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PROPOSED REMEDIAL ACTION PLAN
FOR
SITE 7, LANDFILL SOUTH OF "P" BARRICADES (OU 10)

NAVAL WEAPONS STATION EARLE
Colts Neck, New Jersey

Naval Facilities Engineering Command
Mid-Atlantic

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TETRA TECH

Department of the Navy

Proposed Remedial Action Plan for OU 10

Naval Weapons Station, Earle
Colts Neck, New Jersey

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NAVY ANNOUNCES PROPOSED REMEDIAL ACTION PLAN

The purpose of this **Proposed Remedial Action Plan (PRAP)** is to present the preferred alternative for remedial action at Site 7 – Landfill South of "P" Barricades designated Operable Unit (OU) 10, which is located within the Waterfront area at Naval Weapons Station, Earle (NWS Earle), Colts Neck, New Jersey. The preferred remedy is a soil cover over the landfill, plus land use controls (LUCs), periodic groundwater monitoring, and a review of site conditions and risks every five year. Groundwater monitoring will be conducted on an annual basis to assess contaminant status until New Jersey Groundwater Quality Standards (GWQS) or background levels are met. After New Jersey GWQS or background levels are met, groundwater monitoring would then be conducted every five years to provide information for five-year reviews or if site conditions changed. This document contains background information and lays out the rationale for selecting the preferred remedy.

This Proposed Plan is issued by the Department of Navy, the lead agency for **Environmental Restoration Program (ERP)** and **Superfund** activities at NWS Earle, and by the U.S. 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 the **Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)**, as amended, 42 U.S.C. §§ 9613(k), 9617(a), and 9621 (f) and 40 C.F.R. §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, May 19, 2009 at 7:00 PM** in the *Public Meeting Room* at the Middletown Township Municipal Building. For directions to the meeting location, please see the Middletown Township web site at http://www.middletownnj.org. The meeting date and location will also be published in the *Asbury Park Press* newspaper.

The Proposed Plan summarizes the findings of the **Remedial Investigation (RI)** conducted at Site 7, outlines the remedial alternatives detailed in the **Feasibility Study (FS)**, identifies the cleanup alternative preferred by the Navy and EPA, and explains the reasons for this preference. In addition, the Proposed Plan explains how the public can participate in the decision-making process and provides addresses for the appropriate Navy and EPA contacts.

The Proposed Plan also summarizes information from other documents that are contained in the **Administrative Record File** for this site. The Administrative Record File is available at the Navy **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.

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

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. Mainside consists primarily of a large area, specially developed 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 the Proposed Plan, is located in the Waterfront area (Figure 2).

Site 7, the Landfill South of "P" Barricades is approximately five-acres in size. About 3.6 acres of the site contains landfilled waste materials as determined by a 1974 EPA Environmental Photographic Interpretation Center (EPIC) photo. 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.

An unpaved road borders the landfill to the north, west and south. The ground surface slopes downward to the north from approximately 160 feet above mean sea level (msl) near monitoring well 07MW-03 to approximately 125 feet msl near 07MW-02 (See Figure 3). Large white pine trees, 20 to 30 feet in height, and short grasses cover the site. A small wetland area, formed in a depression on top of the landfill, is also present.

Based on a 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 downstream of the site.

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 1982, a **Site Inspection (SI)** in 1986, and a **Phase 1 RI** in 1993. 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.

IAS 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.

SI 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 3). 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 below their respective GWQS (acetone – 6,000 ug/L and di-n-butyl phthalate – 700 ug/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 remedial investigation at NWS Earle, seven test pits were excavated and two additional monitoring wells were installed at Site 7 (see Figure 3). 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 above 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 above both current criteria [GWQS and Maximum Contaminant Levels (MCLs)] and upgradient background concentrations. Two organics, 1,1,2,2-tetrachloroethane and 1,1,2-trichloroethane were detected in one well at concentrations that exceeded both current criteria and upgradient concentrations.

Phase II RI Investigation (1995-1996)

A RI of 27 sites, including Site 7 was conducted at NWS Earle in 1995, as part of the Navy 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, 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. Table 4 presents the groundwater analytical results and compares them to the range of results obtained for groundwater samples collected as background. Concentrations of most metals in Site 7 groundwater were within the range of background results. Aluminum and iron were detected at concentrations higher than current criteria and background concentrations. Manganese was detected in one well, below background concentrations, but above its current GWQS and MCL. Thallium was detected in well at a concentration above its respective GWQS and MCL.

Only one organic compound (benzene) was detected in one well at a concentration above the GWQS, but below 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 higher than the range of

background surface soil concentrations. No organic compounds were detected in sample SD WET7-B2.

A watershed sample, WSSW30, was taken 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.

April 2005 Groundwater Investigation

Groundwater sampling was performed at Site 7 in April 2005 for certain inorganics and VOCs that had been previously detected and 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 only aluminum and iron exceeded upgradient background concentrations and current GWQS. Manganese was present in upgradient well 07MW-03 and two downgradient wells (07MW-02 and 07MW-05) at concentrations that exceeded the New Jersey GWQS at 50 ug/L.

No organic compounds were detected at concentrations that exceed current GWQS and MCLs. Groundwater was the only media sampled during the April 2005 investigation; no other samples were collected by the Navy.

SUMMARY OF SITE RISKS

As part of the Phase II RI, a human health risk assessment (HHRA) and an ecological risk screening were performed for Site 7. The exact procedures used for the HHRA and ecological risk screening are presented in the RI Report (July, 1996). The process used for the assessment of human health risk is summarized in the box 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 impact the Site 7 risk calculations, but none of the major conclusions of the HHRA 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.
- 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 $1x10^{-6}$ to $1x10^{-4}$ 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 hazard quotients. If the HI does not exceed the reference benchmark of one 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 (5.3×10^{-6}) is within the 1×10^{-6} to 1×10^{-4} EPA target acceptable risk range. 1,1,2-TCA and benzene via ingestion and chloroform via inhalation during showering are the principal **chemicals of potential concern (COPCs)** that contributed to the cancer risks for these exposure scenarios. The RME cancer risks associated with the future recreational sediment exposure (2.0×10^{-7}) are below the 1×10^{-6} to 1×10^{-4} target acceptable risk range. The RME cancer risks associated with future industrial groundwater exposure (1.1×10^{-5}) are within the 1×10^{-4} to 1×-10^{-6} target acceptable risk range. Beryllium via ingestion is the principal COPC that contributed to the cancer risks for these exposure scenarios.

RME estimates for noncarcinogenic hazard yielded a hazard index that exceeded one 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. Adverse noncarcinogenic effects cannot be ruled out when the HI is greater than 1.0.

The RME estimates for noncarcinogenic HI hazard associated with the future recreational sediment exposure (0.0075) and the future industrial groundwater exposure (0.47) are below the benchmark threshold HI (1.0). Adverse noncarcinogenic effects are not expected when the HIs are below 1.0.

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. Currently, there are no land use controls (i.e., institutional controls) in place that prevent use of groundwater or installation of drinking water wells.

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 (EPA, 1997), dermal guidance (EPA, 2004), and methods for estimating statistical exposure point concentrations (EPCs) via upper confidence limits (EPA, 2002, 2008). In addition, toxicity factors published in EPA's Integrated Risk Information System (IRIS, 2008) 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

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 chemicals of potential concern (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 10^{-6} for cancer risk and an HI of 1 for a non-cancer health hazard. 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.

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 one, but the value increases by a factor of 1.5. The sum of groundwater cancer risks from 1,1,2-TCA, benzene, and chloroform would increase by a factor of 2.5, but would still be within the target acceptable risk range.

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 HHRA would be affected.

Summary of Ecological Risk Assessment

As part of the Phase II RI, an ecological risk assessment (ERA) 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, which exceeded its **ecological screening value (ESV).** 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 chemicals of potential concern 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 watershed sample WS SW 30 at a concentration above any conservative ARAR or to be considered (TBC) guidance was 0.069 ug/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.

