N60478.AR.001721
NWS EARLE
5090.3a

FINAL FEASIBILITY STUDY FOR SITE 9 LANDFILL SOUTHEAST OF P BARRICADES NWS EARLE NJ

4/1/2013

TETRA TECH

Feasibility Study
for
Site 9
Landfill Southeast of "P" Barricades

Naval Weapons Station Earle
Colts Neck, New Jersey

Naval Facilities Engineering Command
Mid-Atlantic

Contract No. N62470-08-D-1001
Contract Task Order WE15

April 2013

TETRA TECH

PHIL-23788

FEASIBILITY STUDY
for
SITE 9
LANDFILL SOUTHEAST OF "P" BARRICADES

NAVAL WEAPONS STATION EARLE
COLTS NECK, NEW JERSEY

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Naval Facilities Engineering Command Mid-Atlantic
9742 Maryland Avenue
Norfolk, Virginia 23511-3095

Submitted by:
Tetra Tech
234 Mall Boulevard, Suite 260
King of Prussia, Pennsylvania 19406

CONTRACT NO. N62470-08-D-1001
CONTRACT TASK ORDER WE15

APRIL 2013

PREPARED UNDER THE DIRECTION OF:

Mary M. Mang

MARY M. MANG, CHMM
PROJECT MANAGER
TETRA TECH
KING OF PRUSSIA, PENNSYLVANIA

APPROVED FOR SUBMISSION BY:

John Trepanowski

JOHN J. TREPANOWSKI, P.E.
PROGRAM MANAGER
TETRA TECH
KING OF PRUSSIA, PENNSYLVANIA

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLES

NUMBER

FIGURES

NUMBER

ACRONYMS AND ABBREVIATIONS

ARAR	Applicable or Relevant and Appropriate Requirements
B&RE	Brown & Root Environmental, Inc.
BERA	Baseline Ecological Risk Assessment
bgs	below ground surface
BOD	Biological Oxygen Demand
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-Term Environmental Action Navy
COC	Contaminant of Concern
COD	Chemical Oxygen Demand
COPC	Chemical of Potential Concern
CSF	Cancer Slope Factor
CTE	Central Tendency Exposure
CTO	Contract Task Order
EPA	Unites States Environmental Protection Agency
EPIC	Environmental Photographic Interpretation Center
ERA	Ecological Risk Assessment
ESQD	Explosive Safety Quality Distance
FS	Feasibility Study
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
ICR	Incremental Cancer Risk
mg/kg	milligram per kilogram
msl	Mean Sea Level
Navy	United States Navy
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NERP	Navy Environmental Restoration Program
NJDEP	New Jersey Department of Environmental Protection
N.J.A.C.	New Jersey Administrative Code
NWS	Naval Weapons Station
PRG	Preliminary Remediation Goal
PID	Photoionization Detector
RAO	Remedial Action Objective
RfD	Reference Dose
RI	Remedial Investigation

ACRONYMS AND ABBREVIATIONS (Continued)

RME	Reasonable Maximum Exposure
RSL	Regional Screening Level
SARA	Superfund Amendments and Reauthorization Act
SI	Site Investigation
SLERA	Screening-Level Ecological Risk Assessment
SSL	Soil Screening Level
TAL	Target Analyte List
TBC	To Be Considered
TCL	Target Compound List
TPH	Total Petroleum Hydrocarbons
TOC	Total Organic Carbon
µg/kg	micrograms per kilogram
UTL	Upper Tolerance Limit
Weston	Roy F. Weston, Inc.

1.0 INTRODUCTION AND BACKGROUND INFORMATION

This Feasibility Study (FS) report has been prepared for Site 9, Landfill Southeast of "P" Barricades located within the Naval Weapons Station (NWS) Earle in Colts Neck, New Jersey. This report has been prepared by Tetra Tech for the United States Navy (Navy) under the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract No. N62470-08-D-1001, Contract Task Order (CTO) WE15. The FS has been completed to meet the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and has been prepared per guidance issued by the United States Environmental Protection Agency (EPA) and the Department of the Navy Environmental Restoration Program (NERP) Manual.

1.1 PURPOSE AND ORGANIZATION OF THE REPORT

The overall objective of a FS is to identify and develop appropriate remedial alternatives in order to ensure that the most appropriate remedy for a given site is selected based on an informed risk management approach to permanently and significantly reduce the threat to public health and the environment. Several preliminary investigations have been conducted at the site. The Navy conducted a base-wide Remedial Investigation (RI) in 1995-1996 that included Site 9. A human health risk assessment (HHRA) was completed for Site 9 in 2013, (Tetra Tech, 2013), and a screening level ecological assessment (SLERA) was completed in 2011 (Tetra Tech, 2011). This FS incorporates the results and findings from the early preliminary investigations through the RI and the HHRA and the SLERA, to develop and evaluate potential remedial alternatives for Site 9.

The FS report is presented in four sections. Section 1.0 presents an overview of NWS Earle operations and regional environmental conditions. A summary of previous investigative activities and results, including a discussion of human health and ecological risks for Site 9, are also included. For a full understanding of site conditions, the Final RI Report by Brown & Root Environmental, Inc. (B&RE, 1996) should be reviewed. The RI report is an essential companion document to this FS because it was prepared as part of the prescribed CERCLA RI/FS development procedure.

Section 2.0 discusses remedial objectives for the Site, applicable or relevant and appropriate requirements (ARARs), preliminary remediation goals (PRGs), and general response actions for any media of interest including areal extent or volume. The identification and screening of technologies and process objectives is also presented in Section 2.0.

Based on the selected technologies and process options, remedial alternatives are developed and described in Section 3.0. The rationale for selection of the alternatives and a conceptual description of the alternatives, including a no-action alternative, are presented.

Section 4.0 provides a description of the agreed upon alternative per criteria outlined in the EPA guidance. Both capital and long-term operations and maintenance costs (if applicable) are included in Section 4.0

Several appendices are included as part of this FS report. Appendix A contains photos of Site 9 taken in February 2009. Appendix B contains test pit logs from the 1994 Site Investigation (SI). Appendix C contains an analytical results summary table from samples collected from the 1994 SI test pits. Appendix D contains test pit logs from the 1996 RI field investigation, and Appendix E contains tables that summarize the analytical results from surface water and sediment samples also collected during the RI. Appendix F contains the RI tables detailing the statistical evaluation of NWS Earle background surface and subsurface soil metals data.

1.2 BACKGROUND INFORMATION

1.2.1 Site Description

NWS Earle is located in Monmouth County, New Jersey, approximately 47 miles south of New York City (Figure 1-1). The base consists of two areas, the 10,248-acre Main Base (Mainside area), located approximately 10 miles inland from the Atlantic Ocean at Sandy Hook Bay, and the 706-acre Waterfront area. The Mainside and Waterfront Areas are connected by a Navy-controlled right-of-way as shown on Figure 1-1.

NWS Earle was commissioned as a Naval Ammunition Depot in 1943 with the primary responsibility of furnishing ammunition to the Atlantic Fleet. The current mission of NWS Earle is to operate and maintain a coastal ordnance handling and processing facility supporting Atlantic Fleet, U.S. Coast Guard and Department of Defense requirements, while providing force protection, logistics support and host services for facility personnel and home ported and visiting ships. An estimated 1,500 people either work or live at NWS Earle. The Waterfront area is located in Middletown Township, which has a population of approximately 68,200 people. Land use within the Waterfront 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 buildings and single-family residences. 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 9, the Landfill Southeast of "P" Barricades is located within the Chapel Hill portion of the Waterfront area of NWS Earle (Figure 1-2) and is approximately 3-acres in size based on a 1974 EPA Environmental Photographic Interpretation Center photo. As shown on Figure 1-3, Site 9 and the immediate area surrounding the site are heavily wooded and there are no residential areas located in the immediate vicinity of the site. An unpaved road borders the Site on the west and an earthen and grass covered road is present along the southern boundary. The Navy planted a number of pine trees within the Site and mature hardwood trees currently surround the area on all sides. Topographically, the site ground surface is level and slopes gently downward to the north. A small, intermittent stream/drainage ditch is present approximately 300 feet south of the site (Figure 1-4). As shown on Figure 1-4, stream flow direction is north-northeast towards Wagner Creek. The stream is intermittent due to low stream flow volume during periods of dry weather. Wagner Creek is the closest perennial stream and is located approximately 2,000 feet to the northeast. No drainage swales or streams are located on or within the areal extent of the Site. Drainage at Site 9 occurs through infiltration and evaporation. Photos of Site 9 are contained in Appendix A.

Over 90 percent of the acreage at NWS Earle is dedicated to its primary mission of storage and delivery of ordnance. The actual amount of land used for storage and distribution facilities is much less than this, but Explosive Safety Quality Distance (ESQD) arcs are established around each facility. Any development within these arcs is extremely restricted by safety requirements. The formal disestablishment or reclassification of a facility is required before any development can occur within an ESQD arc.

Two areas of NWS Earle, the Mainside Administration and Housing area and the Waterfront Administrative area are not encumbered by ESQD arcs. These areas are used for offices, base support, housing, and recreational facilities. Any future development would be expected to occur in one of these areas unless the development had an ordnance-specific use. Site 9 is not within the Waterfront Administration area and is therefore, encumbered by ESQD arcs.

All facilities located in the Waterfront area are connected to a public water supply (New Jersey American Water Company). Water for the public supply network comes from surface intakes, reservoirs, and deep wells. No public water supply wells, reservoirs, or surface water intakes are located within the NWS Earle facility boundaries. A combination of private wells and the public water supply from the New Jersey American Water Company serves businesses and residences in areas surrounding the Mainside and Waterfront areas. There are private wells located within a 1-mile radius of NWS Earle and several within the NWS Earle boundaries. On-base wells (located at remote building locations) are not used for potable water supply.

NWS Earle is an active military facility with limited access. Site 9 is located in an unused wooded area in the Waterfront Area of NWS Earle. Future land use within the vicinity of Site 9 is not expected to vary significantly from its current inactive use, unless a major base realignment was to occur.

Hydrology

NWS Earle is located in the coastal lowlands of Monmouth County, New Jersey, within the Atlantic Coastal Plain Physiographic Province. The Waterfront Area lies on the southern coast of Sandy Hook Bay on New Jersey's Atlantic shoreline, in an area known as the Bayshore Lowlands. The property and associated piers occupy a narrow strip of land running roughly perpendicular to the shoreline that serves as access from the ammunition depot (located one mile inland). This thin strip of land consists primarily of tidal marsh and swamp with areas of fill and has an average elevation of approximately 10 feet above mean sea level (msl).

The rivers and streams draining NWS Earle ultimately discharge to the Atlantic Ocean. Surface water drainage from the Waterfront Area enters Sandy Hook Bay. Much of this area is under tidal influence. Most of the surface drainage from the Chapel Hill area flows northward to Sandy Hook Bay via Compton, Ware, and Wagner Creeks. A very small area at the topographically high southern end of the Chapel Hill area drains southward through McClees Creek to the Navesink River. Surface runoff follows topographic gradients to storm drains and drainage ditches or occurs as overland flow that discharges to local surface water bodies.

Geology and Hydrogeology

The New Jersey Coastal Plain is a seaward-dipping wedge of unconsolidated Cretaceous to Quaternary sediments that were deposited on a pre-Cretaceous basement-bedrock complex. The Coastal Plain sediments are primarily composed of clay, silt, sand, and gravel and were deposited in continental, coastal, and marine environments. The sediments generally strike northeast-southwest and dip to the southeast at a rate of 10 to 60 feet per mile. The approximate thickness of these sediments beneath NWS Earle is 900 feet.

The pre-Cretaceous complex consists mainly of PreCambrian and lower Paleozoic crystalline rocks and metamorphic schists and gneisses. The Cretaceous to Miocene Coastal Plain Formations are either exposed at the surface or sub crop in a banded pattern that roughly parallels the shoreline. The outcrop pattern is caused by the erosional truncation of the dipping sedimentary wedge. Where these formations are not exposed, they are covered by essentially flat-lying post-Miocene surficial deposits.

The Coastal Plain sediments are the most important source of potable water in the Coastal Plain of New Jersey, with wells supplying greater than 75 percent of the potable water supply. Water-supply problems

associated with the increased demand for groundwater in the Coastal Plain include decreased groundwater levels and the induced recharge of fresh, brackish, or saline water from surface water or adjacent aquifers. The five principal Coastal Plain aquifers are the:

- Kirkwood-Cohansey aquifer system
- Atlantic City 800-foot sand
- Wenonah-Mount Laurel aquifer system
- Englishtown aquifer
- Potomac-Raritan-Magothy aquifer system

Minor Coastal Plain aquifers include the:

- Piney Point aquifer
- Vincentown aquifer
- Red Bank Sand aquifer

The five principal aquifers are capable of yielding large quantities of water for public supply use. The minor aquifers generally yield small to moderate quantities of water in or near their outcrop areas. All the Coastal Plain aquifers except the Kirkwood-Cohansey aquifer system are confined to semi-confined, except where they crop out, or are overlain by permeable surficial deposits. Increased groundwater withdrawals have produced large regional cones of depression in the major artesian aquifers.

The Waterfront area, including Site 9, is situated in the recharge area of the Wenonah-Mount Laurel aquifer system, the Englishtown aquifer, and the Red Bank Sand aquifer. The Red Bank Sand aquifer is developed in the Red Bank Sand. This aquifer is underlain by confining beds of the Navesink Formation.

Aquifer Thickness

Regional geologic mapping places Site 9 within the combined outcrop area of the Wenonah formation and Mount Laurel Sand. The Wenonah formation consists of gray and brown, silty, slightly glauconitic, very fine- to fine-grained sand; the Mount Laurel Sand consists of brown and gray, silty, slightly glauconitic, fine- to coarse-grained quartz sand. However, the presence of the Wenonah formation or Mount Laurel Sand beneath the site cannot be confirmed because no soil borings were drilled at the site. Therefore, the thickness of the aquifer underlying Site 9 is unknown.

Groundwater Flow Direction

Groundwater flow direction beneath the Site cannot be confirmed because no monitoring wells were installed as part of the investigative activities. Based upon the topographic setting in the immediate vicinity of Site 9, shallow groundwater is assumed to flow northward toward Sandy Hook Bay.

1.2.2 Site History

As outlined in a 1983 Initial Assessment Study (IAS), Site 9 was used by the Navy for the disposal of dunnage lumber from 1967 to 1972. Dunnage is lumber that is used to secure and space a ship's cargo during transport. Waste lumber was stacked, burned (using a petroleum ignition source), and then covered. No records exist of dunnage quantities disposed of at this site; however, it was estimated that 4,500 to 7,500 cubic yards of lumber was disposed in this manner. No further studies were recommended for this site because of the presence of only waste lumber from dunnage disposal (FCH, 1983).

1.2.3 Previous Environmental Investigations

Environmental investigation activities related to areas of potential environmental concern at NWS Earle have been undertaken by the Navy since approximately 1982. The following reports include Site 9 and have been submitted to EPA and New Jersey Department of Environmental Protection (NJDEP) for Environmental Restoration work at NWS Earle.

- Initial Assessment Study, Naval Weapons Station Earle, Colts Neck, New Jersey (Fred C. Hart and Associates; February 1983).

- Installation Restoration Program Site Investigation for 16 Sites at NWS Earle, Colts Neck, New Jersey (Roy F. Weston, Inc., January 1994).

- Remedial Investigation Report for Naval Weapons Station Earle, Volumes IA, IB and II (B&RE, July 1996).

Results from the previous investigations at Site 9 and the 1996 RI are discussed below.

Initial Assessment Study

As noted in Section 1.2.2., an IAS was performed at the NWS Earle by Fred C. Hart Associates, Inc. in accordance with Navy direction to collect and evaluate evidence in order to identify the existence of pollutants which might pose a potential threat to human health or the environment, on or off the installation

(FCH, 1983). Twenty-nine waste disposal sites or areas of concern were identified at NWS Earle. Sites were identified based on NWS Earle employee interviews, extensive record searches, and on-site inspections.

