I RI)
- SURFACE SOIL SAMPLE LOCATION (1995 PHASE II RI)
- ⊕ WATERSHED SAMPLE LOCATION (1995 PHASE II RI)
- GEOPROBE LOCATION (2009)
- ⊙ HYDROPUNCH LOCATION (2009)
- APPROXIMATE LANDFILL BOUNDARY
- TEST PIT (1991-1992 RI)
- TEST PIT SAMPLE (1991-1992 RI)



TETRA TECH NUS, INC.

**SAMPLE LOCATION MAP**  
**SITE 7 – LANDFILL SOUTH OF "P" BARRICADES**  
**NAVAL WEAPONS STATION EARLE**  
**COLTS NECK, NEW JERSEY**

|                                  |                  |
|----------------------------------|------------------|
| SCALE AS NOTED                   |                  |
| FILE<br>112G00573GM02-1          |                  |
| REV<br>0                         | DATE<br>06/06/10 |
| FIGURE NUMBER<br><b>FIGURE 5</b> |                  |