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 on Table 8, only two metals (lead and vanadium) were detected at concentrations that slightly exceeded their 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.

REMEDIATION GOALS AND OBJECTIVES

The overall objective for the remedy at Site 7 is to protect human health and the environment.

Based on the baseline human health risk assessment, the ecological risk assessment, the RI results, and an April 2005 groundwater sampling event of the five site monitoring wells, **Remedial Action Objectives (RAOs)** were developed to address the landfilled waste materials and contaminated media (groundwater) present at Site 7.

Protection of Human Health RAO

- Prevent potential human exposure to landfill contents.
- Prevent potential human exposure to metals in groundwater.

Protection of the Environment RAO

- None.

REMEDIAL ALTERNATIVES CONSIDERED

The purpose of the alternatives development and screening process was to assemble an appropriate range of possible remedial options to address potential risks related to the landfilled waste materials and contaminated groundwater.

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

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

Ecological risk assessment includes three steps:

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

The problem formulation includes:

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

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

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

The following eight criteria, as established by the NCP, were used for the detailed analysis of alternatives:

- Overall protection of human health and the environment.
- Compliance with **Applicable or Relevant and Appropriate Requirements (ARARs).**

- Long-term effectiveness and permanence.
- Reduction of toxicity, mobility, and volume through treatment.
- Short-term effectiveness.
- Implementability.
- Cost.
- State (NJDEP) concurrence.

The other evaluation criterion, community acceptance, will be addressed in the **Record of Decision (ROD)** following the receipt of public comments.

Based on the nature of contamination and site conditions, the **New Jersey Groundwater Quality Standards (GWQS)** will be used to gauge the achievement of remedial action objectives. The GWQS are levels of constituents in groundwater that have been established by the NJDEP for protection of ambient groundwater quality as appropriate for use as potable water. The Navy, through the establishment of Land Use Controls (LUCs) and long-term monitoring, will prohibit the potable use of untreated groundwater at Site 7 until site-related metals concentrations are below the GWQS or background levels.

To prevent potential human exposure to landfill contents, the Navy evaluated the construction of various capping materials over the landfill. These are more fully discussed in the following sections. Prior to implementation of the selected remedy, the Navy will conduct a design investigation (i.e., borings or test pits) to determine the areal extent of buried waste materials. Based on this investigation, the extent of the capping materials will be determined.

In this process, technically feasible technologies were combined to form remedial alternatives that would protect human health and the environment. These remedial alternatives were developed in accordance with the NCP and are detailed in the FS for Site 7 Landfill South of "P" Barricades (OU 10).

Alternative 1 – No Action

The no action alternative was developed as the baseline case, as required by the NCP. The purpose of the no action alternative is to evaluate the overall human health and environmental protection provided by the site in its present state. Under this alternative, no remedial actions would be taken to protect human health or the environment. No measures would be implemented to prevent potential human exposure to site groundwater or contact with landfill materials. The only activity conducted under this alternative would be a review of site conditions and risks every five years. Five-year reviews would be conducted as long as contaminants remain in place at levels that do not allow for unlimited use and unrestricted exposure.

Cost

No capital costs are associated with the no action alternative. The average operation and maintenance (O&M) cost for five-year reviews is $23,000 per event. Over a 30-year period, the net present-worth cost is $49,600 at an annual 7 percent discount rate.

Alternative 2 – Land Use Controls and Long-Term Monitoring

Under this alternative, LUCs would be implemented to protect human health and the environment by preventing exposure to landfilled waste materials and contaminated groundwater. This alternative does not employ engineered treatment or containment to address groundwater contamination. Since no engineered treatment or containment to address groundwater contamination would be

implemented under Alternative 2, waste constituents would continue to be exposed to infiltration from precipitation. Over time, groundwater contamination would be expected to gradually decrease.

LUCs such as use restrictions placed in the NWS Earle Base Master Plan would be enacted to limit potential contact to the former landfill and its contents. Restricted activities would include excavation, excessive vehicular traffic, and use of untreated groundwater for drinking water. If it is determined to be necessary, a New Jersey groundwater Classification Exception Area (CEA) pursuant to N.J.A.C. 7:9-6 would be established to ensure that use of groundwater in the affected area is restricted until standards are achieved. Both the use restrictions and if necessary, a CEA would be established as part of the remedy implementation. Long-term periodic monitoring would be conducted to assess the alternative's effectiveness and potential threats to human health and the environment. Site conditions and risks would be reviewed every five years because contaminants would be left in place.

Cost

Capital costs associated with the implementation of Alternative 2 are estimated at $117,000. The average O&M cost for long-term monitoring is $11,100, and five-year reviews are $23,000 per event. If a CEA is established, recertification may be required every two years until GWQS are achieved. Over a 30-year period, the net present-worth cost is $266,900 (at a seven percent discount rate).

Alternative 3 – Soil Cover, Land Use Controls, and Long-Term Monitoring

Alternative 3 would include the removal of trees and other vegetation from the site, and the addition of soil and reshaping the landfill cover to manage precipitation infiltration and surface runoff. The landfill would require revegetation to minimize erosion and to promote evapotranspiration of precipitation, thus reducing infiltration. The soil cap will reduce the amount of infiltration entering the landfill and will prevent exposure to landfilled materials. As part of a pre-design investigation, an assessment of the small wetland area located on the landfill and any adjacent wetlands (if present) will be conducted to identify possible impacts from implementation of Alternative 3.

Seven test pits were constructed as part of the 1991-1992 field investigation. A layer of trash, ranging in thickness from 1.5 to 6 feet was encountered in five of the seven test pits. No water or saturated wastes were found in any of the test pits. This finding indicated that if any waste materials were in contact with groundwater, the amount of materials contacted and the duration of contact are probably low. Groundwater level measurements that were collected as part of the field investigations support the conclusion that if any waste materials are in contact with groundwater, it is seasonal in nature and of short duration. The relatively low levels of contaminants detected in groundwater also provide evidence that little, if any, wastes are in contact with groundwater.

Alternative 3 relies on LUCs to limit potential exposure to contaminated groundwater and landfill contents. Since no engineered treatment or containment to address groundwater contamination would be implemented under Alternative 3, waste constituents would continue to be exposed to infiltration from precipitation, however the presence of the soil cover, enhanced grading and sloping of the landfill surface to facilitate surface water runoff and prevent ponding, and establishment of a uniform vegetative cover would reduce the amount of infiltrating precipitation to some degree. Over

time, groundwater contaminants would be expected to gradually decrease.

LUCs such as use restrictions placed in the NWS Earle Base Master Plan would be enacted to limit potential contact to the former landfill and its contents. Restricted activities would include excavation, excessive vehicular traffic, and use of untreated groundwater for drinking water. If it is determined to be necessary, a New Jersey groundwater CEA pursuant to N.J.A.C. 7:9-6 would be established to ensure that use of groundwater in the affected area is restricted until standards are achieved. Both the use restrictions and if necessary, a CEA would be established as part of the remedy implementation. Long-term periodic monitoring would be conducted to assess the alternative's effectiveness and potential threats to human health and the environment. Site conditions and risks would be reviewed every five years because contaminants would be left in place.

Cost

Capital costs associated with Alternative 3 are $452,300. The annual cost for site inspections and cap maintenance is $375. The average O&M cost for long-term monitoring is $7,700, and five-year reviews are $23,000 per event. If a CEA is established, recertification may be required every two years until GWQSs are achieved. Over a 30-year period, the net present-worth cost is $631,900 at a seven percent discount rate.