The 1983 IAS identified Site 9, Landfill Southeast of "P" Barricades and concluded that the Site did not pose a potential threat to human health or significant potential threat to the environment. As outlined in the 1983 report, the Site was used for disposal of dunnage lumber from 1967 to 1972. Lumber was stacked and burned and then covered. No records existed of dunnage quantities disposed of at the site. Navy estimates of total dunnage generation of 900 to 1,500 cubic yards per year indicated that approximately 4,500 to 7,500 cubic yards of lumber were disposed of at Site 9. No environmental media samples were collected at Site 9 as part of the IAS. Site 9 was not recommended for a follow-up Confirmation Study because of the presence of only waste lumber from dunnage disposal.

Site Investigation

In 1994, as part of a facility-wide SI, a test pit investigation was conducted at Site 9 for the purposes of defining the general limits of the site and obtaining soil samples for chemical analysis (Weston, 1994). Prior to the test pit investigation, representatives of the Navy and the SI subcontractor (Roy F. Weston, Inc.) conducted a site reconnaissance including a review of historical aerial photographs. As reported in the SI Report, the location and extent of Site 9 was identified by evaluating apparent soil disturbance, consideration of the approximate age of the reforestation, and from review of several aerial photographs that were taken sequentially during the period of operation. A backhoe was used to excavate six test pits in May 1992 to a maximum depth of 10 feet below ground surface (bgs). Cover material was stockpiled separately from any underlying waste. Each test pit was described and logged in the field for color description, texture, moisture, depth to water, and odor or staining, if present. Samples were collected from the backhoe bucket and analyzed for Target Compound List (TCL) and Target Analyte List (TAL) parameters. As reported in the January 1994 SI Report, the samples were taken at specified horizons considered to be representative of potentially impacted soils that were in contact with waste materials. Where no fill materials were encountered, samples were taken from immediately above the soil/water interface, or, if no water was encountered, from the base of the test pit. Upon completion of each pit, the excavated materials were backfilled into the pit and compacted with the backhoe bucket. The backhoe bucket was steam cleaned before excavation of the first pit, between sampling locations, and following completion of the last pit.

The test pit logs for Site 9 are included in Appendix B. Figures 1-3 and 1-4 detail the locations of the six test pits (TP9-01 through TP9-06). Test pit TP9-01 was excavated upslope of the site, to a depth of 7 feet, to establish background conditions. Test pit TP9-02 was excavated in the center of Site 9 to a depth of 10 feet. A piece of cement and trace brick fragments were the only items found in this test pit.

The majority of soil in test pit TP9-02 was classified as clayey sand. Test pit TP9-03 was located near the upslope southern margin of Site 9. As noted in the respective test pit log, no waste materials were found here. A naturally occurring formation of iron veins, "bog iron" was exposed at a depth from 6 to 8 feet bgs, which is indicative of undisturbed soils. TP9-03 was excavated to a depth of 9 feet. Metal scrap (steel sheeting, metal bands) and timber (wood beams) were found on the ground surface around test pits TP9-04 and TP9-05 as noted in the 1994 SI Report. TP9-04 was excavated on the northeast downslope corner and TP9-05 was excavated on the east edge of Site 9. TP9-04 was excavated to a depth of 9.5 feet and TP9-05 was excavated to 8 feet. The sixth test pit, TP9-06 was located near the western edge of Site 9 and was excavated to a depth of 10.5 feet. One 4-inch by 4-inch piece of timber was found within the first 2 feet of excavation; no other items or materials were found. Bog iron was also identified in TP9-06 at a depth of 6 to 7 feet bgs. Groundwater was not encountered in any test pit. From the individual test pit logs, no PID readings were recorded during any of the test pit excavations.

As noted in the SI Report, the original soils within Site 9 are part of the Tinton-Phalanx Group. In general, shallow soils at Site 9 consisted of a silty, sandy loam dark yellow brown to light yellowish brown in color. Coarse fragments of iron-cemented sandstone were also encountered in each of the test pits (Weston, 1994).

The SI test pit samples were identified as 09-001-T007, 09-002-T010, 09-003-T001, 09-004-T001, 09-005-T001, and 09-006-T008. For purposes of this FS report, the test pits samples have been renumbered as TP9-01 through TP9-06. Samples were collected from depths ranging from 3 feet bgs to 10 feet bgs. Subsurface soil analysis in the test pit samples indicated low levels of metals, chloroform, di-n-butylphthalate, pesticides, and total petroleum hydrocarbons (TPH). Cyanide was detected in one sample, TP9-06, collected from 5-8 feet bgs at a concentration of 1.57 milligrams per kilogram (mg/kg). Cyanide was not detected in any of the other five test pit soil samples and the test pit finding for TP9-06 indicated the presence of undisturbed soils. Methoxychlor was also detected in just one sample (TP9-04), but was not detected in any of the other test pit samples. A number of the organic concentrations were data qualified "J", denoting that the reported concentration as estimated because the concentration is below the method quantitation limit or because of exceedances of data validation quality control criteria. Table C-1 (see Appendix C) presents a complete summary of the test pit soil analytical results including the sample depth, as presented in the 1994 SI Report.

Based on the test pits findings and soil analyses results, the SI concluded that past activities at Site 9 have had minimal impact on site soils. Site 9 was used for the disposal of dunnage lumber and relatively small amounts of solid waste. Brick, steel sheeting, metal banding, burnt wood, and timber were identified in several test pits. The area was found to be overgrown and physically stable. Low concentrations of several organic compounds, pesticides, TPHs, and cyanide (in only one sample) were

found in soils collected from test pits located in the central portion of the Site. However, no results indicated that Site 9 posed a threat to human health or the environment and no further investigation or other action was recommended (Weston, 1994). No other media sampling or investigative tasks were completed as part of the SI for Site 9.

1996 Remedial Investigation

During 1995 and 1996, B&RE, on behalf of the Navy, conducted an RI of 27 former known or suspected waste disposal sites at NWS Earle (B&RE, 1996). Based on the results from previous investigations, the scope of work at Site 9 was defined to include the excavation of two more test pits to confirm the northern extent of the filled area and sampling of nearby springs and streams to determine if Site 9 groundwater was impacting surface water. In December 1995, two additional test pits were excavated at Site 9. The two test pits, TP9-07 (also identified as 09 TP 07) and TP9-08 (also identified as 09 TP 08), were placed along the northern edge of the Site, in the vicinity of the pine tree reforestation area (see Figure 1-3). The approximate boundary of Site 9 (as shown in Figures 1-3 and 1-4) was determined based on an analysis of historical photographs conducted as part of a study performed for the EPA by the Environmental Photographic Interpretation Center (EPIC). An area 20 feet long by 3 feet wide by 8.5 feet deep was excavated for the two test pits (B&RE, 1996). No municipal waste fill, dunnage lumber, or construction debris was encountered in either test pit. The material encountered during excavation of both pits generally consisted of olive-brown or orange-brown sandy silt and clay with a small amount of weathered sandstone/siltstone fragments.

The excavated material in the backhoe bucket was screened with a photoionization detector (PID); no PID readings were recorded above background in either test pit. Based on the visual inspection and PID screenings, no soil samples were collected for chemical analysis and the excavated materials were returned to each pit. The 1996 RI test pit logs are included in Appendix D.

The Wagner Creek watershed is located in the eastern section of the Waterfront Area, primarily south of Route 36. A Wagner Creek tributary, the intermittent stream/drainage ditch described previously, is located approximately 300 feet south of Site 9. The tributary, as reported in the 1996 RI Report is small and usually dry; water is present only after periods of heavy rainfall. Sampling of the intermittent stream/drainage ditch was conducted as part of the RI Wagner Creek Watershed sampling program, to determine if groundwater flow and/or surface runoff had affected surface water and sediment quality. One stream/spring sample (WSSW18) and two surface water samples (WSSW17 and WSSW19) were collected from a drainage ditch southeast of Site 9 that drains northeastward to Wagner Creek (see Figure 1-4). Four surface water samples were proposed in the RI Work Plan; however, due to dry summer conditions, only three surface water samples could be collected. Analytical results from a fourth

watershed study sample, WSSW20 which was collected from Wagner Creek and is located approximately 1,600 feet northeast of Site 9, are included for comparison.

Three sediment samples WSSD17, WSSD18, and WSSD19 were collected from along the intermittent stream/drainage ditch at the same approximate locations as the surface water samples. A fourth watershed study sample, WSSD20, is included for comparison. Due to dry summer conditions, a sample could not be collected from upstream of Site 9.

Surface water samples were analyzed for TCL volatiles and semivolatiles, TAL metals/cyanide, hardness, and landfill indicator parameters (ammonia, biological oxygen demand [BOD], chemical oxygen demand [COD], chloride, nitrite, nitrate, total organic carbon [TOC], phosphate, and turbidity). Sediment samples were analyzed for TCL volatiles and semivolatiles, TAL metals/cyanide, moisture, and landfill indicator parameters (ammonia, BOD, COD, chloride, nitrite, nitrate, TOC, phosphate, and turbidity). Appendix E contains two tables that summarize the Wagner Creek Watershed sampling results. Table E-1 summarizes the RI surface water analytical results. Table E-2 is a summary of the RI sediment sampling analytical results. More detailed information on the 1995 Wagner Creek watershed assessment can be found in Section 30 of the March 1996 RI Report.

Based on the test pit investigation and surface water and sediment sampling, the 1996 RI concluded that no unacceptable risk to human health is apparent from Site 9. The presence of metals in Wagner Creek sediments and surface water indicates a possible impact to the receiving water body; however, the source of the metals was not defined as noted in the RI, and is not necessarily from Site 9 (B&RE, 1996).

The aquifer underlying NWS Earle is classified as Class II-A, a potential source of potable water under New Jersey regulations [N.J.A.C. 7:9-6]. Groundwater at Site 9 is not currently used for drinking water, and potable water is not supplied or expected to be supplied at the site. The Navy has no plans to change the current land use at Site 9. Groundwater was not sampled as part of any investigation; however, based on the type and limited presence of any waste materials, impact to groundwater from site activities is expected to be minimal, if at all.

1.2.4 Nature and Extent of Contamination

1.2.4.1 Test Pit Soil Samples

Inorganics

The soil sampling at Site 9 was limited to subsurface soil due to the lack of visible impacts to surface soil as noted during the SI and RI test pit investigations. The Site 9 test pit soil samples were collected from

depths ranging from 3 feet to 10 feet bgs. Table 1-1 presents the comparison of Site 9 test pit soils analytical results to NWS Earle background subsurface and surface soil sample results obtained during the 1994 SI. As shown on Table 1-1, aluminum, magnesium, potassium, silver, and zinc were the only inorganics found in the test pit soil samples that exceeded their respective 95 percent Upper Tolerance Limit (UTL) concentrations, in one or more samples, for background surface and subsurface soils at NWS Earle. The tolerance limit defines the concentration range that, on average, is estimated to contain 95 percent of all data points from the background population.

The 95 percent UTL concentration for aluminum in NWS Earle background surface soils (0 feet – 0.5 feet) is 7,510 mg/kg. The 95 percent UTL for background subsurface soils (0.5 – 2.0 feet bgs) is 5,870 mg/kg. The test pit soil sample results for aluminum ranged from 2,320 mg/kg to 9,220 mg/kg, below or slightly above the 95 percent UTL calculated values. Section 31 of the 1996 RI Report provides detailed information on the location, collection results, and statistical evaluation of background samples collected at NWS Earle as part of the site-wide RI. Appendix F contains Tables 31-7 and 31-8 from the RI report that detail the results from the statistical evaluation that was conducted for soil inorganics. Potassium was detected in one test pit soil sample at a concentration that exceeded the 95 percent UTL for NWS Earle background subsurface soils (2,780 mg/kg); however, it was just slightly above the 95 percent UTL for background surface soils (4,050 mg/kg). Potassium detected concentrations in the remaining five samples were below both the 95 percent UTL for both surface and subsurface soils. Silver concentrations detected in two test pit soil samples were above the calculated 95 percent UTL for both surface and subsurface soils. Silver was not detected in the remaining four test pit soil samples.

Zinc concentrations in two of the six test pit soil samples exceeded the subsurface 95 percent UTL calculated for background subsurface samples. However, the concentrations did not exceed the background surface soil 95 percent UTL value. Magnesium was detected in two test pit soil samples at concentrations above its background surface soil 95 percent UTL, but the concentrations detected did not exceed the calculated 95 percent UTL for background subsurface soils.

Table 1-2 compares the test pit soil samples results to current EPA Regional Screening Levels (RSLs) for residential soils and industrial soil, and risk-based Soil Screening Levels (SSLs) for protection of groundwater. Based on this comparison, aluminum was detected in two test pit soil samples at levels above its residential RSL, but the concentrations did not exceed the industrial RSL or risk-based SSL. Iron was detected in the test pit soil samples at levels above its residential RSL and SSL, but below its industrial RSL. Arsenic and total chromium exceeded their respective risk-based SSLs and residential and industrial RSLs. However, the calculated mean and 95 percent UTL of NWS Earle background subsurface soil concentrations for arsenic and total chromium also exceed the current EPA RSLs and SSLs values.

Organics

Pesticides detected in one or more of the test pit soil samples, above their detection limits, were 4,4' dichlorodiphenyldichloroethane (DDD), 4,4' dichlorodiphenyldichloroethylene (DDE), and 4,4' dichlorodiphenyltrichloroethane (DDT). However, all of the detected concentrations were data qualified "J", denoting that the reported concentration was estimated because the concentration was below the method quantitation limit or because of exceedances of data validation quality control criteria. Methoxychlor was detected at 93 micrograms per kilogram (µg/kg) in one test pit soil sample; however, it was not detected in any of the other samples.

Organic compounds detected in one or more of the test pit soil samples, above their detection limits, were chloroform, di-n-butylphthalate and bis(2-ethylhexyl)phthalate. All of the detected values were data qualified "J", denoting that the reported concentration was estimated because the concentration was below the method quantitation limit or because of exceedances of data validation quality control criteria.

Petroleum hydrocarbons were detected at low concentrations (3.6 mg/kg to 4.7 mg/kg) in three of the six test pit soil samples.

1.2.4.2 Wagner Creek Watershed Surface Water and Sediment Samples

Table 1-3 details RI surface water results and compares them to background concentrations. As noted in the 1996 RI Report, the presence of elevated aluminum in several of the surface water samples suggests the presence of suspended solids. In the Wagner Creek Watershed, metals were detected in surface water at levels greater than background in conjunction with elevated levels of aluminum. No organic compounds were detected in any of the Wagner Creek surface water samples.

Metals were also detected in the sediment samples collected from the intermittent stream and Wagner Creek wetlands (WSSD17, WSSD18, WSSD19 and WSSD20) at concentrations that exceeded background concentrations (see Table 1-4).

The organic compounds, di-n-butylphthalate, diethylphthalate, hexachloroethane, and tetrachloroethene were detected in one sediment sample, SWSD20, at concentrations above detection limits. These compounds are unrelated to Site 9 because only di-n-butylphthalate was detected in the Site 9 soil samples. Di-n-butylphthalate was detected in the test pit soil samples at estimated concentrations ranging from 21 ug/kg to 37 ug/kg, well below the 1300 ug/kg detected at WSSD20.

Of the metals detected in the surface water and sediment samples from the Wagner Creek watershed, antimony, cadmium, mercury, nickel, selenium, and thallium were not detected in any of the Site 9 test pit soil samples.

Site 9 resides on the edge of the Wagner Creek watershed in the eastern section of the Waterfront Area (Figure 1-4) and is topographically and hydrologically either down gradient or cross gradient from the watershed study sample locations WSS17, WSS18, and WSS19. Site 9 slopes gently to the north while sample locations WSS17 and WSS18 are, respectively, southeast and south of Site 9. WSS19 and WSS20 are east of Site 9. Runoff from the site is generally northerly; however, the relatively flat nature of the site, and the distances to the sampling locations, between 700 feet and 1300 feet, would promote infiltration rather than runoff.

There are no surface water bodies in immediate proximity to Site 9. The closest surface water is an intermittent flowing stream that is located south and southeast of the site. Due to the lack of waste materials on the site surface and the distance between the site and intermittent stream, there is little potential for runoff of any site-related contaminants into surface waters or sediments.