Alternative 4 – Single Barrier Cap, Land Use Controls, and Long-Term Monitoring

Under this alternative, a single barrier cap would be placed over the landfilled waste materials to reduce surface infiltration, prevent direct contact, and control erosion. A protective and vegetative layer of soil, 18 to 24 inches thick including 6 inches of topsoil, and vegetation establishment would eliminate potential exposure to the buried landfill wastes. As part of the Alternative 4 construction activities, all trees and other heavy vegetation would also be removed from the site. A pre-design assessment of the small wetland area located on the landfill and any adjacent wetlands (if present) would be conducted to identify impacts from implementation of Alternative 4. No engineered treatment or containment of groundwater would be implemented under Alternative 4; however, the placement of the low permeability single membrane cap system would significantly reduce or eliminate infiltration of precipitation into the landfill thus resulting in a significant reduction in the generation of leachate and mobility of waste constituents.

LUCs such as use restrictions placed in the NWS Earle Base Master Plan would be enacted to limit potential contact to the former landfill and its contents. Restricted activities would include excavation, excessive vehicular traffic, and use of untreated groundwater for drinking water. If it is determined to be necessary, a New Jersey groundwater CEA pursuant to N.J.A.C. 7:9-6 would be established to ensure that use of groundwater in the affected area is restricted until standards are achieved. Both the use restrictions and if necessary, a CEA would be established as part of the remedy implementation. Long-term periodic monitoring would be conducted to assess the alternative's effectiveness and potential threats to human health and the environments. Site conditions and risks would be reviewed every five-years because contaminants would be left in place.

Cost

Alternative 4 capital costs are estimated at $2,031,300. The annual cost for site inspections and cap maintenance is $1,000. The average O&M cost for long-term monitoring is $12,900 and five-year reviews are $23,000 per event. If

a CEA is established, recertification may be required every two years until GWQS are achieved. Over a 30-year period, the net present-worth cost is $2,204,500 at a seven percent discount rate.

Alternative 5 – Removal and Off-Site Disposal

Under Alternative 5, landfilled waste materials and contaminated soils would be excavated and disposed at appropriate off-site Resource Conservation and Recovery Act (RCRA) Subtitle C or Subtitle D landfills or permitted municipal landfills (if allowable). RCRA Subtitle C landfills are EPA-permitted facilities that accept RCRA hazardous wastes; Subtitle D landfills are typically state-permitted facilities that accept non-hazardous solid wastes and hazardous wastes from households or exempt small quantity generators. Most municipal landfills are Subtitle D landfills unless they are Construction and Demolition (C&D) landfills that accept only non-hazardous building materials. Materials deposited at the site include municipal-type solid waste and waste from Waterfront industrial operations. Waste 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. Test pit logs from 1991 describe the encountered waste as consisting of household type trash, plastic, wood, cans, paper, glass, and cardboard. Based on the extent of disturbance depicted in a 1974 EPIC photo (approximately 3.6 acres) and the average thickness of waste encountered during the 1991 test pit investigation (3.4 feet), approximately 19,800 cubic yards of waste are present at the site. The excavated materials would be transported to either a RCRA permitted Subtitle C (hazardous), Subtitle D (non-hazardous) or municipal solid waste landfill for final disposal. It was assumed in the FS that about 90 percent (about 17,820 cubic yards) of the total volume of landfilled material (19,800 cubic yards) would be sent to a non-hazardous waste landfill. The remaining materials or about 10 percent (1,980 cubic yards) of the total waste would be sent to a hazardous waste landfill. Because no waste materials would be left at the site, no long-term monitoring or five-year reviews would be required.

A pre-design assessment of the small wetland area located on the landfill and any adjacent wetlands (if present) would be conducted to identify impacts from implementation of Alternative 5.

Cost

The estimated capital cost for implementation of Alternative 5 is $4,478,000.

EVALUATION OF ALTERNATIVES

The remedial alternatives were compared to one another based on the first seven selection criteria to identify differences among the alternatives and how site contaminant threats are addressed.

Analysis

Overall protection of human health and the environment

Alternative 1 would not be protective of human health and the environment since no actions would be taken to prevent exposure to landfilled waste materials or contaminated groundwater. Alternative 2 would be slightly more protective of human health and the environment since restrictions on the current and future use of the site would be placed in the Base Master Plan. If determined to be necessary, a CEA would be

established to prevent use of site groundwater until GWQS are achieved for several metals including aluminum and iron. Groundwater monitoring would be conducted by the Navy and CERCLA five-year reviews would identify if site risks have changed and/or if additional remedial actions are needed.

Alternatives 3 and 4 would provide similar overall protection of human health and the environment though Alternative 4 would be more effective at minimizing precipitation infiltration into the landfilled materials. Under Alternative 3, the vegetated soil cover would eliminate the presence of any waste materials on the landfill surface and would reduce the infiltration of precipitation into the landfill. Under Alternative 4, installation of the low-permeability barrier would also reduce or eliminate the amount of potential leachate generation and movement of waste contaminants into the underlying groundwater. Since waste materials were not seen in contact with groundwater in any of the test pits, movement of waste contaminants is most likely due to precipitation entering through the existing soil cover. Both alternatives would also employ land use controls that would maintain the current site status and prevent intrusive activities or future development. Groundwater monitoring would be conducted by the Navy and CERCLA five-year reviews would identify if site risks have changed or if additional remedial actions are needed.

Alternative 5 would provide the most overall protection of human health and the environment because all of the waste materials would be excavated and disposed in a secure permitted facility, recycled or incinerated, if appropriate. Levels of metals in groundwater attributable to the landfilled materials would decrease and GWQS or background levels would be achieved.

Compliance with ARARs

Alternative 1 would not comply with chemical-specific ARARs. No action-specific ARARs apply to this alternative because no actions would be implemented. Alternative 1 would not meet any components of the EPA presumptive remedy for military landfills.

Alternative 2 would eventually comply with chemical-specific groundwater ARARs if GWQS or background levels are achieved. Since no cover would be placed over the landfilled materials, Alternative 2 would not meet any of the components of the EPA presumptive remedy for municipal military landfills.

Alternative 3 would eventually comply with chemical-specific groundwater ARARs when GWQS or background levels are achieved. Alternative 3 would not include all of the components of the EPA containment presumptive remedy, which are applicable to Site 7. However, due to the low level of groundwater contaminants and the length of time the landfill has been in place, plume containment and/or treatment, controlling, and treating landfill gas are probably not needed at Site 7.

Alternative 4 would eventually comply with chemical-specific groundwater ARARs because infiltration and resulting leachate generation should be significantly reduced or eliminated by placement of an impermeable cover over the landfilled materials.

Alternative 5 would comply with all action-specific ARARs for the handling, transport and disposal of the landfilled materials. Any materials that are characterized as RCRA hazardous wastes would be handled, transported and disposed in accordance with applicable portions of RCRA requirements (40 CFR parts 262 and 263) and applicable

transportation requirements (49 CFR 107, 171-179).

Long-term effectiveness and permanence

Alternative 1 would not provide any long-term protection of human health since no actions would be taken to prevent exposure to landfilled materials or contaminated groundwater. Alternative 2 would provide limited long-term effectiveness and permanence because restrictions on the use of the site and any intrusive activities would be outlined in the Base Master Plan. Under Alternative 2, a CEA would be established if it is determined to be necessary. The Navy would conduct sampling on a routine basis to monitor groundwater quality.

Alternatives 3 and 4 would both provide long-term effectiveness and permanence because the landfill would be capped and annual O&M inspections would provide notification if erosion and/or intrusive vegetation/animals were resulting in exposure of waste materials. Land use restrictions and if necessary, the establishment of a CEA are both part of Alternatives 3 and 4 and would provide the same level of effectiveness and permanence in restricting use of the site and monitoring groundwater quality. The synthetic membrane cap included in Alternative 4 would provide more effectiveness and permanence in reducing the amount of infiltration and leachate generation than the soil cover included in Alternative 3. However, the extra effectiveness of the synthetic membrane cap is not warranted at Site 7 due to the number of years the landfilled wastes have been in place and the low levels of groundwater contaminants.