1.2.5 Contaminant Fate and Transport

Soil

Only several inorganics were detected at concentrations above the calculated 95 percent UTL for background subsurface or surface soils at NWS Earle. Aluminum, potassium, and silver are generally considered to exhibit low toxicity unless present at very elevated levels. No waste handling or disposal activities have been conducted at the site since 1972 or over 40 years ago. All of the detected inorganics are generally considered to be insoluble, stable elements that are not biologically available and are not mobile in normal soil environments.

Surface Water and Sediment

The primary constituents found in surface water and sediment samples were metals. Levels of a number of metals were greater than background for both surface water and sediment samples. The surface water samples exhibited several metals that are normally insoluble (indicating metals in suspended solids) thus, it was concluded in the RI Report that the concentrations of these metals in solution (mobile) may actually be lower. Surface water transport through sediment resuspension was identified as the principal mechanism for migration of the detected metals in sediment. Metals in sediment tend to remain in the sorbed state;

however, heavy precipitation events may increase the rate of erosional dispersion and migration of sediments along the surface water pathway.

1.2.6 Human Health Risk Assessment

An HHRA was performed in February 2013 for NWS Earle Site 9 to characterize the potential risks to human receptors under current and potential land uses (Tetra Tech, 2013). Both carcinogenic and non-carcinogenic risks were assessed.

Risk-based screening of Site 9 soil concentrations was used to select chemicals of potential concern (COPCs). Toxicity screening levels based on the EPA's latest RSLs for residential soil were used to identify COPCs for the assessment of incidental soil ingestion, soil dermal contact, and inhalation of particulate emissions from soil. As shown in Table 1-5, the maximum detected levels of aluminum, chromium, arsenic, and iron exceeded their respective RSLs in Site 9 soil. Arsenic and chromium are known human carcinogens and so were automatically retained as COPCs in accordance with EPA Region 2 recommendations. Background concentrations did not factor into the decision process for selecting COPCs documented in Table 1-5. The HHRA identified four substances as soil COPCs - aluminum, chromium, arsenic, and iron. Aluminum was the only COPC found at levels that were shown to be statistically greater than background.

The quantitative HHRA evaluated each potential receptor under a reasonable maximum exposure (RME) scenario. A less conservative central tendency exposure (CTE) analysis is performed only if the overall cumulative cancer risks are above 1×10^{-4} or the noncancer hazard indices (HIs) based on the same target organ are above 1.0, which did not occur for any of the receptors or media evaluated at the site.

Incremental cancer risk (ICR) estimates can be generated for each exposure pathway by multiplying the estimated intakes by published cancer slope factors (CSFs). CSFs generally represent an upper bound on the average risk in a population or the risk for a randomly selected individual but not the risk for a highly susceptible individual or group. According to the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), EPA has defined the range of 1×10^{-6} to 1×10^{-4} as the ICR target range such that, when the sum of cancer risks for all COPCs in a given medium is greater than 1×10^{-4}, this generally indicates that EPA will require consideration of remediation options. ICRs below 1×10^{-4} normally do not require remediation or remedial efforts for a given medium.

Non-carcinogenic risks are presented in the form of Hazard Quotient (HQs), which are determined by dividing the estimated intake of a chemical by the published reference doses (RfDs). RfDs have been developed by EPA and represent a level to which an individual may be exposed that is not expected to result in any deleterious effect. HIs are generated by summing individual HQs for COPCs. If the value of the

total HI exceeds unity (1.0), the potential for non-carcinogenic health hazards associated with exposure to a particular chemical mixture cannot be ruled out. In that case, a review of the target organ(s) affected by each chemical should be performed, which indicates the most sensitive toxic endpoints used to develop the associated RfDs for each substance. If each target organ-specific HI is less than 1, then adverse effects are not anticipated. EPA's goal of protection for noncancer hazards is an HI less than or equal to 1.

Cancer risks were evaluated for potential future soil exposures to child, adult, and lifetime residents, and for industrial workers, construction workers, and recreational users, respectively. The associated RME ICRs were estimated for exposures to soil COPCs for the residential child (ICR of 8.4×10^{-5}), residential adult (ICR of 1.8×10^{-5}), lifetime resident (ICR of 1.0×10^{-4}), industrial worker (ICR of 1.0×10^{-5}), construction worker (ICR of less than 1×10^{-6}), and the recreational user (ICR of less than 1×10^{-6}). The estimated carcinogenic risk for the future lifetime resident was at the upper end of EPA's target acceptable risk range of 1×10^{-4} to 1×10^{-6}.

The COPCs that contributed to cancer risks were arsenic and chromium, which are Class A carcinogens that were detected at concentrations similar to background based on statistical tests. Note that the arsenic maximum site concentration of 13.2 mg/kg and the upper confidence limit of 10.3 mg/kg were both less than the NJDEP residential direct contact soil cleanup standard of 19 mg/kg, which is based on natural background levels for arsenic in New Jersey soils (NJDEP, 2012).

Non-cancer hazards were estimated for potential exposures to child and adult residents, industrial workers, construction workers, and recreational users, respectively. For the residential child, the estimated RME HI exceeded 1.0 for exposure to soil. When HIs were grouped according to target organ, no target organ-specific HIs exceeded 1.0, which indicates that adverse non-cancer hazards are not expected from exposures to soil. RME HIs were less than 1.0 for the residential adult, industrial worker, construction worker, and recreational user.

1.2.7 Ecological Risk Assessment

An ecological risk assessment (ERA) was conducted in June 2011 for Site 9 to determine whether adverse ecological impacts are potentially occurring from exposure to site-related contaminants (Tetra Tech, 2011). The ERA consists of Steps 1, 2, and 3a of the eight step ERA process. Because no additional site-specific investigations and biological studies were conducted at the Site, Steps 3b through 7 are not included in this ERA.

Site 9 is approximately 3-acres in size and is located on the edge of the Wagner Creek watershed in the eastern section of the Waterfront area. Both upland and wetland habitats are present in this watershed.

A number of inorganics were detected in surface water and sediment samples collected from an intermittent stream located south and southeast of Site 9. As concluded in the 1996 RI Report, runoff is limited at Site 9 and flows away from the stream. While the direction of groundwater flow is not known, the concentrations of metals found in Site 9 test pit soil samples were not high enough to correlate with the elevated levels of some of the metals detected in the intermittent stream and Wagner Creek wetlands surface water and sediments. The highest concentrations of most metals were found in samples WSSW/SD17 and WSSW/SD20, which were collected several hundred feet from Site 9. Based on review of the sampling results, on the whole, potential risks from the historical activities at Site 9 to aquatic receptors in the Wagner Creek Watershed are low to moderate. The exact source of these inorganics is unclear, and as noted in the 1996 RI Report, is not necessarily Site 9 (B&RE, 1996).

Based on the habitat at the site, potentially exposed receptors include a variety of terrestrial plants, invertebrates, mammals, and birds exposed to chemicals in the surface soil. Although no surface soil samples were collected at this site, higher chemical concentrations would be expected in the subsurface soil because the remains of the disposed dunnage lumber were covered after the lumber was burned. Therefore, it would be conservative that chemicals detected in the subsurface soil collected from test pits between 3 to 10 feet bgs were evaluated in this ERA.

The first two screening steps comprise SLERA, and correspond with Tier 1 of the Navy Policy (Navy, 1999), where conservative exposure estimates are compared to screening-level and threshold toxicity values. Based on the initial screening of the chemical data, several chemicals were initially selected as COPCs in soil because they were either detected at concentrations that exceeded conservative screening levels, had ecological effects quotients greater than 1.0 in the conservative food chain model, or did not have screening levels. Table 1-6 presents the chemicals that were selected as COPCs in soil for potential risks to plants and invertebrates. Table 1-6 was revised based on comments on the Site 9 SLERA from NJDEP (NJDEP, 2011).

Chemicals that were initially selected as COPCs were further evaluated in Step 3a. Step 3a is the first step of a baseline ecological risk assessment (BERA) and consists of refining the conservative assumptions following Steps 1 and 2 to further focus the ERA process on the chemicals of greatest concern at a site. Step 3a corresponds with the first part of Tier 2 of the Navy Policy (Navy, 1999). For chemicals that were evaluated further in Step 3a, the COPC refinement including background, bioavailability, detection frequency, food chain modeling and magnitude of criterion exceedance were considered, as appropriate, to determine if the risks are great enough to warrant additional evaluations. In Step 3a, no chemicals were retained as COPCs for risks to terrestrial plants, invertebrates, mammals, or birds. Therefore, no site related contaminants are of potential ecological concern at Site 9.

2.0 IDENTIFICATION AND SCREENING OF TECHNOLOGIES

2.1 COMPLIANCE WITH ARARs AND TBC CRITERIA

ARARs are promulgated, enforceable Federal and state environmental or public health requirements that are determined to be legally applicable or relevant and appropriate to the hazardous substances, remedial actions, or other circumstances at a CERCLA site. The NCP, Section 300.430, states that on-site remedial actions at CERCLA sites must meet ARARs unless there are grounds for invoking a waiver. A waiver is required if ARARs cannot be achieved. The two classes of ARAR, "applicable, relevant and appropriate, are defined below:

- **Applicable Requirements** - Section 300.5 of the NCP defines applicable requirements as those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site.

- **Relevant and Appropriate Requirements** - Section 300.5 of the NCP defines relevant and appropriate requirements as those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at a CERCLA site that their use is well suited to the particular site.

To Be Considered (TBC) criteria may or may not be promulgated advisories or guidance issued by federal or state governments that are not legally binding but may be considered during development of remedial alternatives.

At Site 9, no hazardous substances, pollutants, or contaminants were identified in any of the sampled media at concentrations or levels that would warrant further investigation or a remedial action. Thus, no ARARs or TBCs have been identified for Site 9.

2.2 CHEMICALS AND MEDIA OF CONCERN

Based on the SI and RI sampling activities, HHRA, ERA, and current and future use of the Site, no chemicals or compounds were identified as contaminants of concern (COCs) for any environmental media at Site 9. There are no potable wells at Site 9 or in its immediate vicinity and the Navy has no plans to change the current non-residential land use. From an ecological standpoint, the levels of inorganics detected in the Wagner Creek Watershed do not appear to pose a significant risk to ecological

receptors. The source(s) of inorganics detected in surface water and sediments are unclear and as noted in the 1996 RI Report, Site 9 may not necessarily be a significant contributor.

2.3 PRELIMINARY REMEDIATION GOALS

PRGs are contaminant concentration levels that are established with consideration given to:

- Protection of human receptors from adverse health effects.
- Protection of the environment from detrimental impacts from site-related contamination.
- Compliance with federal and state ARARs.

PRGs were not warranted for Site 9 as no media-specific COCs were identified.

2.4 REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) are medium-specific goals for protecting human health and the environment. Where warranted, RAOs typically specify COCs, exposure routes, and acceptable contaminant levels or range of levels for each exposure route. Based on the SI and RI sampling activities, comparison to background levels, and current and future use of the site, no RAOs for protection of human health or ecological receptors are warranted for Site 9.

2.5 DEVELOPMENT OF GENERAL RESPONSE ACTIONS

RAOs are used to develop general response actions that describe medium-specific measures that will satisfy the RAOs. General response actions presented in OSWER Directive No. 9355.3-01, *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA*, were evaluated for their applicability to site specific conditions, environmental media, the nature of the contaminants, and how the potential risks would be mitigated.

No general response actions are warranted for Site 9 soils, groundwater, surface water, and sediments.

2.6 IDENTIFICATION, SCREENING, AND EVALUATION OF REMEDIAL TECHNOLOGIES

Based on the RAOs and general response actions for Site 9, the only technology identified for Site 9 was No Action. No Action would be effective at meeting the RAO for the site and is easily implementable. There are no capital or operation and maintenance costs associated with the No Action technology.

2.7 VOLUME OF CONTAMINATED MEDIA

There are no quantities of soil, groundwater, surface water, or sediment to be remediated.

3.0 DEVELOPMENT AND SCREENING OF ALTERNATIVES

3.1 RATIONALE FOR ALTERNATIVE DEVELOPMENT

The purpose of this FS is to evaluate the site-specific conditions as identified during the completion of the RI and previous investigations, and develop an appropriate range of remedial alternatives to address the contamination in sufficient detail to allow the selection of an appropriate remedy. The development of alternatives should reflect the specific characteristics of the Site and the nature and extent of contamination. Based on the general response actions discussed in Section 2.6, the No Action alternative has been developed for Site 9. Development of the No Action alternative for Site 9 was based on the following:

- Land-use scenarios
- Exposure scenarios
- Technologies and process options remaining after the screening evaluation from Section 2.0

3.1.1 Land-Use Scenarios

It is anticipated that the future land use of the Site and surrounding property will be consistent with the current uses. As such, the potential exposure of humans to the Site was evaluated in the context of two land-use scenarios: (1) industrial restricted-access land use for the Site and (2) industrial restricted-access land use for adjacent lands.

3.1.2 Exposure Scenarios

The exposure scenarios at the Site are dependent on the future use of the NWS Earle facility. NWS Earle is an active Naval facility with access restrictions in place at all points of entry. At this time, the Navy has no plans to change the current use of the facility. Site 9 is located in a remote, wooded area of the Waterfront area and is encumbered by ESQD arcs. As a result, no development is expected to occur within this area for the foreseeable future. Access to the site is restricted to Navy personnel only, for work or occasional hunting activities only. This assumption is consistent with the land-use scenarios.

3.1.3 Technologies and Process Options

Based on the lack of need for any remedial action objectives, no action is the only technology and process option that is recommended for Site 9.

3.2 DEVELOPMENT OF ALTERNATIVES

The No Action alternative was developed based on the type of historical operations conducted at the site (burning of waste dunnage), the visual evidence from the SI and RI test pit investigations, the SI test pit soil results and comparison to current NJDEP soil cleanup criteria, RI watershed surface water and sediment sampling results, and current and future land use and exposure scenarios. No RAOs or COCs were identified or warranted for Site 9; therefore, no action was determined to be an appropriate technology and process option.

The remedial alternative developed for Site is:

- Alternative 1: No Action

3.2.1 Alternative 1: No Action

The no action alternative is normally developed and retained as a baseline scenario to which other alternatives may be compared, as required by the NCP. For sites where no CERCLA action is warranted, such as sites with low potential for risk to human health and the environment, the no action alternative is developed as needed. Based on the SI and RI test pits, only small amounts of burnt wood, brick, metal strapping, and trash were present in some of the test pits. No hazardous wastes or hazardous waste-containing materials were identified in the pits. Thus, no activities, monitoring, or five-year reviews will be conducted under the no action alternative. The site will remain in its current condition.

4.0 DETAILED DESCRIPTION AND ANALYSIS OF ALTERNATIVES

As outlined in the Department of the Navy Environmental Restoration Program Manual (Navy, 2006), remedies are to be developed in accordance with the nine NCP criteria and the *Navy/Marine Corps Policy for Optimizing Remedial and Removal Actions Under the Environmental Restoration Program* (2004). The NCP Threshold Criteria and Primary Balancing Criteria are specifically addressed in this FS Report. State acceptance will be evaluated after NJDEP has reviewed and commented on this FS Report and community acceptance will be addressed in the Record of Decision that will be finalized after the public comment period for the FS Report and Proposed Plan.

The following nine criteria are outlined in the NCP for the detailed analysis of remedial alternatives:

Threshold Criteria

- Overall Protection of Human Health and the Environment
- Compliance With ARARs and TBCs

Primary Balancing Criteria

- Long-term Effectiveness and Permanence
- Reduction of Toxicity, Mobility, and Volume through Treatment
- Short-term Effectiveness
- Implementability
- Cost

Modifying Criteria

- State Acceptance
- Community Acceptance

4.1 DESCRIPTION AND INDIVIDUAL ANALYSIS OF ALTERNATIVES

One remedial alternative, Alternative 1: No Action was developed for Site 9. The detailed evaluation of the alternative is presented below. No detailed cost estimates for capital or annual operation and maintenance are provided, as no activities will be implemented at the site.

4.1.1 Alternative 1: No Action

4.1.1.1 Detailed Description

The no action alternative was developed because no RAOs or COCs were identified for Site 9. No remedial activities or measures are needed at the Site because contaminant concentrations identified in site soils, do not result in unacceptable risk to human health or the environment.

4.1.1.2 Detailed Analysis

Overall Protection of Human Health and the Environment

Implementation of Alternative 1 would provide overall protection of human health and the environment because under the current and future land-use scenarios no remedial actions are warranted for Site 9. NWS Earle is a restricted-access Navy facility and Site 9 is located within a remote area of the Waterfront area. Test pit soil sample data was compared to background subsurface and surface soil sample data collected during the RI. No unacceptable levels were identified. No potable wells are located at Site 9 or within the immediate proximity of the Site; therefore the expected risk to a residential well water user would be considered to be low. No groundwater wells were installed at the site; however, groundwater flow direction is assumed to be to the north based on the next closest site (Site 7). The closest residence or commercial building to Site 9, in the assumed downgradient direction, is about one mile away.

Compliance with ARARs

At Site 9, no hazardous substances, pollutants, or contaminants were identified in any of the sampled media at concentrations or levels that would warrant further investigation or a remedial action. Thus, no ARARs or TBCs have been identified for Site 9.

Long-Term Effectiveness and Permanence

No significant contamination from the historical operations conducted at Site 9 was identified, so Alternative 1 would be considered a long-term effective and permanent remedy. No land-use or institutional controls are required for the current and future land-use scenarios.

Reduction of Toxicity, Mobility, or Volume through Treatment

No contaminants were identified at levels that would pose a potential risk to human health or the environment at Site 9. Therefore, the reduction of toxicity, mobility, or volume of contaminants through treatment is not applicable to Site 9.

Short-Term Effectiveness

Since no remedial action would occur, implementation of the no action alternative would not pose any additional short-term risks to the community that borders the NWS Earle Waterfront area. There would be no additional impacts to the environment if Alternative 1 is implemented.

Implementability

Since no remedial actions or measures would occur, Alternative 1 would be readily implementable. The technical feasibility criteria, including constructability, operability, and reliability are not applicable. Implementability of administrative measures is not applicable since no such measures would be taken.

Costs

No capital or annual operation and maintenance costs are associated with the no action alternative. No hazardous wastes or hazardous waste containing materials were identified at the site so no CERCLA five-year reviews are needed.

4.2 COMPARATIVE ANALYSIS

A comparative analysis is not included in this FS as only one alternative, Alternative 1: No Action was warranted for Site 9.

REFERENCES

B&RE (Brown and Root Environmental), 1996. Remedial Investigation Report for Naval Weapons Station Earle, Colts Neck, New Jersey. Wayne, Pennsylvania. July.

EPA (U.S. Environmental Protection Agency).1988. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final. Office of Solid Waste and Emergency and Remedial Response. EPA 540/G-89/004, OSWER 9355.3-01. October.

EPA, 1989a. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A). EPA 540/1-89/002. Office of Emergency and Remedial Response. Washington, DC.

EPA, 1989b. Risk Assessment Guidance for Superfund, Volume II – Environmental Evaluation Manual. Office of Solid Waste and Emergency and Remedial Response. EPA 540/1-89/001.

EPA, 1992. Framework for Ecological Risk Assessment. EPA/630/R-92/001. February.

EPA, 1997. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments, Office of Solid Waste and Emergency Response, EPA 540-R-97-006. June.

EPA, 2012. EPA Risk-Based Regional Screening Level (RSL) Table. Website at: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm. November.

Hart (Fred C. Hart and Associates, Inc.), 1983. Initial Assessment Study, Naval Weapons Station Earle, Colts Neck, New Jersey. New York, New York. February.

Navy (U.S. Department of the Navy), 1999. Navy Policy for Conducting Ecological Risk Assessment. April.

Navy, 2004. Policy for Optimizing Remedial and Removal Actions Under the Environmental Restoration Program. April.

Navy, 2006. Environmental Restoration Program Manual. August.

NJDEP (New Jersey Department of Environmental Protection), 2009. Ecological Screening Criteria Table. Website at: http://www.nj.gov/dep/srp/guidance/ecoscreening/esc_table.pdf. March.

REFERENCES (Continued)

NJDEP, 2011. NJDEP comment memo submitted to Navy. September 7.

NJDEP, 2012. N.J.A.C. 7:26D Remediation Standards. Amended May 7, 2012.

Tetra Tech (Tetra Tech, Inc.), 2011. Ecological Risk Assessment for Site 9, Landfill Southeast of "P" Barricades, Naval Weapons Station Earle, Colts Neck, New Jersey. June.

Tetra Tech, 2013. Human Health Risk Assessment for Site 9, Landfill Southeast of "P" Barricades, Naval Weapons Station Earle, Colts Neck, New Jersey. February.

Weston (Roy F. Weston, Inc.), 1994. Installation Restoration Program Site Investigation for 16 Sites at NWS Earle, Colts Neck, New Jersey. West Chester, Pennsylvania. January.

TABLES

TABLE 1-1

COMPARISON OF 1994 SI TEST PIT SOIL ANALYTICAL DATA TO BACKGROUND LEVELS
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE

SAMPLE LOCATION	TP9-01		TP9-02		TP9-03		TP9-04		TP9-05		TP9-06		BACKGROUND							
SAMPLE NOMENCLATURE (RI)	09-001-T007		09-002-T010		09-003-T001		09-004-T001		09-005-T001		09-006-T008		SUBSURFACE				SURFACE			
SAMPLE DEPTH	4 - 7 feet bgs		6 -10 feet bgs		6 - 9 feet bgs		3 - 5 feet bgs		3 - 6 feet bgs		5 - 8 feet bgs									
DATA SOURCE	SI (Weston, 1994)		SI (Weston, 1994)		SI (Weston, 1994)		SI (Weston, 1994)		SI (Weston, 1994)		SI (Weston, 1994)		Frequency of Detection	Range of Detection	Mean or Geometric Mean	95% Upper Tolerance Limit	Frequency of Detection	Range of Detection	Mean or Geometric Mean	95% Upper Tolerance Limit
INORGANICS	**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**			**mg/kg**	**mg/kg**	**mg/kg**		**mg/kg**	**mg/kg**	**mg/kg**
aluminum	2,320		9,070		6,090		7,350		6,280		9,220		8 / 8	675 - 5,310	2,690	5,870	4 / 4	1710 - 5310	3,080	7,510
antimony	8.41	U	9.04	U	8.87	U	7.47	U	8.4	U	9.03	U	-	-	-	-	-	-	-	-
arsenic	6		7.9		13.2		6.5		6.3		8.8		8 / 8	1.35 - 14.4	6.64	17.1	4 / 4	1.35 - 14.4	6.71	23
barium	5	B	13.5	B	7.7	B	20.4	B	31.8	B	10.1	B	8 / 8	0.92 - 31	8.96	29.50	4 / 4	1.85 - 31	11.30	47.1
beryllium	0.3	B	1.2	B	0.52	B	0.72	B	0.58	B	0.93	B	2 / 8	0.12 - 0.28	0.0738	1.22	1 / 4	0.28	0.112	5.55
cadmium	0.93	U	1.03	U	0.99	U	0.85	U	0.96	U	1.01	U	1 / 8	0.57	0.288	0.52	1 / 4	0.57	0.333	0.75
calcium	110	B	242	B	141	B	750	B	799	B	89.5	B	8 / 8	28.6 - 799	289	864	4 / 4	40.1 - 519	144	6810
chromium, total	10.9		16.2		21		19.4		16.9		25.8		8 / 8	4.7 - 59.5	27.4	73.4	4 / 4	7.8 - 59.5	34.5	107
cobalt	2.1	B	4.3	B	2.3	B	4.6	B	3.9	B	4	B	4 / 8	0.75 - 5	1.38	4.73	2 / 4	0.75 - 5	1.58	7.61
copper	3	B	4.2	B	4.1	B	4.9	B	6.3		3.1	B	8 / 8	0.97 - 8.6	4.33	11.2	4 / 4	0.97 - 8.4	5.03	15.1
iron	8,580		36,300		22,300		33,300		27,600		26,600		8 / 8	3745 - 62,500	20,400	59,500	4 / 4	3745 - 62500	26,200	95,800
lead	5.5		5.6		9.9		12.7		17.4		6.9		8 / 8	1.4 - 39.4	12.2	39.5	4 / 4	1.8 - 39.4	11.4	397
magnesium	147	B	1,210	B	911	B	1,100		893	B	1,520		8 / 8	18.5 - 619	172	1,600	4 / 4	71.7 - 619	289	901
manganese	59.2		112		24.4		104		168		28.1		8 / 8	2.6 - 214	46.3	189	4 / 4	3.45 - 214	64.2	329
mercury	0.06	U	0.07	U	0.06	U	0.05	U	0.06	U	0.06	U	8 / 8	0.03 - 0.17	0.0648	0.17	4 / 4	0.035 - 0.17	0.0724	0.591
nickel	4.2	U	4.65	U	4.45	U	3.82	U	4.33	U	4.53	U	4 / 8	1.8 - 7.2	2.38	7.3	2 / 4	1.8 - 7.2	2.59	10.8
potassium	209	U	1,840		1,970		2,040		1,420		4,120		7 / 8	95 - 792	276	2,780	4 / 4	95 - 792	358	4,050
selenium	0.47	U	0.51	U	0.48	U	0.41	U	0.48	U	0.5	U	2 / 8	0.57 - 0.93	0.397	0.877	2 / 4	-	0.516	1.330
silver	1.87	U	2.7		1.97	U	2.5		2.2	B	2.01	U	2 / 8	0.37 - 0.67	0.256	0.622	2 / 4	0.37 - 0.67	0.345	0.967
sodium	42.6	B	52.8	B	47.8	B	50.5	B	36.5	B	51.3	B	8 / 8	17.5 - 94.8	39.7	103	4 / 4	-	39.2	123
thallium	0.47	U	0.51	U	0.48	U	0.41	U	0.48	U	0.5	U	4 / 8	0.7 - 1.9	0.688	1.75	2 / 4	17.5 - 86.2	0.82	2.77
vanadium	23.2		5.7	B	20.8		11		11.7	B	11.5	B	8 / 8	11.05 - 64	27.70	96.7	4 / 4	11.05 - 64	29.40	201
zinc	5.3		39.8		17.5		60.3		44.6		60.1		6 / 8	1.1 - 50.7	15.7	50.2	3 / 4	1.1 - 27.6	4.7	461
cyanide	1.17	U	1.31	U	1.27	U	1.07	U	1.21	U	1.57		-	-	-	-	-	-	-	-
SEMIVOLATILES	**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**			**µg/kg**	**µg/kg**	**µg/kg**		**µg/kg**	**µg/kg**	**µg/kg**
1,2,4-trichlorobenzene	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-	-	-	-	-	-
1,2-dichlorobenzene	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-	-	-	-	-	-
1,3-dichlorobenzene	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-	-	-	-	-	-
1,4-dichlorobenzene	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-	-	-	-	-	-
2,2'-oxybis(2-chloropropane)	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-	-	-	-	-	-
2,4,5-trichlorophenol	980	U	1100	U	1100	U	1000	U	1000	U	1000	U	-	-	-	-	-	-	-	-
2,4,6-trichlorophenol	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-	-	-	-	-	-
2,4-dichlorophenol	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-	-	-	-	-	-
2,4-dimethylphenol	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-	-	-	-	-	-
2,4-dinitrophenol	980	U	1100	U	1100	U	1000	U	1000	U	1000	U	-	-	-	-	-	-	-	-
2,4-dinitrotoluene	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-	-	-	-	-	-
2,6-dinitrotoluene	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-	-	-	-	-	-
2-chloronaphthalene	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-	-	-	-	-	-
2-chlorophenol	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-	-	-	-	-	-
2-methylnaphthalene	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-	-	-	-	-	-
2-methylphenol	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-	-	-	-	-	-
2-nitroaniline	980	U	1100	U	1100	U	1000	U	1000	U	1000	U	-	-	-	-	-	-	-	-
2-nitrophenol	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-	-	-	-	-	-
3,3'-dichlorobenzidine	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-	-	-	-	-	-
3-nitroaniline	980	U	1100	U	1100	U	1000	U	1000	U	1000	U	-	-	-	-	-	-	-	-
4,6-dinitro-2-methylphenol	980	U	1100	U	1100	U	1000	U	1000	U	1000	U	-	-	-	-	-	-	-	-
4-bromophenyl-phenylether	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-	-	-	-	-	-
4-chloro-3-methylphenol	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-	-	-	-	-	-
4-chloroaniline	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-	-	-	-	-	-
4-chlorophenyl-phenylether	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-	-	-	-	-	-
4-methylphenol	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-	-	-	-	-	-
4-nitroaniline	980	U	1100	U	1100	U	1000	U	1000	U	1000	U	-	-	-	-	-	-	-	-
4-nitrophenol	980	U	1100	U	1100	U	1000	U	1000	U	1000	U	-	-	-	-	-	-	-	-

TABLE 1-1

COMPARISON OF 1994 SI TEST PIT SOIL ANALYTICAL DATA TO BACKGROUND LEVELS
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE

SAMPLE LOCATION	TP9-01	TP9-02	TP9-03	TP9-04	TP9-05	TP9-06	BACKGROUND							
SAMPLE NOMENCLATURE (RI)	09-001-T007	09-002-T010	09-003-T001	09-004-T001	09-005-T001	09-006-T008	SUBSURFACE				SURFACE			
SAMPLE DEPTH	4 - 7 feet bgs	6 -10 feet bgs	6 - 9 feet bgs	3 - 5 feet bgs	3 - 6 feet bgs	5 - 8 feet bgs	Frequency of Detection	Range of Detection	Mean or Geometric Mean	95% Upper Tolerance Limit	Frequency of Detection	Range of Detection	Mean or Geometric Mean	95% Upper Tolerance Limit
DATA SOURCE	SI (Weston, 1994)	SI (Weston, 1994)	SI (Weston, 1994)	SI (Weston, 1994)	SI (Weston, 1994)	SI (Weston, 1994)								
N-nitroso-di-n-propylamine	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
N-nitrosodiphenylamine	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
acenaphthene	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
acenaphthylene	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
anthracene	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
benzo(a)anthracene	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
benzo(a)pyrene	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
benzo(b)fluoranthene	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
benzo(g,h,i)perylene	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
benzo(k)fluoranthene	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
bis(2-chloroethoxy)methane	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
bis(2-chloroethyl)ether	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
bis(2-ethylhexyl)phthalate	390 U	35 J	440 U	410 U	26 J	34 J	-	-	-	-	-	-	-	-
butylbenzylphthalate	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	1 / 4	220	220	-
carbazole	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
chrysene	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
di-n-butylphthalate	23 J	37 J	25 J	28 J	25 J	21 J	2 / 8	45 J - 48 J	46.5 J	-	2 / 4	45 - 48	46.5	-
di-n-octylphthalate	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
dibenz(a,h)anthracene	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
dibenzofuran	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
diethylphthalate	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
dimethylphthalate	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
fluoranthene	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	2 / 4	40 - 84	62	-
fluorene	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
hexachlorobenzene	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
hexachlorobutadiene	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
hexachlorocyclopentadiene	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
hexachloroethane	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
indeno(1,2,3-cd)pyrene	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
isophorone	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
naphthalene	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
nitrobenzene	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
pentachlorophenol	980 U	1100 U	1100 U	1000 U	1000 U	1000 U	-	-	-	-	-	-	-	-
phananthrene	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
phenol	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	-	-	-	-
pyrene	390 U	440 U	440 U	410 U	400 U	420 U	-	-	-	-	1 / 4	46	46	-
VOLATILES	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**		**µg/kg**	**µg/kg**	**µg/kg**		**µg/kg**	**µg/kg**	**µg/kg**
1,1,1-trichloroethane	12 U	13 U	13 U	11 U	12 U	13 U	-	-	-	-	-	-	-	-
1,1,2,2-tetrachloroethane	12 U	13 U	13 U	11 U	12 U	13 U	-	-	-	-	-	-	-	-
1,1,2-trichloroethane	12 U	13 U	13 U	11 U	12 U	13 U	-	-	-	-	-	-	-	-
1,1-dichloroethane	12 U	13 U	13 U	11 U	12 U	13 U	-	-	-	-	-	-	-	-
1,1-dichloroethene	12 U	13 U	13 U	11 U	12 U	13 U	-	-	-	-	-	-	-	-
1,2-dichloroethane	12 U	13 U	13 U	11 U	12 U	13 U	-	-	-	-	-	-	-	-
1,2-dichloroethene (total)	12 U	13 U	13 U	11 U	12 U	13 U	-	-	-	-	-	-	-	-
1,2-dichloropropane	12 U	13 U	13 U	11 U	12 U	13 U	-	-	-	-	-	-	-	-
2-butanone	12 U	13 U	13 U	11 U	12 U	13 U	-	-	-	-	-	-	-	-
2-hexanone	12 U	13 U	13 U	11 U	12 U	13 U	-	-	-	-	-	-	-	-
4-methyl-2-pentanone	12 U	13 U	13 U	11 U	12 U	13 U	-	-	-	-	-	-	-	-