Alternative 5 would provide the most long-term effectiveness and permanence because all the landfilled materials would be excavated and disposed of in secure facilities, recycled, or incinerated. Alternative 5 would eliminate the source of contamination at the site, thereby eliminating any further degradation of groundwater quality. Post-removal groundwater sampling would be conducted to determine if additional measures (i.e., CEA) are needed to achieve the RAOs.

Reduction of toxicity, mobility, and volume through treatment

Alternative 1 would not satisfy the statutory preference for treatment since no remedial activities would be performed. No treatment of waste materials or groundwater is proposed under Alternative 2 so there would be no reduction in the toxicity, mobility, or volume of contaminants through treatment. Over time, it is expected that groundwater quality would meet New Jersey GWQS or background levels as the wastes have been in place for a number of years and exposed to numerous precipitation events, and impact to groundwater appears to have decreased.

Alternatives 3 and 4 would not reduce the volume of landfilled waste materials but should reduce the mobility and leachability of contaminants contained in the landfilled materials. Alternative 4 would initially be more effective than Alternative 3 in reducing contaminant mobility and leachate generation however; Alternative 3 is also expected to reduce the amount of infiltration and resulting leachate generation such that GWQS or background levels are achieved. Neither alternative would result in treatment of waste and/or groundwater.

Alternative 5 would not necessarily reduce the volume of waste materials but would reduce the mobility and leachability of any contaminants contained in the buried waste. The source of elevated metals in the underlying groundwater would be completely removed from the site.

Excavated materials would be disposed utilizing best practices, including secure landfills, recycling, and/or incineration depending upon the type and volume of materials encountered.

Short-term effectiveness

Because no active response actions would be implemented under Alternative 1, no additional short-term impacts at the site would be anticipated for this option. Under Alternative 2, the only short-term impact might be due to additional worker exposure and traffic during the installation of the proposed downgradient monitoring well and periodic sampling events. The potential impact from monitoring well installation and groundwater sampling is minimal because experienced personnel trained in effective health and safety procedures are readily available for those tasks. Installation of the well should take only two days and groundwater sampling should take no more than two days per year for a 1 to 2--person crew. Documentation of the land use restrictions and if necessary, the CEA certification, would not have any site-related impacts.

Short-term impacts would be less for Alternative 3 than for Alternative 4 because field construction for Alternative 3 is expected to be completed within 1 month during which there will be increased traffic related to hauling of the cover materials and construction equipment. Following placement of the soil cover and site fencing, the only short-term impacts at the site would be related to the groundwater sampling events. Landfill capping is a common type of construction with ample availability of contractors proficient in the appropriate environmental, health, and safety controls.

Implementation of Alternative 4 is estimated to have a longer period of short-term impact at the site than the implementation of Alternative 5. For both alternatives, there would be additional traffic due to the movement of cover or waste materials. Additional impact would result from grading and/or excavation activities and dust releases. However, Site 7 is located in a remote area of the Waterfront with no adjacent Naval, commercial or residential developments in immediate proximity. Site-specific health and safety procedures and personal protective equipment (PPE) would be implemented to protect workers. Standard engineering controls and other precautionary measures would be taken to ensure worker safety and impact to the environment.

Implementability

Since no active remediation or response activities would occur, Alternative 1 is the most readily implementable. Alternative 2 is slightly more implementable than Alternative 3 because the only field activity associated with Alternative 2 is the installation of an additional downgradient monitoring well. However, Alternative 3 is easily implementable and involves standard construction techniques and equipment. Experienced and OSHA-certified workers and companies are readily available to implement construction of the soil cover.

Implementation of Alternative 4 would be more difficult than Alternative 3 as it involves the placement of both a single membrane cap and associated drainage layer, but is implementable as standard construction techniques, equipment, and materials would be employed.

Alternative 5 is the most difficult to implement because it involves the excavation, transport and disposal of the landfilled materials to a secure permitted facility.

Cost

The present-worth cost associated with each alternative is provided below for comparison.

Alternative 1, no action, would be the least expensive to implement and Alternative 5, Removal and Off-Site Disposal, would be the most expensive to implement. Alternative 3 is less expensive to implement than Alternative 4.

Alternative 1	$49,600
Alternative 2	$266,900
Alternative 3	$631,900
Alternative 4	$2,204,500
Alternative 5	$4,478,000

State and Community Acceptance

The State of New Jersey supports the preferred alternative. Community acceptance of the preferred alternative will be evaluated at the conclusion of the public comment period and will be described in the ROD. Public comments on this Proposed Plan will help address state acceptance and community acceptance.

PREFERRED ALTERNATIVE SUMMARY

The Navy, with EPA and NJDEP, has proposed Alternative 3 as its preferred alternative. The range of technologies included in Alternative 3 are appropriate for the protection of human health and the environment at this remote former landfill.

Alternative 3 relies on containment, access restrictions, and LUCs to limit exposures to site risks. The implementation of Alternative 3 should not pose any additional unacceptable long-term risk or hazard as the landfilled materials have been in place for a number of years and the only groundwater contaminants that currently exceed NJDEP GWQS and background concentrations are aluminum and iron.

Site 7 has not been used for many years and is moderately vegetated with grasses and large white pine trees. Any exposed debris would be removed and additional soil cover material would be placed to grade the site to encourage runoff of precipitation. Clearing and grubbing of the existing vegetative growth will be necessary to prepare for soil cover placement and final site grading. The horizontal limit of buried waste materials will be determined by the Navy as part of the remedial design. Based on the location of buried materials, a determination will then be made regarding tree removal. Trees that are located within the area of buried waste materials are normally removed in order to allow for the placement of a uniform thickness of cover materials and to regrade the landfill surface for surface water direction and control. Trees outside the boundary of buried wastes, and not in the way of construction of the landfill cover or any surface water controls, are typically left in place.

Grading of the landfill area and compaction of the surface soil cover and landfill materials would be performed as needed. The appropriate slopes for the final covering (to facilitate surface runoff) would be determined during the design of the soil cover system.

The final surface slope of the landfill cover should range between three percent (3V:100H) and five percent (5V:100H) to ensure slope stability, control erosion, and allow for compaction, seeding and revegetation of the cover materials. The objective of the final slope design is to promote precipitation runoff while inhibiting erosion or infiltration.

Security fencing and signage consistent with other NWS Earle landfill sites would be installed to deter human and vehicle entry onto the proposed vegetated soil cover. The fence will be a post and cable fence with treated wood posts and a strung cable. A locked gate will be installed to allow for controlled access into the fenced enclosure for monitoring and inspection activities.

After construction of the landfill cover, access restrictions would be incorporated into the NWS Earle Base Master Plan to limit future activities that could result in exposure of the landfilled materials or use of untreated groundwater for drinking water. Restrictions on future development of the site would also be prohibited unless landfilled waste materials were removed or disposed of properly.

If it is determined to be necessary, a CEA pursuant to N.J.A.C. 7:9-6 would be established to provide the State official notice that the groundwater standards will not be met for a specified duration and to ensure that use of groundwater in the affected area is suspended until standards are achieved.

Long-term, periodic groundwater monitoring would be conducted to assess contaminant status and potential threats to human health and the environment. In addition to the existing wells, a sentinel well may be installed north of the site boundary pursuant to CEA guidelines (if a CEA is determined to be required). Since wastes would be left in place, site conditions and risks would be reviewed every 5 years.

As part of the development of remedial alternatives, the Navy developed **Preliminary Remediation Goals (PRGs)** for those compounds that were detected in Site 7 groundwater and that were identified as **contaminants of potential concern (COPCs)**. Table 9 presents potential PRGs based on ARARs/TBCs, maximum detected background concentrations and risk-based cleanup goals that were developed for the final COPCs (final COPCs were identified based on a review of the 1986, RI and April 2005 groundwater sampling data. Frequency of detection, number of wells detected in, level of concentration detected, and the results of the FS risk assessment evaluation were considered in identifying final COPCs) to ensure that cancer risks would not exceed 1 x 10^{-4} and non-cancer risks would not be greater than a HI of 1. Based on comparison of groundwater concentrations to the PRGs, no **chemicals of concern (COCs)** were identified for groundwater at Site 7. Aluminum and iron are present in site groundwater at levels above NJDEP GWQS and background concentrations. Manganese is present in site groundwater at a concentration above its GWQS, but below the upgradient background concentration. The Navy has proposed that groundwater sampling and monitoring for site-specific contaminants (metals) be conducted on an annual basis as needed. The estimated present worth cost associated with the implementation of the preferred alternative is $631,900.