TABLE 1-1

COMPARISON OF 1994 SI TEST PIT SOIL ANALYTICAL DATA TO BACKGROUND LEVELS
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE

SAMPLE LOCATION	TP9-01		TP9-02		TP9-03		TP9-04		TP9-05		TP9-06		BACKGROUND							
SAMPLE NOMENCLATURE (RI)	09-001-T007		09-002-T010		09-003-T001		09-004-T001		09-005-T001		09-006-T008		SUBSURFACE				SURFACE			
SAMPLE DEPTH	4 - 7 feet bgs		6 -10 feet bgs		6 - 9 feet bgs		3 - 5 feet bgs		3 - 6 feet bgs		5 - 8 feet bgs									
DATA SOURCE	SI (Weston, 1994)		SI (Weston, 1994)		SI (Weston, 1994)		SI (Weston, 1994)		SI (Weston, 1994)		SI (Weston, 1994)		Frequency of Detection	Range of Detection	Mean or Geometric Mean	95% Upper Tolerance Limit	Frequency of Detection	Range of Detection	Mean or Geometric Mean	95% Upper Tolerance Limit
acetone	12	U	17	U	22	U	12	U	22	U	34	U	-	-	-	-	-	-	-	-
benzene	12	U	13	U	13	U	11	U	12	U	13	U	-	-	-	-	-	-	-	-
bromodichloromethane	12	U	13	U	13	U	11	U	12	U	13	U	-	-	-	-	-	-	-	-
bromoform	12	U	13	U	13	U	11	U	12	U	13	U	-	-	-	-	-	-	-	-
bromomethane	12	U	13	U	13	U	11	U	12	U	13	U	-	-	-	-	-	-	-	-
carbon disulfide	12	U	13	U	13	U	11	U	12	U	13	U	-	-	-	-	-	-	-	-
carbon tetrachloride	12	U	13	U	13	U	11	U	12	U	13	U	-	-	-	-	-	-	-	-
chlorobenzene	12	U	13	U	13	U	11	U	12	U	13	U	-	-	-	-	-	-	-	-
chloroethane	12	U	13	U	13	U	11	U	12	U	13	U	-	-	-	-	-	-	-	-
chloroform	1	J	1	J	13	U	11	U	12	U	13	U	-	-	-	-	-	-	-	-
chloromethane	12	U	13	U	13	U	11	U	12	U	13	U	-	-	-	-	-	-	-	-
cis-1,3-dichloropropene	12	U	13	U	13	U	11	U	12	U	13	U	-	-	-	-	-	-	-	-
dibromochloromethane	12	U	13	U	13	U	11	U	12	U	13	U	-	-	-	-	-	-	-	-
ethylbenzene	12	U	13	U	13	U	11	U	12	U	13	U	-	-	-	-	-	-	-	-
methylene chloride	12	U	13	U	17	U	12	U	13	U	21	U	-	-	-	-	-	-	-	-
styrene	12	U	13	U	13	U	11	U	12	U	13	U	-	-	-	-	-	-	-	-
tetrachloroethene	12	U	13	U	13	U	11	U	12	U	13	U	-	-	-	-	-	-	-	-
toluene	12	U	13	U	13	U	11	U	12	U	13	U	-	-	-	-	-	-	-	-
trans-1,3-dichloropropene	12	U	13	U	13	U	11	U	12	U	13	U	-	-	-	-	-	-	-	-
trichloroethene	12	U	13	U	13	U	11	U	12	U	13	U	-	-	-	-	-	-	-	-
vinyl chloride	12	U	13	U	13	U	11	U	12	U	13	U	-	-	-	-	-	-	-	-
xylene (total)	12	U	13	U	13	U	11	U	12	U	13	U	-	-	-	-	-	-	-	-
PESTICIDES	**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**			**µg/kg**	**µg/kg**	**µg/kg**		**µg/kg**	**µg/kg**	**µg/kg**
4,4'-DDD	3.8	U	4.3	U	4.3	U	4.1	U	0.41	J	4.2	U	-	-	-	-	-	-	-	-
4,4'-DDE	3.8	U	4.3	U	4.3	U	0.41	J	1.2	J	4.2	U	2 / 8	16 J - 330	-	-	2 / 4	16 - 330	-	-
4,4'-DDT	3.8	U	4.3	U	4.3	U	0.82	J	0.41	JP	4.2	U	3 / 8	1.6 JN - 420	-	-	2 / 4	43 - 420	-	-
aldrin	1.9	U	2.2	U	2.2	U	2.1	U	2	U	2.1	U	-	-	-	-	-	-	-	-
alpha-BHC	1.9	U	2.2	U	2.2	U	2.1	U	2	U	2.1	U	-	-	-	-	-	-	-	-
alpha-chlordane	1.9	U	22	U	22	U	2.1	U	2	U	2.1	U	-	-	-	-	-	-	-	-
beta-BHC	1.9	U	2.2	U	2.2	U	2.1	U	2	U	2.1	U	-	-	-	-	-	-	-	-
delta-BHC	1.9	U	2.2	U	2.2	U	2.1	U	2	U	2.1	U	-	-	-	-	-	-	-	-
dieldrin	3.8	U	4.3	U	4.3	U	4.1	U	4.1	U	4.2	U	-	-	-	-	-	-	-	-
endosulfan I	1.9	U	2.2	U	2.2	U	2.1	U	2	U	2.1	U	-	-	-	-	-	-	-	-
endosulfan II	3.8	U	4.3	U	4.3	U	4.1	U	4.1	U	4.2	U	-	-	-	-	-	-	-	-
endosulfan sulfate	3.8	U	4.3	U	4.3	U	4.1	U	4.1	U	4.2	U	-	-	-	-	-	-	-	-
endrin	3.8	U	4.3	U	4.3	U	4.1	U	4.1	U	4.2	U	-	-	-	-	-	-	-	-
endrin aldehyde	3.8	U	4.3	U	4.3	U	4.1	U	4.1	U	4.2	U	-	-	-	-	-	-	-	-
endrin ketone	3.8	U	4.3	U	4.3	U	4.1	U	4.1	U	4.2	U	-	-	-	-	-	-	-	-
gamma-BHC (Lindane)	1.9	U	2.2	U	2.2	U	2.1	U	2	U	2.1	U	-	-	-	-	-	-	-	-
gamma-chlordane	1.9	U	22	U	22	U	2.1	U	2	U	2.1	U	-	-	-	-	-	-	-	-
heptachlor	1.9	U	2.2	U	2.2	U	2.1	U	2	U	2.1	U	-	-	-	-	-	-	-	-
heptachlor epoxide	1.9	U	2.2	U	2.2	U	2.1	U	2	U	2.1	U	-	-	-	-	-	-	-	-
methoxychlor	19	U	22	U	22	U	93		20	U	21	U	-	-	-	-	-	-	-	-
toxaphene	190	U	220	U	220	U	210	U	200	U	210	U	-	-	-	-	-	-	-	-

TABLE 1-1

COMPARISON OF 1994 SI TEST PIT SOIL ANALYTICAL DATA TO BACKGROUND LEVELS
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE

SAMPLE LOCATION	TP9-01	TP9-02	TP9-03	TP9-04	TP9-05	TP9-06	BACKGROUND							
SAMPLE NOMENCLATURE (RI)	09-001-T007	09-002-T010	09-003-T001	09-004-T001	09-005-T001	09-006-T008	SUBSURFACE				SURFACE			
SAMPLE DEPTH	4 - 7 feet bgs	6 -10 feet bgs	6 - 9 feet bgs	3 - 5 feet bgs	3 - 6 feet bgs	5 - 8 feet bgs								
DATA SOURCE	SI (Weston, 1994)	SI (Weston, 1994)	SI (Weston, 1994)	SI (Weston, 1994)	SI (Weston, 1994)	SI (Weston, 1994)	Frequency of Detection	Range of Detection	Mean or Geometric Mean	95% Upper Tolerance Limit	Frequency of Detection	Range of Detection	Mean or Geometric Mean	95% Upper Tolerance Limit
PESTICIDES	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**		**mg/kg**	**mg/kg**	**mg/kg**		**mg/kg**	**mg/kg**	**mg/kg**
Aroclor-1016	38 U	43 U	43 U	41 U	41 U	42 U	-	-		-	-	-		-
Aroclor-1221	77 U	87 U	87 U	82 U	81 U	84 U	-	-		-	-	-		-
Aroclor-1232	38 U	43 U	43 U	41 U	41 U	42 U	-	-		-	-	-		-
Aroclor-1242	38 U	43 U	43 U	41 U	41 U	42 U	-	-		-	-	-		-
Aroclor-1248	38 U	43 U	43 U	41 U	41 U	42 U	-	-		-	-	-		-
Aroclor-1254	38 U	43 U	43 U	41 U	41 U	42 U	-	-		-	-	-		-
Aroclor-1260	36 U	43 U	43 U	41 U	41 U	42 U	-	-			-	-		
MISCELLANEOUS	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**								
petroleum hydrocarbons	4.7 J	5.1 U	4.3 J	4.8 U	3.6 J	5.1 U	-	-		-	-	-		-

Notes:

	Shading indicates exceedance of 95% upper tolerance limit for subsurface soil only
	Shading indicates exceedance of 95% upper tolerance limit for surface soil only
	Shading indicates exceedance of 95% upper tolerance limit for subsurface and surface soil
NA	Not Sampled
J	Value is estimated because concentration is below the quantitation limit or because of exceedances of data validation quality control criteria.
JP	Value is estimated because concentration is below the quantitation limit or because of exceedances of data validation quality control criteria.
B	Analyte also detected in a the blank sample.
U	Compound or element was not detected. Value is the detection limit (inorganics) or quantitation limit (organics).

Sample Data Source:
Weston (Roy F. Weston, Inc.), 1994. Installation Restoration Program Site Investigation for 16 Sites at NWS Earle, Colts Neck, NJ. West Chester, PA. January.

TABLE 1-2

COMPARISON OF 1994 SI TEST PIT SOIL ANALYTICAL DATA TO EPA REGIONAL SCREENING LEVELS
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE

SAMPLE LOCATION	TP9-01		TP9-02		TP9-03		TP9-04		TP9-05		TP9-06		EPA Regional Screening Levels (RSLs)		
SAMPLE NOMENCLATURE (RI)	09-001-T007		09-002-T010		09-003-T001		09-004-T001		09-005-T001		09-006-T008				
SAMPLE DEPTH	4 - 7 feet bgs		6 -10 feet bgs		6 - 9 feet bgs		3 - 5 feet bgs		3 - 6 feet bgs		5 - 8 feet bgs				
DATA SOURCE	SI (Weston, 1994)		SI (Weston, 1994)		SI (Weston, 1994)		SI (Weston, 1994)		SI (Weston, 1994)		SI (Weston, 1994)		Risk-based SSLs	Residential Soil RSLs	Industrial Soil RSLs
INORGANICS	**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**	**mg/kg**	**mg/kg**
aluminum	2,320		9,070		6,090		7,350		6,280		9,220		23,000	7,700	99,000
antimony	8.41	U	9.04	U	8.87	U	7.47	U	8.4	U	9.03	U	0.27	3.1	41
arsenic	**6**		**7.9**		**13.2**		**6.5**		**6.3**		**8.8**		0.0013	0.39	1.6
barium	5	B	13.5	B	7.7	B	20.4	B	31.8	B	10.1	B	120	1,500	19,000
beryllium	0.3	B	1.2	B	0.52	B	0.72	B	0.58	B	0.93	B	13	16	200
cadmium	0.93	U	1.03	U	0.99	U	0.85	U	0.96	U	1.01	U	0.52	7	80
calcium	110	B	242	B	141	B	750	B	799	B	89.5	B	-	-	-
chromium, total	**10.9**		**16.2**		**21**		**19.4**		**16.9**		**25.8**		5.9E-04*	0.29*; 12,000**	5.6*; 150,000**
cobalt	2.1	B	4.3	B	2.3	B	4.6	B	3.9	B	4	B	0.21	2.3	30
copper	3	B	4.2	B	4.1	B	4.9	B	6.3		3.1	B	22	310	4,100
iron	**8,580**		**36,300**		**22,300**		**33,300**		**27,600**		**26,600**		270	5,500	72,000
lead	5.5		5.6		9.9		12.7		**17.4**		6.9		14***	400	800
magnesium	147	B	1,210	B	911	B	1,100		893	B	1,520		-	-	-
manganese	**59.2**		**112**		**24.4**		**104**		**168**		**28.1**		21	180	2,300
mercury	0.06	U	0.07	U	0.06	U	0.05	U	0.06	U	0.06	U	0.033	0.78	10
nickel	4.2	U	4.65	U	4.45	U	3.82	U	4.33	U	4.53	U	20	150	2,000
potassium	209	U	1,840		1,970		2,040		1,420		4,120		-	-	-
selenium	0.47	U	0.51	U	0.48	U	0.41	U	0.48	U	0.5	U	0.4	39	510
silver	1.87	U	**2.7**		1.97	U	**2.5**		2.2	B	2.01	U	0.6	39	510
sodium	42.6	B	52.8	B	47.8	B	50.5	B	36.5	B	51.3	B	-	-	-
thallium	0.47	U	0.51	U	0.48	U	0.41	U	0.48	U	0.5	U	0.011	0.078	1
vanadium	23.2		5.7	B	20.8		11		11.7	B	11.5	B	78	39	520
zinc	5.3		39.8		17.5		60.3		44.6		60.1		290	2,300	31,000
cyanide	1.17	U	1.31	U	1.27	U	1.07	U	1.21	U	**1.57**		0.014	2.2	14
SEMIVOLATILES	**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**	**µg/kg**	**µg/kg**
1,2,4-trichlorobenzene	390	U	440	U	440	U	410	U	400	U	420	U	2.9	22,000	99,000
1,2-dichlorobenzene	390	U	440	U	440	U	410	U	400	U	420	U	270	190,000	980,000
1,3-dichlorobenzene	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-
1,4-dichlorobenzene	390	U	440	U	440	U	410	U	400	U	420	U	0.4	2,400	12,000
2,2'-oxybis(2-chloropropane)	390	U	440	U	440	U	410	U	400	U	420	U	0.11	4,600	22,000
2,4,5-trichlorophenol	980	U	1100	U	1100	U	1000	U	1000	U	1000	U	3,300	610,000	6,200,000
2,4,6-trichlorophenol	390	U	440	U	440	U	410	U	400	U	420	U	13	44,000	160,000
2,4-dichlorophenol	390	U	440	U	440	U	410	U	400	U	420	U	41	18,000	180,000
2,4-dimethylphenol	390	U	440	U	440	U	410	U	400	U	420	U	320	120,000	1,200,000
2,4-dinitrophenol	980	U	1100	U	1100	U	1000	U	1000	U	1000	U	34	12,000	120,000
2,4-dinitrotoluene	390	U	440	U	440	U	410	U	400	U	420	U	0.28	1,600	5,500
2,6-dinitrotoluene	390	U	440	U	440	U	410	U	400	U	420	U	20	6,100	62,000
2-chloronaphthalene	390	U	440	U	440	U	410	U	400	U	420	U	2900	630,000	8,200,000
2-chlorophenol	390	U	440	U	440	U	410	U	400	U	420	U	57	39,000	510,000
2-methylnaphthalene	390	U	440	U	440	U	410	U	400	U	420	U	140	23,000	220,000
2-methylphenol	390	U	440	U	440	U	410	U	400	U	420	U	580	310,000	3,100,000
2-nitroaniline	980	U	1100	U	1100	U	1000	U	1000	U	1000	U	62	61,000	600,000
2-nitrophenol	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-
3,3'-dichlorobenzidine	390	U	440	U	440	U	410	U	400	U	420	U	0.71	1,100	3,800
3-nitroaniline	980	U	1100	U	1100	U	1000	U	1000	U	1000	U	-	-	-
4,6-dinitro-2-methylphenol	980	U	1100	U	1100	U	1000	U	1000	U	1000	U	2	490	4,900
4-bromophenyl-phenylether	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-
4-chloro-3-methylphenol	390	U	440	U	440	U	410	U	400	U	420	U	1300	610,000	6,200,000
4-chloroaniline	390	U	440	U	440	U	410	U	400	U	420	U	0.13	2,400	8,600
4-chlorophenyl-phenylether	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-
4-methylphenol	390	U	440	U	440	U	410	U	400	U	420	U	1100	610,000	6,200,000
4-nitroaniline	980	U	1100	U	1100	U	1000	U	1000	U	1000	U	1.4	24,000	86,000
4-nitrophenol	980	U	1100	U	1100	U	1000	U	1000	U	1000	U	-	-	-
N-nitroso-di-n-propylamine	390	U	440	U	440	U	410	U	400	U	420	U	0.007	69	250

TABLE 1-2

COMPARISON OF 1994 SI TEST PIT SOIL ANALYTICAL DATA TO EPA REGIONAL SCREENING LEVELS
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE

SAMPLE LOCATION	TP9-01		TP9-02		TP9-03		TP9-04		TP9-05		TP9-06		EPA Regional Screening Levels (RSLs)		
SAMPLE NOMENCLATURE (RI)	09-001-T007		09-002-T010		09-003-T001		09-004-T001		09-005-T001		09-006-T008				
SAMPLE DEPTH	4 - 7 feet bgs		6 -10 feet bgs		6 - 9 feet bgs		3 - 5 feet bgs		3 - 6 feet bgs		5 - 8 feet bgs				
DATA SOURCE	SI (Weston, 1994)		SI (Weston, 1994)		SI (Weston, 1994)		SI (Weston, 1994)		SI (Weston, 1994)		SI (Weston, 1994)		Risk-based SSLs	Residential Soil RSLs	Industrial Soil RSLs
N-nitrosodiphenylamine	390	U	440	U	440	U	410	U	400	U	420	U	57	99,000	350,000
acenaphthene	390	U	440	U	440	U	410	U	400	U	420	U	4,100	340,000	3,300,000
acenaphthylene	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-
anthracene	390	U	440	U	440	U	410	U	400	U	420	U	42,000	1,700,000	17,000,000
benzo(a)anthracene	390	U	440	U	440	U	410	U	400	U	420	U	10	150	2,100
benzo(a)pyrene	390	U	440	U	440	U	410	U	400	U	420	U	3.5	15	210
benzo(b)fluoranthene	390	U	440	U	440	U	410	U	400	U	420	U	35	150	2,100
benzo(g,h,i)perylene	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-
benzo(k)fluoranthene	390	U	440	U	440	U	410	U	400	U	420	U	350	1,500	21,000
bis(2-chloroethoxy)methane	390	U	440	U	440	U	410	U	400	U	420	U	11	18,000	180,000
bis(2-chloroethyl)ether	390	U	440	U	440	U	410	U	400	U	420	U	0.0031	210	1,000
bis(2-ethylhexyl)phthalate	390	U	35	J	440	U	410	U	26	J	34	J	1,100	35,000	120,000
butylbenzylphthalate	390	U	440	U	440	U	410	U	400	U	420	U	200	260,000	910,000
carbazole	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-
chrysene	390	U	440	U	440	U	410	U	400	U	420	U	1,100	15,000	210,000
di-n-butylphthalate	23	J	37	J	25	J	28	J	25	J	21	J	1,700	610,000	6,200,000
di-n-octylphthalate	390	U	440	U	440	U	410	U	400	U	420	U	53,000	73,000	740,000
dibenz(a,h)anthracene	390	U	440	U	440	U	410	U	400	U	420	U	11	15	210
dibenzofuran	390	U	440	U	440	U	410	U	400	U	420	U	110	7,800	100,000
diethylphthalate	390	U	440	U	440	U	410	U	400	U	420	U	4,700	4,900,000	49,000,000
dimethylphthalate	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-
fluoranthene	390	U	440	U	440	U	410	U	400	U	420	U	70,000	230,000	2,200,000
fluorene	390	U	440	U	440	U	410	U	400	U	420	U	4,000	230,000	2,200,000
hexachlorobenzene	390	U	440	U	440	U	410	U	400	U	420	U	0.53	300	1,100
hexachlorobutadiene	390	U	440	U	440	U	410	U	400	U	420	U	0.5	6,200	22,000
hexachlorocyclopentadiene	390	U	440	U	440	U	410	U	400	U	420	U	70	37,000	370,000
hexachloroethane	390	U	440	U	440	U	410	U	400	U	420	U	0.48	12,000	43,000
indeno(1,2,3-cd)pyrene	390	U	440	U	440	U	410	U	400	U	420	U	200	150	2,100
isophorone	390	U	440	U	440	U	410	U	400	U	420	U	22	510,000	1,800,000
naphthalene	390	U	440	U	440	U	410	U	400	U	420	U	0.47	3,600	18,000
nitrobenzene	390	U	440	U	440	U	410	U	400	U	420	U	0.079	4,800	24,000
pentachlorophenol	980	U	1100	U	1100	U	1000	U	1000	U	1000	U	0.36	890	2,700
phananthrene	390	U	440	U	440	U	410	U	400	U	420	U	-	-	-
phenol	390	U	440	U	440	U	410	U	400	U	420	U	2,600	1,800,000	18,000,000
pyrene	390	U	440	U	440	U	410	U	400	U	420	U	9,500	170,000	1,700,000
VOLATILES	**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**ug/kg**	**µg/kg**	**µg/kg**
1,1,1-trichloroethane	12	U	13	U	13	U	11	U	12	U	13	U	3200	870,000	3,800,000
1,1,2,2-tetrachloroethane	12	U	13	U	13	U	11	U	12	U	13	U	0.026	560	2,800
1,1,2-trichloroethane	12	U	13	U	13	U	11	U	12	U	13	U	0.078	1,100	5,300
1,1-dichloroethane	12	U	13	U	13	U	11	U	12	U	13	U	0.69	3,300	17,000
1,1-dichloroethene	12	U	13	U	13	U	11	U	12	U	13	U	120	24,000	110,000
1,2-dichloroethane	12	U	13	U	13	U	11	U	12	U	13	U	0.042	430	2,200
1,2-dichloroethene (total)	12	U	13	U	13	U	11	U	12	U	13	U	140	93,000	1,069,000
1,2-dichloropropane	12	U	13	U	13	U	11	U	12	U	13	U	0.13	890	4,500
2-butanone	12	U	13	U	13	U	11	U	12	U	13	U	1500	2,800,000	20,000,000
2-hexanone	12	U	13	U	13	U	11	U	12	U	13	U	11	21,000	140,000
4-methyl-2-pentanone	12	U	13	U	13	U	11	U	12	U	13	U	-	-	-
acetone	12	U	17	U	22	U	12	U	22	U	34	U	4500	610,000	6,300,000
benzene	12	U	13	U	13	U	11	U	12	U	13	U	0.21	1,100	5,400
bromodichloromethane	12	U	13	U	13	U	11	U	12	U	13	U	0.032	270	1,400
bromoform	12	U	13	U	13	U	11	U	12	U	13	U	2.3	61,000	220,000
bromomethane	12	U	13	U	13	U	11	U	12	U	13	U	2.2	730	3,200
carbon disulfide	12	U	13	U	13	U	11	U	12	U	13	U	310	82,000	370,000
carbon tetrachloride	12	U	13	U	13	U	11	U	12	U	13	U	0.17	610	3,000
chlorobenzene	12	U	13	U	13	U	11	U	12	U	13	U	62	29,000	140,000

TABLE 1-2

COMPARISON OF 1994 SI TEST PIT SOIL ANALYTICAL DATA TO EPA REGIONAL SCREENING LEVELS
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE

SAMPLE LOCATION	TP9-01		TP9-02		TP9-03		TP9-04		TP9-05		TP9-06		EPA Regional Screening Levels (RSLs)		
SAMPLE NOMENCLATURE (RI)	09-001-T007		09-002-T010		09-003-T001		09-004-T001		09-005-T001		09-006-T008				
SAMPLE DEPTH	4 - 7 feet bgs		6 -10 feet bgs		6 - 9 feet bgs		3 - 5 feet bgs		3 - 6 feet bgs		5 - 8 feet bgs				
DATA SOURCE	SI (Weston, 1994)		SI (Weston, 1994)		SI (Weston, 1994)		SI (Weston, 1994)		SI (Weston, 1994)		SI (Weston, 1994)		Risk-based SSLs	Residential Soil RSLs	Industrial Soil RSLs
chloroethane	12	U	13	U	13	U	11	U	12	U	13	U	5900	1,500,000	6,100,000
chloroform	1	J	1	J	13	U	11	U	12	U	13	U	0.053	290	1500
chloromethane	12	U	13	U	13	U	11	U	12	U	13	U	49	12000	50000
cis-1,3-dichloropropene	12	U	13	U	13	U	11	U	12	U	13	U	0.15	1700	8100
dibromochloromethane	12	U	13	U	13	U	11	U	12	U	13	U	0.039	680	3300
ethylbenzene	12	U	13	U	13	U	11	U	12	U	13	U	1.7	5,400.0	27,000
methylene chloride	12	U	13	U	17	U	12	U	13	U	21	U	1.2	11000	53000
styrene	12	U	13	U	13	U	11	U	12	U	13	U	1800	630,000	3,600,000
tetrachloroethene	12	U	13	U	13	U	11	U	12	U	13	U	0.049	550	2600
toluene	12	U	13	U	13	U	11	U	12	U	13	U	1600	500,000	4,500,000
trans-1,3-dichloropropene	12	U	13	U	13	U	11	U	12	U	13	U	0.15	1700	8100
trichloroethene	12	U	13	U	13	U	11	U	12	U	13	U	0.72	2800	14000
vinyl chloride	12	U	13	U	13	U	11	U	12	U	13	U	0.0056	60	1700
xylene (total)	12	U	13	U	13	U	11	U	12	U	13	U	1200	340,000	1,700,000
PESTICIDES	**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**	**µg/kg**	**µg/kg**
4,4'-DDD	3.8	U	4.3	U	4.3	U	4.1	U	0.41	J	4.2	U	66	2,000	7,200
4,4'-DDE	3.8	U	4.3	U	4.3	U	0.41	J	1.2	J	4.2	U	47	1,400	5,100
4,4'-DDT	3.8	U	4.3	U	4.3	U	0.82	J	0.41	JP	4.2	U	67	1,700	7,000
aldrin	1.9	U	2.2	U	2.2	U	2.1	U	2	U	2.1	U	0.65	29	100
alpha-BHC	1.9	U	2.2	U	2.2	U	2.1	U	2	U	2.1	U	0.062	77	270
alpha-chlordane	1.9	U	22	U	22	U	2.1	U	2	U	2.1	U	13	1,600	6,500
beta-BHC	1.9	U	2.2	U	2.2	U	2.1	U	2	U	2.1	U	0.22	270	960
delta-BHC	1.9	U	2.2	U	2.2	U	2.1	U	2	U	2.1	U	-	-	-
dieldrin	3.8	U	4.3	U	4.3	U	4.1	U	4.1	U	4.2	U	0.17	30	110
endosulfan I	1.9	U	2.2	U	2.2	U	2.1	U	2	U	2.1	U	3,000	37,000	370,000
endosulfan II	3.8	U	4.3	U	4.3	U	4.1	U	4.1	U	4.2	U	3,000	37,000	370,000
endosulfan sulfate	3.8	U	4.3	U	4.3	U	4.1	U	4.1	U	4.2	U	3,000	37,000	370,000
endrin	3.8	U	4.3	U	4.3	U	4.1	U	4.1	U	4.2	U	440	1,800	18,000
endrin aldehyde	3.8	U	4.3	U	4.3	U	4.1	U	4.1	U	4.2	U	440	1,800	18,000
endrin ketone	3.8	U	4.3	U	4.3	U	4.1	U	4.1	U	4.2	U	440	1,800	18,000
gamma-BHC (Lindane)	1.9	U	2.2	U	2.2	U	2.1	U	2	U	2.1	U	-	-	-
gamma-chlordane	1.9	U	22	U	22	U	2.1	U	2	U	2.1	U	13	1,600	6,500
heptachlor	1.9	U	2.2	U	2.2	U	2.1	U	2	U	2.1	U	1.2	110	380
heptachlor epoxide	1.9	U	2.2	U	2.2	U	2.1	U	2	U	2.1	U	0.15	53	190
methoxychlor	19	U	22	U	22	U	93		20	U	21	U	9,900	31,000	310,000
toxaphene	190	U	220	U	220	U	210	U	200	U	210	U	9.4	440	1,600
PCBS	**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**	**µg/kg**	**µg/kg**
Aroclor-1016	38	U	43	U	43	U	41	U	41	U	42	U	-	-	-
Aroclor-1221	77	U	87	U	87	U	82	U	81	U	84	U	-	-	-
Aroclor-1232	38	U	43	U	43	U	41	U	41	U	42	U	-	-	-
Aroclor-1242	38	U	43	U	43	U	41	U	41	U	42	U	-	-	-
Aroclor-1248	38	U	43	U	43	U	41	U	41	U	42	U	-	-	-
Aroclor-1254	38	U	43	U	43	U	41	U	41	U	42	U	-	-	-
Aroclor-1260	36	U	43	U	43	U	41	U	41	U	42	U	-	-	
MISCELLANEOUS	**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**				
petroleum hydrocarbons	4.7	J	5.1	U	4.3	J	4.8	U	3.6	J	5.1	U	-	-	-

TABLE 1-2

COMPARISON OF 1994 SI TEST PIT SOIL ANALYTICAL DATA TO EPA REGIONAL SCREENING LEVELS
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE

SAMPLE LOCATION	TP9-01	TP9-02	TP9-03	TP9-04	TP9-05	TP9-06	EPA Regional Screening Levels (RSLs)		
SAMPLE NOMENCLATURE (RI)	09-001-T007	09-002-T010	09-003-T001	09-004-T001	09-005-T001	09-006-T008			
SAMPLE DEPTH	4 - 7 feet bgs	6 -10 feet bgs	6 - 9 feet bgs	3 - 5 feet bgs	3 - 6 feet bgs	5 - 8 feet bgs			
DATA SOURCE	SI (Weston, 1994)	SI (Weston, 1994)	SI (Weston, 1994)	SI (Weston, 1994)	SI (Weston, 1994)	SI (Weston, 1994)	Risk-based SSLs	Residential Soil RSLs	Industrial Soil RSLs

Notes:

Bold denotes exceedance of EPA Regional Screening Levels (RSLs) for Protection of Groundwater Risk-Based Soil Screening Level (SSL) values.

Shading denotes exceedance of EPA Regional Screening Levels (RSLs) for Residential Soils (November 2012).

Shading denotes exceedance of EPA Regional Screening Levels (RSLs) for Industrial Soils and Residential Soils (November 2012).

* - RSL value for Chromium (VI) * * - RSL value for Chromium (III)

*** - MCL based SSL

NA — Not Sampled

J — Value is estimated because concentration is below the quantitation limit or because of exceedances of data validation quality control criteria.

JP — Value is estimated because concentration is below the quantitation limit or because of exceedances of data validation quality control criteria.

B — Analyte also detected in a the blank sample.

U — Compound or element was not detected. Value is the detection limit (inorganics) or quantitation limit (organics).

Sample Data Source:
Weston (Roy F. Weston, Inc.), 1994. Installation Restoration Program Site Investigation for 16 Sites at NWS Earle, Colts Neck, NJ. West Chester, PA. January.