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 **May 14, 2009 through June 12, 2009** 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, May 19, 2009 and will be held in the *Public Meeting Room* at the Middletown Township Municipal Building, 1 Kings Highway, Middletown, 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:

Environmental Director (Building C-23)
Naval Weapons Station Earle
201 Highway 34 South
Colts Neck, NJ 07722-5031

For further information, contact:

Roberto Pagtalunan, Remedial Project Manager
NAVFAC MIDLANT
Environmental Restoration
9742 Maryland Avenue
Norfolk, VA 23511-3095
Phone: (757) 444-0808
Email: roberto.pagtalunan@navy.mil

Jessica Mollin, Remedial Project Manager
Environmental Protection Agency, Region II
290 Broadway, 20th Floor
New York, NY 10007-1866
Phone: (212) 637-3921
Email: Mollin.Jessica@epa.gov

Please note that all comments must be submitted and postmarked on or before June 12, 2009.

TERMS USED IN THE PROPOSED PLAN

Applicable or Relevant and Appropriate Requirements (ARARs): Requirements, including cleanup standards, standards of control and other substantive environmental protection requirements and criteria, for hazardous substances as specified under Federal and state laws and regulations, that must be met when complying with CERCLA and SARA.

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.

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 1×10^{-4} to 1×10^{-6}, meaning there is 1 additional chance in 10,000 (1×10^{-4}) to 1 additional chance in 1 million (1×10^{-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 EPA for releases of hazardous substances from facilities under the jurisdiction of the Secretary.

Classification Exception Area (CEA): A NJDEP designation for a specific area of groundwater that serves as an institutional control by providing notice that there is groundwater pollution in a localized area caused by a discharge at a contaminated site.

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 affects 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.

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

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.

Preliminary Remediation Goals (PRGs): Set of remediation cleanup goals for individual contaminants agreed upon by the Navy, EPA and NJDEP, usually based on various risk-based concentrations and\or site-specific risk assessment identification of Chemicals of Potential concern. PRGs are set at specific risk levels (i.e., 1×10^{-6} for cancer risks and a HI=1 for noncancer hazards).

Proposed Plan: A Proposed Remedial Action Plan (PRAP) is 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 noncancer 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): 1) A public document that explains the remedy selection process and which cleanup alternative(s) will be used at National Priorities List sites where under CERCLA, Trust Funds pay for the cleanup. 2) 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.

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.

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 ANAYTICAL RESULTS
1986 SITE INSPECTION
NWS EARLE, COLTS NECK, NEW JERSEY

			SITE WELLS						UPGRADIENT WELL	
Sample ID:			**07MW001**		**07MW002**		**07MW002B**		**07MW003**	
Duplicate:										
Sample Date:	**NJDEP**	**USEPA**	**July 1986**		**July 1986**		**July 1986**		**July 1986**	
Well Installation Date:	**GWQS[1]**	**MCLS[2]**	**3/4/1986**		**3/5/1986**		**3/5/1986**		**1/24/1986**	
SOLUBLE INORGANICS	**ug/L**	**ug/L**	**ug/L**		**ug/L**		**ug/L**		**ug/L**	
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	
SEMIVOLATILES			**ug/L**		**ug/L**		**ug/L**		**ug/L**	
Di-n-butylphthalate	700	---	**54**		ND		ND		ND	
VOLATILES			**ug/L**		**ug/L**		**ug/L**		**ug/L**	
Acetone	6,000	---	**22**		**380**		**141**		ND	
Methylene Chloride[3]	3	5	7	J	9	J	11		6	J
PESTICIDES/PCBS			**ug/L**		**ug/L**		**ug/L**		**ug/L**	
Total Pesticides	---	---	ND		ND		ND		ND	
TPH			**ug/L**		**ug/L**		**ug/L**		**ug/L**	
Total Petroleum Hydrocarbons	None Noticeable	---	ND		ND		ND		ND	
MISCELLANEOUS PARAMETERS			**ug/L**		**ug/L**		**ug/L**		**ug/L**	
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 USEPA MCLs.
Bolded values exceed the upgradient well value.

[1] New Jersey Department of Environmental Protection Groundwater Quality Standards, July, 2008.
[2] USEPA National Drinking Water Standards Maximum Contaminant Levels, June 2003.
[3] 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.

Database source file: H:\EARLE\OU10\DATA SUMMARIES\SITE7_SQL.DBF data retrieved on: 10/06/08

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

Sample ID:	**NJDEP RDCSCC[1]**	**NJDEP NRDCSCC[2]**	**NJDEP IGWSCC[3]**	**07-001-T001**		**07-001-T001-D**		**07-007-T001**	
Duplicate:						**07-001-T001**			
TOTAL INORGANICS	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**		**mg/kg**		**mg/kg**	
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	
SEMIVOLATILES				**ug/kg**				**ug/kg**	
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
PETROLEUM HYDROCARBONS				**mg/kg**				**mg/kg**	
Petroleum Hydrocarbons	---	---	---	19		NR		0.005	U
MISCELLANEOUS PARAMETERS				**mg/kg**				**mg/kg**	
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

	NJDEP	USEPA	SITE WELLS								UPGRADIENT WELL	
Sample ID:			**07MW001**		**07MW002**		**07MW004**		**07MW005**		**07MW003**	
Well Installation Date:	**GWQS[1]**	**MCLS[2]**	**3/4/1986**		**3/5/1986**		**2/28/1991**		**2/27/1991**		**1/24/1986**	
TOTAL INORGANICS			**ug/L**		**ug/L**		**ug/L**		**ug/L**		**ug/L**	
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	
SEMIVOLATILES			**ug/L**		**ug/L**		**ug/L**		**ug/L**		**ug/L**	
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
VOLATILES			**ug/L**		**ug/L**		**ug/L**		**ug/L**		**ug/L**	
1,1,2,2-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
PESTICIDES/PCBS			**ug/L**		**ug/L**		**ug/L**		**ug/L**		**ug/L**	
Heptachlor	0.008	0.4	0.056	U	**0.01**	**J**	0.051	U	0.063	U	0.069	U
MISCELLANEOUS PARAMETERS			**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**	
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 (NTU)	---	---	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.
Shaded values exceed the screening criteria.
Bolded values exceed the upgradient well concentrations.

[1] New Jersey Department of Environmental Protection Groundwater Quality Standards, July, 2008.
[2] USEPA 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[1]	USEPA MCLS[2]	BACKGROUND[3]		SITE-RELATED			
				FREQUENCY OF DETECTION	RANGE OF POSITIVE DETECTION	07 GW 01	07 GW 02	07 GW 04	07 GW 05
INORGANICS									
aluminum	ug/L	200	---	2 / 2	242 - 393	174	**557 J**	320	**1850**
barium	ug/L	6,000	2,000	2 / 2	42.2 - 50.2	11.9	24.2	26.8	**112**
beryllium	ug/L	1	4	1 / 2	0.40	0.11 U	0.11 U	0.11 U	**0.66**
calcium	ug/L	---	---	2 / 2	1460 - 5870	916	1480	1050	1330
chromium, total	ug/L	70	100	1 / 2	14.8 - 14.8	1.0 U	1.0 U	1.9	1.0 U
cobalt	ug/L	---	---	2 / 2	8.4 - 28.2	1.6	0.85	1.0	6.9
copper	ug/L	1,300	1,300	NOT DETECTED	-	0.77 U	**1.8**	**1.7**	0.77 U
iron	ug/L	300	300	2 / 2	298 - 706	**913**	145	561	63.7
lead	ug/L	5	15	NOT DETECTED	-	**2.3**	1.5 U	1.5 U	1.5 UJ
magnesium	ug/L	---	---	2 / 2	1800 - 2120	723	594	1990	**6920**
mangenese	ug/L	50	50	2 / 2	192 - 246	19.0	48.9	15.2	63.7
mercury	ug/L	2	2	1 / 2	0.047	0.0050	0.033	0.017	**0.34 J**
nickel	ug/L	100	---	2 / 2	3.4 - 11.3	4.2	1.2	3.1	4.8
potassium	ug/L	---	---	2 / 2	714 - 2110	941	1400	1140	1950
sodium	ug/L	50,000	---	2 / 2	4710 - 7760	4240	**20600**	7040	**17800**
thallium	ug/L	0.5	2	NOT DETECTED	-	**4.0**	3.6 U	3.6 U	3.6 U
vanadium	ug/L	---	---	1 / 2	1.4	0.83	0.61 U	0.71	0.61 U
zinc	ug/L	2,000	5,000	2 / 2	5.0 - 8.8	1.6 U	1.6 U	1.6 U	**13.4**
ORGANICS									
1,1,2-trichloroethane	ug/L	3	5	NOT DETECTED	-	10.0 U	10.0 U	10.0 U	**1.0 J**
1,2-dichloroethene (total)	ug/L	70	70	NOT DETECTED	-	10.0 U	10.0 U	10.0 U	**4.0 J**
benzene	ug/L	0.2	5	NOT DETECTED	-	10.0 U	**1.0 J**	10.0 U	10.0 U
chlorobenzene	ug/L	50	100	NOT DETECTED	-	10.0 U	**11.0**	10.0 U	10.0 U
chloroform	ug/L	70	---	NOT DETECTED	-	10.0 U	10.0 U	**2.0 J**	10.0 U
MISCELLANEIOUS PARAMETERS									
ammonia nitrogen	mg/L	3	---	NOT DETECTED	-	1.0 U	**0.90 J**	1.0 U	1.0 U
biochemical oxygen demand	mg/L	---	---	2 / 2	0.80 - 1.9	1.3 J	**2.0**	0.70 J	0.90 J
chemical oxygen demand	mg/L	---	---	2 / 2	4.0 - 5.0	2.0 J	**28.0**	**11.0**	4.0 J
chloride	mg/L	250	250	2 / 2	8.0 - 10.0	9.0	**27.0**	**13.0**	**25.0**
nitrate nitrogen	mg/L	10	---	2 / 2	1.3 - 1.6	0.50 U	0.15 J	0.50 U	0.50 U
sulfate	mg/L	250	250	2 / 2	9.0 - 10.0	7.0	**25.0**	**13.0**	**44.0**
total organic carbon	mg/L	---	---	2 / 2	0.8 - 0.8	1.0 U	**9.0**	**0.90 J**	**2.0**

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.

[1] New Jersey Department of Environmental Protection Groundwater Quality Standards, July, 2008.
[2] USEPA National Drinking Water Standards Maximum Contaminant Levels, June 2003.
[3] Background wells include BG GW 03 and 07 GW 03.

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

SUBSTANCE		BACKGROUND[1]		SITE-RELATED	
		FREQUENCY OF DETECTION	RANGE OF POSITIVE DETECTION	FREQUENCY OF DETECTION	07 SD WET 7-B2
INORGANICS					
aluminum	mg/kg	5 / 5	1710 - 5310	1 / 1	2770
arsenic	mg/kg	5 / 5	1.3 - 14.4	1 / 1	11.7
barium	mg/kg	5 / 5	1.6 - 31.0	1 / 1	8.6
calcium	mg/kg	5 / 5	39.3 - 519	1 / 1	568
chromium	mg/kg	5 / 5	7.4 - 59.5	1 / 1	13.2
copper	mg/kg	5 / 5	1.0 - 8.4	1 / 1	3.6
iron	mg/kg	5 / 5	3700 - 62500	1 / 1	10000
lead	mg/kg	5 / 5	1.8 - 39.4	1 / 1	19.6
magnesium	mg/kg	5 / 5	64.4 - 619	1 / 1	243
mangenese	mg/kg	5 / 5	3.1 - 214	1 / 1	38.1
potassium	mg/kg	5 / 5	69.0 - 792	1 / 1	332
sodium	mg/kg	5 / 5	17.1 - 86.2	1 / 1	28.7
vanadium	mg/kg	5 / 5	10.6 - 64.0	1 / 1	19.3
zinc	mg/kg	5 / 5	1.1 - 27.6	1 / 1	33.7

Notes:

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[1]		SITE-RELATED	
		FREQUENCY OF DETECTION	RANGE OF POSITIVE DETECTION	WS SW 07	
INORGANICS					
aluminum	ug/L	3 / 3	265 - 384	516	J
barium	ug/L	3 / 3	16.3 - 34.0	25.4	
beryllium	ug/L	2 / 3	0.22 - 0.33	0.25	
calcium	ug/L	3 / 3	462 - 10100	1440	
cobalt	ug/L	3 / 3	0.81 - 1.9	1.1	
copper	ug/L	2 / 3	1.1 - 9.8	0.83	
iron	ug/L	3 / 3	160 - 702	815	
lead	ug/L	1 / 3	4.4	1.2	
magnesium	ug/L	3 / 3	369 - 2770	713	
manganese	ug/L	3 / 3	14.0 - 55.5	35.4	R
mercury	ug/L	2 / 3	0.023 - 0.028	0.030	
nickel	ug/L	3 / 3	2.1 - 7.1	1.8	
potassium	ug/L	2 / 3	251 - 1850	724	
sodium	ug/L	R		4870	J
zinc	ug/L	3 / 3	7.6 - 29.4	22.4	J
MISCELLANEIOUS PARAMETERS					
biochemical oxygen demand	mg/L	3 / 3	1.90 - 3.0	0.90	
chemical oxygen demand	mg/L	3 / 3	4.0 - 29.0	20.0	
total hardness	mg/L	3 / 3	4.0 - 38.0	10.0	
total organic carbon	mg/L	3 / 3	0.40 - 9	7.0	J
turbidity	ntu	3 / 3	0.70 1.8	0.90	

Notes:

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

			SITE WELLS										UPGRADIENT WELL	
Sample ID:	**NJDEP GWQS[1]**	**USEPA MCL[2]**	**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**									
			RESULT		**RESULT**		**RESULT**		**RESULT**		**RESULT**		**RESULT**	
INORGANICS	**ug/L**	**ug/L**	**ug/L**		**ug/L**		**ug/L**		**ug/L**		**ug/L**		**ug/L**	
Aluminum	200	NA	105	U	121	U	503	U	114	U	**1710**		302	U
Iron	300	NA	414	U	507	U	340	U	**655**		**965**		117	U
Manganese	50	NA	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
VOLATILES	**ug/L**	**ug/L**	**ug/L**		**ug/L**		**ug/L**		**ug/L**		**ug/L**		**ug/L**	
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	NA	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).
U -- Value is a non-detected result as reported by the laboratory.
Shading denotes concentrations that exceed GQS or MCL.
Bolded values exceed the upgradient well concentrations.

[1] Values from the NJDEP Ground Water Quality Standards (GQS) Table 1 and Interim Specific Criteria.
[2] Values from the EPA List of Drinking Water Contaminants & Maximum Contaminant Levels (MCLs), July 2002.

Database source file: H:\EARLE\SITE 7\T2358\T2358\T2358.DBF data retrieved on: 05/12/05

TABLE 8

ECOLOGICAL SCREENING TABLE - SURFACE SOIL
NAVAL WEAPONS STATION EARLE, NEW JERSEY

Chemical	Sample ID # 07SDWET7-B2*	Ecological Soil Screening Levels			
		Plants	Soil Invertebrates	Wildlife	
				Avian	Mammal
Aluminum	2770	NA(1)	NA(1)	NA(1)	NA(1)
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(2)	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.