TABLE 1-3
COMPARISON OF 1996 RI SURFACE WATER DATA TO BACKGROUND LEVELS
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE
COLTS NECK, NEW JERSEY
PAGE 1 OF 4

Parameter	SAMPLE LOCATION										BACKGROUND		
	WS SW 17		WS SW 17 DUP		WS SW 18		WS SW 19		WS SW 20		Frequency of Detection	Range of Detection	Mean Concentration
INORGANICS	µg/L		µg/L		µg/L		µg/L		µg/L			µg/L	µg/L
aluminum	1,480	J	4,570	J	7,880	J	820	J	16600	J	3 / 3	265 - 409	353
antimony	2.8		4.4		2.5	U	2.5	U	2.5	U	not detected	-	-
arsenic	9.5		18.8	J	18.9		6.6		25.4		not detected	-	-
barium	39.0		79.9		89.0		41.1		133		3 / 3	16.3 - 34	26.9
beryllium	0.40		0.79		0.84		0.19		2.2		2 / 3	0.22 - 0.33	0.205
cadmium	0.17	U	0.17	U	0.34		0.17	U	0.17	U	1 / 3	0.18	0.115
calcium	5,970		6,490		4,640		9,930		9,640		3 / 3	462 - 10,100	4,564
chromium, total	3.4		10.1		14.0		2.1		37.5		3 / 3	0.72 - 2.6	1.36
cobalt	2.5		4.0		4.2		1.6		17.8		3 / 3	0.81 - 1.9	1.27
copper	18.7		25.4	J	28.7	J	14.4		31.7	J	2 / 3	1.1 - 9.8	3.70
cyanide	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	NA	-	-
iron	14,200	J	36,100	J	11,000		17,200		56,400		3 / 3	160 - 702	520
lead	14.2	J	33.9	J	50.4		5.5		49.0		1 / 3	4.4	1.72
magnesium	2,770		3,500		3,020		2,750		6,720		3 / 3	369 - 2,770	1,260
manganese	106		150		68.3		185		1,050		3 / 3	14 - 55.5	30
mercury	0.051		0.10		0.14		0.038		0.14		2 / 3	0.023 - 0.028	0.02
nickel	9.3		16.3		13.5		6.6		29.7		3 / 3	2.1 - 7.1	4.3
potassium	3,040		4,350		1,710		3,630		6,470		2 / 3	251 - 1,850	741
selenium	2.5	UJ	5.3	J	3.2	J	4.9	J	3.3	J	1 / 3	3.5	2.0
silver	0.63	U	0.63	U	0.74		0.63	U	0.63	U	1 / 3	0.86	0.495
sodium	11,900	R	13,100	R	10,500	R	11,900	R	15,100	R	3 / 3	3,060 - 3,890	3,520
thallium	4.1		3.0	U	3.0	U	3.0	U	4.3		2 / 3	3.5 - 5.5	3.5
vanadium	7.2		20.2		35.4		3.5		45.2		2 / 3	0.89 - 0.9	0.66
zinc	33.2	J	64.3	J	70.4	J	25.2	J	127.0	J	3 / 3	7.6 - 29.4	16.3
SEMIVOLATILES	µg/L		µg/L		µg/L		µg/L		µg/L			µg/L	µg/L
1,2,4-trichlorobenzene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
1,2-dichlorobenzene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
1,3-dichlorobenzene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
1,4-dichlorobenzene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
2,2'-oxybis(1-chloropropane)	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
2,4,5-trichlorophenol	25.0	U	25.0	U	25.0	U	25.0	U	25.0	U	NA	-	-
2,4,6-trichlorophenol	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
2,4-dichlorophenol	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
2,4-dimethylphenol	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
2,4-dinitrophenol	25.0	UJ	25.0	UJ	25.0	U	25.0	UJ	25.0	U	NA	-	-
2,4-dinitrotoluene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
2,6-dinitrotoluene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
2-chloronaphthalene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-

TABLE 1-3
COMPARISON OF 1996 RI SURFACE WATER DATA TO BACKGROUND LEVELS
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE
COLTS NECK, NEW JERSEY

Parameter	SAMPLE LOCATION										BACKGROUND		
	WS SW 17		WS SW 17 DUP		WS SW 18		WS SW 19		WS SW 20		Frequency of Detection	Range of Detection	Mean Concentration
2-chlorophenol	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
2-methylnaphthalene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
2-methylphenol	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
2-nitroaniline	25.0	U	25.0	U	25.0	U	25.0	U	25.0	U	NA	-	-
2-nitrophenol	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
3,3'-dichlorobenzidine	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
3-nitroaniline	25.0	U	25.0	U	25.0	U	25.0	U	25.0	U	NA	-	-
4,6-dinitro-2-methylphenol	25.0	U	25.0	U	25.0	U	25.0	U	25.0	U	NA	-	-
4-bromophenyl-phenylether	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
4-chloro-3-methylphenol	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
4-chloroaniline	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
4-chlorophenyl-phenylether	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
4-methylphenol	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
4-nitroaniline	25.0	U	25.0	U	25.0	U	25.0	U	25.0	U	NA	-	-
4-nitrophenol	25.0	UJ	25.0	UJ	25.0	U	25.0	UJ	25.0	U	NA	-	-
N-nitroso-di-n-propylamine	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
N-nitrosodiphenylamine	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
acenaphthene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
acenaphthylene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
anthracene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
benzo(a)anthracene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
benzo(a)pyrene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
benzo(b)fluoranthene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
benzo(g,h,i)perylene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
benzo(k)fluoranthene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
bis(2-chloroethoxy)methane	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
bis(2-chloroethyl)ether	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
bis(2-ethylhexyl)phthalate	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
butylbenzylphthalate	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
carbazole	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
chrysene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
di-n-butylphthalate	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
di-n-octylphthalate	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
dibenz(a,h)anthracene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
dibenzofuran	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
fluoranthene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
fluorene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
hexachlorobenzene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
hexachlorobutadiene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-

TABLE 1-3
COMPARISON OF 1996 RI SURFACE WATER DATA TO BACKGROUND LEVELS
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE
COLTS NECK, NEW JERSEY

Parameter	SAMPLE LOCATION										BACKGROUND		
	WS SW 17		WS SW 17 DUP		WS SW 18		WS SW 19		WS SW 20		Frequency of Detection	Range of Detection	Mean Concentration
hexachlorocyclopentadiene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
hexachloroethane	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
indeno(1,2,3-cd)pyrene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
isophorone	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
naphthalene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
nitrobenzene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
pentachlorophenol	25.0	U	25.0	U	25.0	UJ	25.0	U	25.0	UJ	NA	-	-
phenanthrene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
phenol	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
pyrene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
VOLATILES	**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**			**µg/L**	**µg/L**
1,1,1-trichloroethane	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
1,1,2,2-tetrachloroethane	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
1,1,2-trichloroethane	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
1,1-dichloroethane	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
1,1-dichloroethene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
1,2-dichloroethane	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
1,2-dichloroethene (total)	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
1,2-dichloropropane	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
2-butanone	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
2-hexanone	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
4-methyl-2-pentanone	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
acetone	11.0	U	12.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
benzene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
bromodichloromethane	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
bromoform	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
bromomethane	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
carbon disulfide	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
carbon tetrachloride	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
chlorobenzene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
chloroethane	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
chloroform	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
chloromethane	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
cis-1,3-dichloropropene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
dibromochloromethane	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
ethylbenzene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
methylene chloride	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
styrene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
tetrachloroethene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-

TABLE 1-3
COMPARISON OF 1996 RI SURFACE WATER DATA TO BACKGROUND LEVELS
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE
COLTS NECK, NEW JERSEY

Parameter		SAMPLE LOCATION										BACKGROUND		
		WS SW 17		WS SW 17 DUP		WS SW 18		WS SW 19		WS SW 20		Frequency of Detection	Range of Detection	Mean Concentration
toluene		10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
trans-1,3-dichloropropene		10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
trichloroethene		10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
vinyl chloride		10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
xylene (total)		10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	NA	-	-
MISCELLANEOUS														
ammonia nitrogen	mg/L	0.30	J	0.40	J	0.70	J	1.0	U	0.3	J	NA	-	-
biochemical oxygen demand	mg/L	4.0		4.0		5.0		1.8	J	3		NA	-	-
chemical oxygen demand	mg/L	56.0	J	150	J	390		32.0		70.0		NA	-	-
chloride	mg/L	13.0		13.0		11.0		12.0		17.0		NA	-	-
nitrate nitrogen	mg/L	0.50	U	0.26	J	0.32	J	0.38	J	0.43	J	NA	-	-
total hardness	mg/L	18.0		17.0		19.0		6.0		27.0		NA	-	-
total organic carbon	mg/L	9.0		10.0		NA		NA		NA		NA	-	-
total phosphorus as PO4	mg/L	6.3	J	2.9	J	3.8		3.1		3.4		NA	-	-
turbidity	NTU	15.3		22.0		66.0		37.0		175.0		NA	-	-

Footnotes to sample results:

	Shading denotes exceedance of mean surface water background concentration (values for non-detects considered to be half the detection limit)
	Shading denotes exceedance of maximum surface water background concentration
NA	Not Sampled
J	Value is estimated because concentration is below the quantitation limit or because of exceedances of data validation quality control criteria.
R	Positive result is considered rejected based on exceedance of data validation quality control criteria.
U	Compound or element was not detected. Value is the detection limit (inorganics) or quantitation limit (organics).
UJ	Not detected. Detection limit or quantitation limit shown is considered estimated due to exceedance of data validation quality control criteria.

Sample Data Source:
Brown & Root Environmental. 1996. Remedial Investigation Report for Naval Weapons Station Earle, Colts Neck, New Jersey. Wayne, Pennsylvania. July.

TABLE 1-4
COMPARISON OF 1996 RI SEDIMENT DATA TO BACKGROUND LEVELS
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE
COLTS NECK, NEW JERSEY
PAGE 1 OF 4

Parameters	SAMPLE LOCATION										BACKGROUND		
	WS SD 17		WS SD 17 DUP		WS SD 18		WS SD 19		WS SD 20		Frequency of Detection	Range of Detection	Mean Concentration
INORGANICS	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg			mg/kg	mg/kg
aluminum	10,300	J	10,500	J	1,530		3,010		8,680		3 / 3	839 - 3,940	2,750
arsenic	32.9	J	26.2	J	3.2		12.2		11.7		2 / 3	2.4 - 6.2	3.0
barium	69.9	J	92.2	J	7.4		40.9		42.7		3 / 3	3.9 - 10.6	7.04
beryllium	1.2	J	1.3	J	0.21	U	0.64		1.3		1 / 3	0.57	0.335
cadmium	1.3	UJ	1.4	UJ	0.73	U	0.66	U	0.77	U	not detected	-	-
calcium	765	J	927	J	143		638		821		3 / 3	197 - 518	343
chromium, total	47.5	J	41.2	J	4.4		7.9		25.8		3 / 3	4.3 - 56	21.6
cobalt	4.2	J	5.1	J	1.4	U	1.5		7.2		1 / 3	2.1	1.65
copper	20.7	J	21.5	J	2.4		1.5		7.6		3 / 3	1.5 - 13	6.24
cyanide	0.62	UJ	0.71	UJ	0.36	UJ	0.33	UJ	0.37	UJ	not detected	-	-
iron	61,500	J	52,600	J	3,130		37,200		28,200		3 / 3	228 - 7,650	3,290
lead	46.3	J	55.9	J	9.6	J	6.6	J	19.3	J	3 / 3	4.6 - 34.3	15.3
magnesium	1,780	J	1,470	J	182		504		1780	J	3 / 3	60.7 - 256	153
manganese	56.9	J	73.8	J	4.7		74.6	J	172	J	3 / 3	4.6 - 9.2	6.9
mercury	0.11	J	0.14	J	0.0094	U	0.0086	U	0.032		1 / 3	0.068	0.03
nickel	8.3	J	10.9	J	2.3	U	2.9		12		2 / 3	2.1 - 6.0	4.0
potassium	3,960	J	2,620	J	317		1,140		3,850		2 / 3	86.1 - 681	295
selenium	5.4	J	5.6	J	0.73	U	1.8	J	1.4	J	not detected	-	-
silver	2.2	UJ	2.3	UJ	1.2	U	1.1	U	1.3	U	not detected	-	-
sodium	120	J	79.8	J	13.9		36.8		63.2		3 / 3	26.6 - 116	57.6
thallium	3.4	J	1.9	J	0.87	U	0.79	U	0.92	U	not detected	-	-
vanadium	57.7	J	54.9	J	8.0		11.2		28.3		3 / 3	5.9 - 42.7	18.5
zinc	58.0	J	73.1	J	6.0	J	38.7	J	49.5	J	3 / 3	14.2 - 26.9	18.7
SEMIVOLATILES	µg/kg		µg/kg		µg/kg		µg/kg		µg/kg			µg/kg	µg/kg
1,2,4-trichlorobenzene	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-
1,2-dichlorobenzene	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-
1,3-dichlorobenzene	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-
1,4-dichlorobenzene	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-
2,2'-oxybis(1-chloropropane)	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-
2,4,5-trichlorophenol	2,200	UJ	2,400	UJ	1,200	U	1,100	U	1,300	U	NA	-	-
2,4,6-trichlorophenol	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-
2,4-dichlorophenol	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-
2,4-dimethylphenol	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-
2,4-dinitrophenol	2,200	UJ	2,400	UJ	1,200	UJ	1,100	UJ	1,300	UJ	NA	-	-
2,4-dinitrotoluene	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-
2,6-dinitrotoluene	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-
2-chloronaphthalene	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-
2-chlorophenol	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-
2-methylnaphthalene	900	UJ	950	UJ	480	U	440	U	510	U	not detected	-	-

TABLE 1-4
COMPARISON OF 1996 RI SEDIMENT DATA TO BACKGROUND LEVELS
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE
COLTS NECK, NEW JERSEY

Parameters	SAMPLE LOCATION										BACKGROUND		
	WS SD 17		WS SD 17 DUP		WS SD 18		WS SD 19		WS SD 20		Frequency of Detection	Range of Detection	Mean Concentration
2-methylphenol	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-
2-nitroaniline	2,200	UJ	2,400	UJ	1,200	U	1,100	U	1,300	U	NA	-	-
2-nitrophenol	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-
3,3'-dichlorobenzidine	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-
3-nitroaniline	2,200	UJ	2,400	UJ	1,200	U	1,100	U	1,300	U	NA	-	-
4,6-dinitro-2-methylphenol	2,200	UJ	2,400	UJ	1,200	U	1,100	U	1,300	U	NA	-	-
4-bromophenyl-phenylether	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-
4-chloro-3-methylphenol	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-
4-chloroaniline	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-
4-chlorophenyl-phenylether	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-
4-methylphenol	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-
4-nitroaniline	2,200	UJ	2,400	UJ	1,200	U	1,100	U	1,300	U	NA	-	-
4-nitrophenol	2,200	UJ	2,400	UJ	1,200	UJ	1,100	UJ	1,300	UJ	NA	-	-
N-nitroso-di-n-propylamine	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-
N-nitrosodiphenylamine	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-
acenaphthene	900	UJ	950	UJ	480	U	440	U	510	U	not detected	-	-
acenaphthylene	900	UJ	950	UJ	480	U	440	U	510	U	not detected	-	-
anthracene	900	UJ	950	UJ	480	U	440	U	510	U	not detected	-	-
benzo(a)anthracene	900	UJ	950	UJ	480	U	440	U	510	U	2 / 3	140 - 560	350
benzo(a)pyrene	900	UJ	950	UJ	480	U	440	U	510	U	2 / 3	160 - 590	375
benzo(b)fluoranthene	900	UJ	950	UJ	480	U	440	U	510	U	2 / 3	150 - 490	320
benzo(g,h,i)perylene	900	UJ	950	UJ	480	U	440	U	510	U	2 / 3	130 - 380	255
benzo(k)fluoranthene	900	UJ	950	UJ	480	U	440	U	510	U	2 / 3	150 - 470	310
bis(2-chloroethoxy)methane	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-
bis(2-chloroethyl)ether	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-
bis(2-ethylhexyl)phthalate	900	U	950	U	480	U	440	U	510	U	NA	-	-
butylbenzyl phthalate	900	UJ	97.0	J	480	U	440	U	510	U	not detected	-	-
carbazole	900	UJ	950	UJ	480	U	440	U	510	U	not detected	-	-
chrysene	900	UJ	950	UJ	480	U	440	U	510	U	2 / 3	250 - 940	595
di-n-butylphthalate	900	UJ	950	UJ	480	U	66.0	J	1300		not detected	-	-
di-n-octylphthalate	900	UJ	950	UJ	480	U	440	U	510	U	not detected	-	-
dibenz(a,h)anthracene	900	UJ	950	UJ	480	U	440	U	510.0	U	NA	-	-
dibenzofuran	900	UJ	950	UJ	480	U	440	U	510	U	not detected	-	-
diethylphthalate	900	UJ	110	J	480	U	45.0	J	52	J	1 / 3	44	44
dimethylphthalate	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-
fluoranthene	130	J	130	J	480	U	440	U	510.0	U	2 / 3	300 - 1800	1050
fluorene	900	UJ	950	UJ	480	U	440	U	510	U	1 / 3	190	190
hexachlorobenzene	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-
hexachlorobutadiene	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-
hexachlorocyclopentadiene	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-