TABLE 9
SITE 7 GROUNDWATER COPCs PRELIMINARY REMEDIATION GOALS (µg/L)
OPERABLE UNIT 10 FEASIBILITY STUDY
NAVAL WEAPONS STATION EARLE
COLTS NECK, NEW JERSEY

Contaminant of Potential Concern (COPC)	Maximum Detected Site Concentration and Location	Maximum Background Concentration and Location	SDWA MCL	NJDEP GWQS	Risk-Based Concentration
Aluminum	1850 (MW7-05)	393 (MW7-03)	None	(1)	7800(2)
Iron	965 (MW7-05)	706 (BGGW03)	None	(1)	5500(2)
Manganese	118 (MW7-02)	914 (MW7-03)	None	(1)	160(2)
Chlorobenzene	11 (MW7-02)	ND	100	50	160(2)
Chloroform	2.0J (MW7-04)	ND	80(3)	70	190(4)

Notes:

Thallium was not included as a final COPC for Site 7 groundwater because it was not detected in any of the site monitoring wells during the April 2005 groundwater sampling investigation; it was detected in one well (07GW01) at 4.0 ug/L during the 1995 RI; it was not detected in any of the wells sampled in July 1986.

1,1,2-Trichloroethane (1,1,2-TCA) and Benzene were not included as final COPCs for Site 7 groundwater because they were not detected in any of the site monitoring wells during the April 2005 groundwater sampling investigation and were only detected in one well each at a concentration of 1.0J ug/L during the 1995 RI.

SDWA MCLs are promulgated federal standards for public water supplies.

(1) NJDEP GWQS for Aluminum (200 ug/L), Iron (300 ug/L) and Manganese (50 ug/L) are not risk-based.

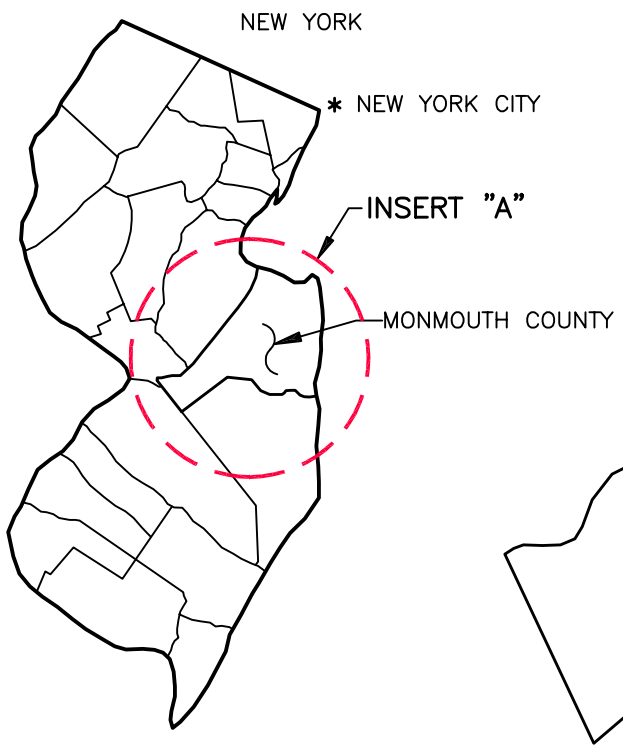
(2) Risk-based concentration for child resident – tap water ingestion exposure scenario based on noncarcinogenic risk HI<1.0 and carcinogenic risk less than or equal to $1X10^{-4}$ (See Appendix A for assumptions and calculations).

(3) 1998 Final Rule for Disinfectants and Disinfection By-products; the total for trihalomethanes (THM) is 0.08 mg/L.

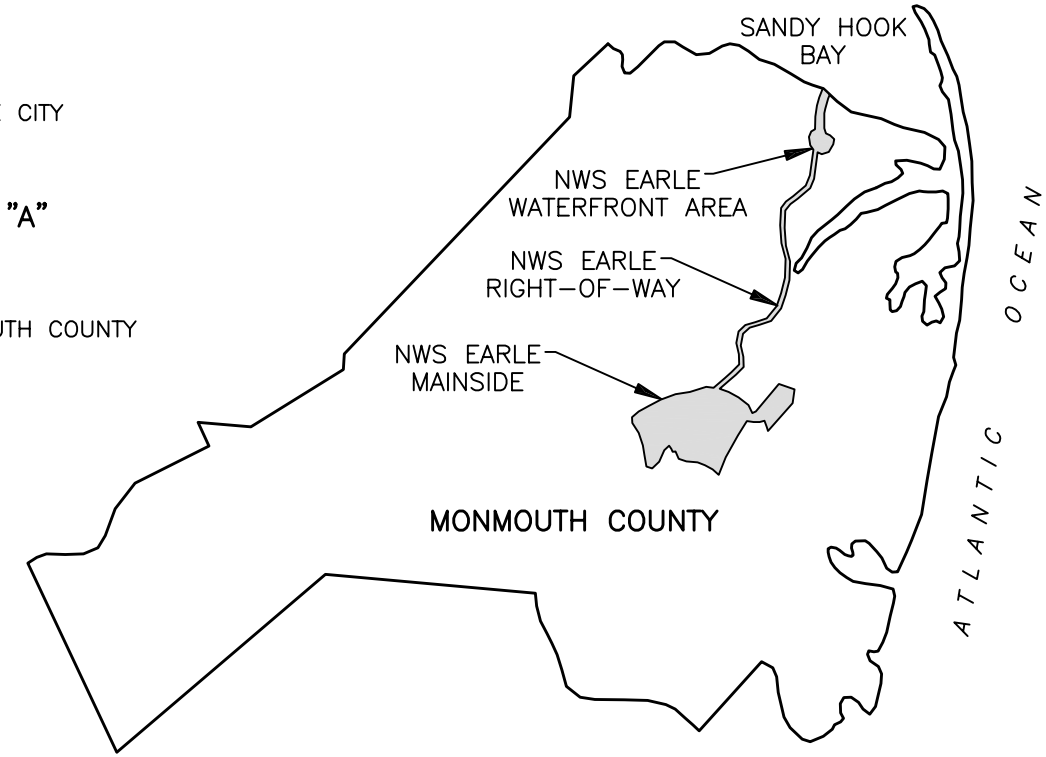
(4) Risk-based concentration for adult resident – daily showering exposure scenario based on carcinogenic risk less than or equal to $1X10^{-4}$ (See Appendix A for assumptions and calculations).

FIGURES

112G00012/0411/112G00012CM01.DWG 08/29/08 MKB



STATE OF NEW JERSEY



INSERT "A"

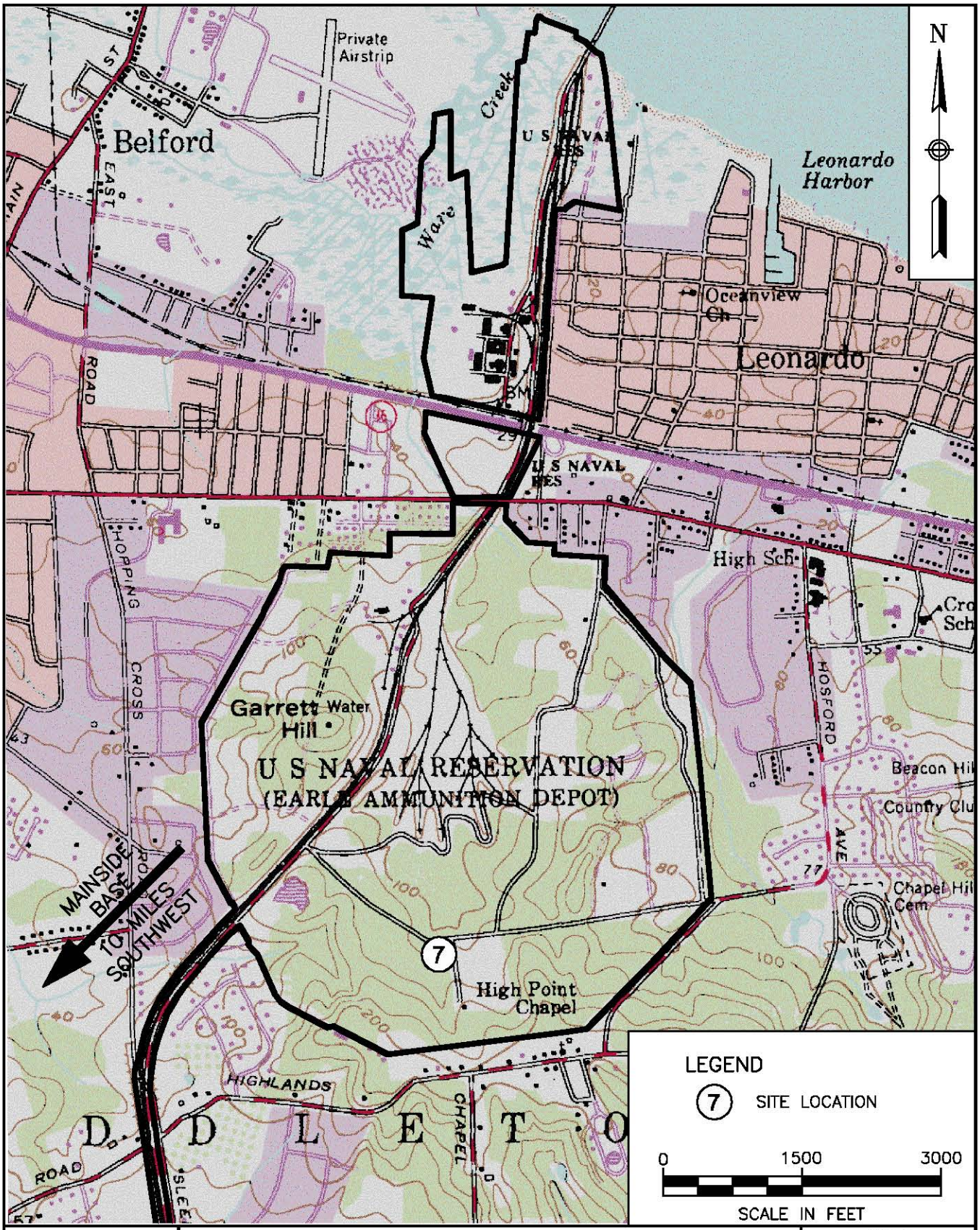
N

TETRA TECHNUS, INC.

LOCATION MAP
NAVAL WEAPONS STATION EARLE
COLTS NECK, NEW JERSEY

SCALE	NOT TO SCALE
FILE	112G00012CM01
REV	0
DATE	07/28/08
FIGURE NUMBER	FIGURE 1

112G00012/0411/112G00012CM02.DWG 08/29/08 MKB

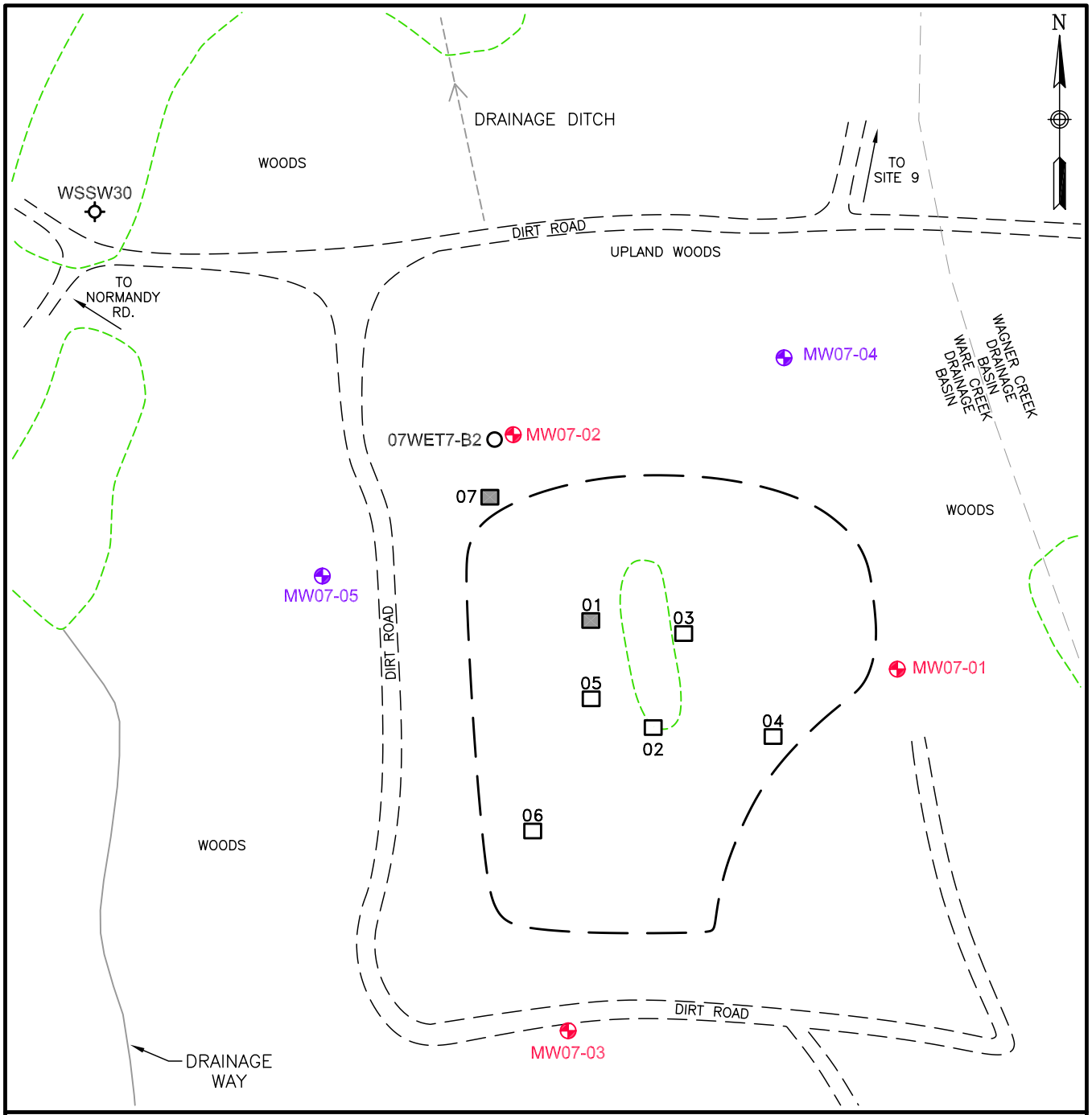


TETRA TECHNUS, INC.

SITE 7 LOCATION
WATERFRONT AREA
NAVAL WEAPONS STATION
COLTS NECK, NEW JERSEY

SCALE	AS NOTED
FILE	112G00012CM02
REV	0
DATE	08/29/08
FIGURE NUMBER	FIGURE 2

112G00012/0411/112G00012GM01.DWG 08/29/08 MKB



LEGEND

- MONITORING WELL (INSTALLED 1986)
- MONITORING WELL (INSTALLED 1991)
- SURFACE SOIL SAMPLE (1995 RI)
- WATERSHED SAMPLE (1995 RI)
- FIELD ESTIMATED WETLANDS
- APPROXIMATE LANDFILL BOUNDARY (EPIC, 1974)
- TEST PIT (1991–1992 RI)
- TEST PIT SAMPLE (1991–1992 RI)

0 150 300
SCALE IN FEET

TETRA TECHNUS, INC.

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

SCALE	AS NOTED
FILE	112G00012GM01
REV	0
DATE	08/29/08
FIGURE NUMBER	FIGURE 3