TABLE 1-4
COMPARISON OF 1996 RI SEDIMENT DATA TO BACKGROUND LEVELS
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE
COLTS NECK, NEW JERSEY

	SAMPLE LOCATION										BACKGROUND		
Parameters	**WS SD 17**		**WS SD 17 DUP**		**WS SD 18**		**WS SD 19**		**WS SD 20**		**Frequency of Detection**	**Range of Detection**	**Mean Concentration**
hexachloroethane	900	UJ	950	UJ	480	U	440	U	55	J	not detected	-	-
indeno(1,2,3-cd)pyrene	900	UJ	950	UJ	480	U	440	U	510	U	2 / 3	110 - 310	210
isophorone	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-
naphthalene	900	UJ	950	UJ	480	U	440	U	510	U	not detected	-	-
nitrobenzene	900	UJ	950	UJ	480	U	440	U	510	U	NA	-	-
pentachlorophenol	2,200	UJ	2,400	UJ	1,200	U	1,100	U	1,300	U	NA	-	-
phananthrene	900	UJ	950	UJ	480	U	440	U	510	U	2 / 3	200 - 1900	1050
phenol	900	UJ	950	UJ	480	U	440	U	120	J	not detected	-	-
pyrene	900	UJ	110	J	480	UJ	440	UJ	510	UJ	2 / 3	350 - 1900	1125
VOLATILES	**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**			**µg/kg**	**µg/kg**
1,1,1-trichloroethane	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U	NA	-	-
1,1,2,2-tetrachloroethane	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U	NA	-	-
1,1,2-trichloroethane	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U	NA	-	-
1,1-dichloroethane	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U	NA	-	-
1,1-dichloroethene	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U	NA	-	-
1,2-dichloroethane	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U	NA	-	-
1,2-dichloroethene (total)	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U	NA	-	-
1,2-dichloropropane	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U	NA	-	-
2-butanone	45.0	UJ	51.0	UJ	14.0	U	13.0	U	15.0	U	not detected	-	-
2-hexanone	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U	NA	-	-
4-methyl-2-pentanone	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U	NA	-	-
acetone	100	UJ	130	UJ	14.0	UJ	13.0	UJ	24.0	U	NA	-	-
benzene	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U	NA	-	-
bromodichloromethane	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U	NA	-	-
bromoform	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U	NA	-	-
bromomethane	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U	NA	-	-
carbon disulfide	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U	NA	-	-
carbon tetrachloride	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U	NA	-	-
chlorobenzene	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U	NA	-	-
chloroethane	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U	NA	-	-
chloroform	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U	NA	-	-
chloromethane	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U	NA	-	-
cis-1,3-dichloropropene	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U	NA	-	-
dibromochloromethane	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U	NA	-	-
ethylbenzene	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U	not detected	-	-
methylene chloride	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U	not detected	-	-
styrene	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U	NA	-	-
tetrachloroethene	27.0	UJ	24.0	J	14.0	UJ	13.0	UJ	46.0		2 / 3	3 - 50	26.5
toluene	27.0	UJ	28.0	UJ	2.0	J	13.0	U	15.0	U	1 / 3	480	480
trans-1,3-dichloropropene	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U	NA	-	-

TABLE 1-4
COMPARISON OF 1996 RI SEDIMENT DATA TO BACKGROUND LEVELS
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE
COLTS NECK, NEW JERSEY

Parameters		SAMPLE LOCATION										BACKGROUND		
		WS SD 17		WS SD 17 DUP		WS SD 18		WS SD 19		WS SD 20		Frequency of Detection	Range of Detection	Mean Concentration
trichloroethene		27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U	NA	-	-
vinyl chloride		27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U	NA	-	-
xylene (total)		27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U	NA	-	-
MISCELLANEOUS														
ammonia nitrogen	mg/kg	300	J	400	J	100	U	100	U	100	J	NA	-	-
biochemical oxygen demand	mg/kg	NA		NA		NA		NA		NA		NA	-	-
chemical oxygen demand	mg/kg	NA		NA		NA		NA		NA		NA	-	-
chloride	mg/kg	22.0	J	25.0	J	24.0	J	4.0	J	9.0	J	NA	-	-
nitrate nitrogen	mg/kg	1.2	J	1.5	J	0.9	J	1.2	J	0.8	J	NA	-	-
total hardness	mg/kg	NA		NA		NA		NA		NA		NA	-	-
total organic carbon	mg/kg	27,000	J	47,000	J	NA		NA		NA		NA	-	-
total phosphorus as PO4	mg/kg	13,000	J	13,000	J	1,800		6,900		5,500		NA	-	-
turbidity	NTU	NA		NA		NA		NA		NA		NA	-	-
moisture	%	62.8		64.9		31.3		24.3		NA		NA	-	-

Footnotes to sample results:

	Shading denotes exceedance of mean sediment background concentration
	Shading denotes exceedance of maximum sediment background concentration
NA	Not Sampled
J	Value is estimated because concentration is below the quantitation limit or because of exceedances of data validation quality control criteria.
R	Positive result is considered rejected based on exceedance of data validation quality control criteria.
U	Compound or element was not detected. Value is the detection limit (inorganics) or quantitation limit (organics).
UJ	Not detected. Detection limit or quantitation limit shown is considered estimated due to exceedance of data validation quality control criteria.

Sample Data Source:
Brown & Root Environmental. 1996. Remedial Investigation Report for Naval Weapons Station Earle, Colts Neck, New Jersey. Wayne, Pennsylvania. July.

TABLE 1-5
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - EXPOSURE TO SOIL, INCLUDING ALL COPCS ABOVE SCREENING LEVELS
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE
COLTS NECK, NEW JERSEY

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point(s)	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits (2)	Concentration Used for Screening (3)	Screening Toxicity Value (N/C) (5)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Contaminant Selection or Deletion (6,7)
Contact with Soil	7429-90-5	**Aluminum**	2320	9220	mg/kg	TP9-06	6/6	N/A	9220	7700 N			**Y**	**ASL**
	7440-38-2	**Arsenic**	6	13.2	mg/kg	TP9-03	6/6	N/A	13.2	0.39 C			**Y**	**ASL**
	7440-47-3	**Chromium**	10.9	25.8	mg/kg	TP9-06	6/6	N/A	25.8	0.29 C			**Y**	**ASL**
	7440-50-8	Copper	6.3	6.3	mg/kg	TP9-05	1/1	N/A	6.3	310 N			N	BSL
	57-12-5	Cyanide	1.57	1.57	mg/kg	TP9-06	1/6	1.07-1.31	1.57	2.2 N			N	BSL
	7439-89-6	**Iron**	8580	36300	mg/kg	TP9-02	6/6	N/A	36300	5500 N			**Y**	**ASL**
	7439-92-1	Lead	5.5	17.4	mg/kg	TP9-05	6/6	N/A	17.4	400 N			N	BSL
	7439-95-4	Magnesium	1100	1520	mg/kg	TP9-06	2/2	N/A	1520	N			N	NUT
	7439-96-5	Manganese	24.4	168	mg/kg	TP9-05	6/6	N/A	168	180 N			N	BSL
	7440-09-7	Potassium	1420	4120	mg/kg	TP9-06	5/6	209-209	4120	N			N	NUT
	7440-22-4	Silver	2.5	2.7	mg/kg	TP9-02	2/5	1.87-2.01	2.7	39 N			N	BSL
	7440-62-2	Vanadium	11	23.2	mg/kg	TP9-01	3/3	N/A	23.2	39 N			N	BSL
	7440-66-6	Zinc	5.3	60.3	mg/kg	TP9-04	6/6	N/A	60.3	2300 N			N	BSL
	72-54-8	4,4'-DDD	0.41 J	0.41 J	ug/kg	TP9-05	1/6	3.8-4.3	0.41	2000 C			N	BSL
	72-55-9	4,4'-DDE	0.41 J	1.2 J	ug/kg	TP9-05	2/6	3.8-4.3	1.2	1400 C			N	BSL
	50-29-3	4,4'-DDT	0.41 J	0.82 J	ug/kg	TP9-04	2/6	3.8-4.3	0.82	1700 C			N	BSL
	72-43-5	Methoxychlor	93	93	ug/kg	TP9-04	1/6	19-22	93	31000 N			N	BSL
	117-81-7	Bis(2-ethylhexyl) Phthalate	26 J	35 J	ug/kg	TP9-02	3/6	390-440	35	35000 C			N	BSL
	84-74-2	Di-n-butyl Phthalate	21 J	37 J	ug/kg	TP9-02	6/6	N/A	37	610000 N			N	BSL
	67-66-3	Chloroform	1 J	1 J	ug/kg	TP9-01	2/6	11-13	1	290 C			N	BSL

Footnotes:

1 - Data qualifiers are defined in the Definitions section of the footnotes to this table.
2 - Values presented are sample-specific quantitation limits or sample-specific instrument detection limits.
3 - The maximum detected concentration is used for screening purposes.
4 - Metals that did not exceed background were eliminated as COPCs based on statistical two sample hypothesis tests presented in Table HH-2.
5 - The EPA Regional Screening Levels (RSLs) for residential soil exposure are presented. The noncarcinogenic values (annotated "N") are divided by 10. to correspond to a target hazard quotient of 0.1, or an incremental cancer risk of 1.0E-06 for carcinogens (annotated "C") (USEPA , November 2012).
6 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level (ignoring whether levels exceed background if it is a metal).

Samples Compared:

TP9-01	TP9-03	TP9-05
TP9-02	TP9-04	TP9-06

Definitions:

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
N/A = Not Applicable or Not Available
COPC = Chemical of Potential Concern
C = Carcinogen
N = Non-Carcinogenic
J = Estimated Value

(7) Rationale Codes:

For Selection as a COPC:
ASL = Above Screening Level
For Elimination as a COPC:
BSL = Below Screening Level
NUT = Nutrient

TABLE 1-6

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SOIL
ECOLOGICAL RISK ASSESSMENT
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE
COLTS NECK, NEW JERSEY

Chemical	Frequency of Detection	Minimum Concentration	Maximum Concentration	Sample of Maximum Concentration	Minimum Non-Detect	Maximum Non-Detect	Average Positive Result[1]	Overall Average[2]	EEQs				COPC (yes/no)?	Rationale for COPC Selection	Further Evaluated in Terrestrial Food Chain Modeling (yes/no)?[3]
									Plants	Invertebrates	Avian	Mammals			
INORGANICS (mg/kg)															
Aluminum	6/6	2320	9220	09-006-T008	-	-	6722	6722	**184.40**	**NA[4]**	**NA[4]**	**NA[4]**	**YES**	ASL/NSL	NO
Arsenic	6/6	6	13.2	09-003-T001	-	-	8.12	8.12	0.73	0.78	0.31	0.29	NO	BSL	NO
Chromium	6/6	10.9	25.8	09-006-T008	-	-	18.4	18.4	0.33	0.33	0.99	0.76	NO	BSL	NO
Copper	1/6	6.3	6.3	09-005-T001	3	4.9	6.30	2.66	0.09	0.079	0.23	0.13	NO	BSL	NO
Iron	6/6	8580	36300	09-002-T010	-	-	25780	25780	**NA[5]**	**182**	**NA**	**NA**	**YES**	ASL/NSL	NO
Lead	6/6	5.5	17.4	09-005-T001	-	-	9.67	9.67	0.15	0.010	**1.6**	0.31	**YES**	ASL	**YES**
Magnesium	2/6	1100	1520	09-006-T008	147	1210	1310	700	NA	NA	NA	NA	NO	NUT	NO
Manganese	6/6	24.4	168	09-005-T001	-	-	82.6	82.6	0.76	0.37	0.039	0.042	NO	BSL	NO
Potassium	5/6	1420	4120	09-006-T008	209	209	2278	1916	NA	NA	NA	NA	NO	NUT	NO
Silver	2/6	2.5	2.7	09-002-T010	1.87	2.2	2.60	1.54	0.0048	0.054	0.64	0.19	NO	BSL	NO
Vanadium	3/6	11	23.2	09-001-T007	5.7	11.7	18.3	11.6	0.18	0.18	**2.97**	0.083	**YES**	ASL	**YES**
Zinc	6/6	5.3	60.3	09-004-T001	-	-	37.9	37.9	0.38	0.50	**1.31**	0.76	**YES**	ASL	**YES**
Cyanide	1/6	1.57	1.57	09-006-T008	1.07	1.31	1.57	0.764	**1.74**	**1.74**	0.14	0.14	**YES**	ASL	NO
SEMIVOLATILES (ug/kg)															
Bis(2-ethylhexyl)phthalate	3/6	26 J	35 J	09-002-T010	390	440	31.7	119	0.04	0.04	0.04	0.04	NO	BSL	NO
Di-n-butylphthalate	6/6	21 J	37 J	09-002-T010	-	-	26.5	26.5	0.00019	0.25	0.25	0.25	NO	BSL	NO
VOLATILES (ug/kg)															
Chloroform	2/6	1 J	1 J	09-001-T007, 09-002-T010	11	13	1.00	4.42	0.00084	0.000840	**NA**	0.00084	**YES**	BSL/NSL	NO
PESTICIDES (ug/kg)															
4,4'-DDD	1/6	0.41 J	0.41 J	09-005-T001	3.8	4.3	0.410	1.79	0.000033	0.000033	0.0044	0.020	NO	BSL	NO
4,4'-DDE	2/6	0.41 J	1.2 J	09-005-T001	3.8	4.3	0.805	1.65	0.000096	0.000096	0.013	0.057	NO	BSL	NO
4,4'-DDT	2/6	0.41 JP	0.82 J	09-004-T001	3.8	4.3	0.615	1.59	0.000066	0.000066	0.0088	0.039	NO	BSL	NO
Methoxychlor	1/6	93	93	09-004-T001	19	22	93.0	24.2	**4.67**	**4.67**	**4.67**	**4.67**	**YES**	ASL	**YES**
MISCELLANEOUS (mg/kg)															
Petroleum hydrocarbons	3/6	3.6 J	4.7 J	09-001-T007	4.8	5.1	4.20	3.35	**NA**	**NA**	**NA**	**NA**	NO	[6]	NO

Notes:
Shaded cells indicate that the EEQ exceeds 1 or no screening level is available.
EEQ is calculated by dividing the chemical concentration by its screening level presented in Table 2.
Screening levels for aluminum, chloroform, bis(2-ethylhexyl)phthalate and di-n-butylphthalate are based on NJDEP Ecological Screening Criteria Table.
1/2 the detection limit was used for B qualified data and non-detects.

Abbreviations:
COPC = Chemical of Potential Concern
EEQ = Ecological Effects Quotient
NA = Not available or not applicable

J = Estimated value
JP = Estimated value
B = Detected in a blank sample

Rationale Codes for COPC Selection:
ASL = Above COPC Screening Level
BSL = Below COPC Screening Level
NUT = Essential Nutrient

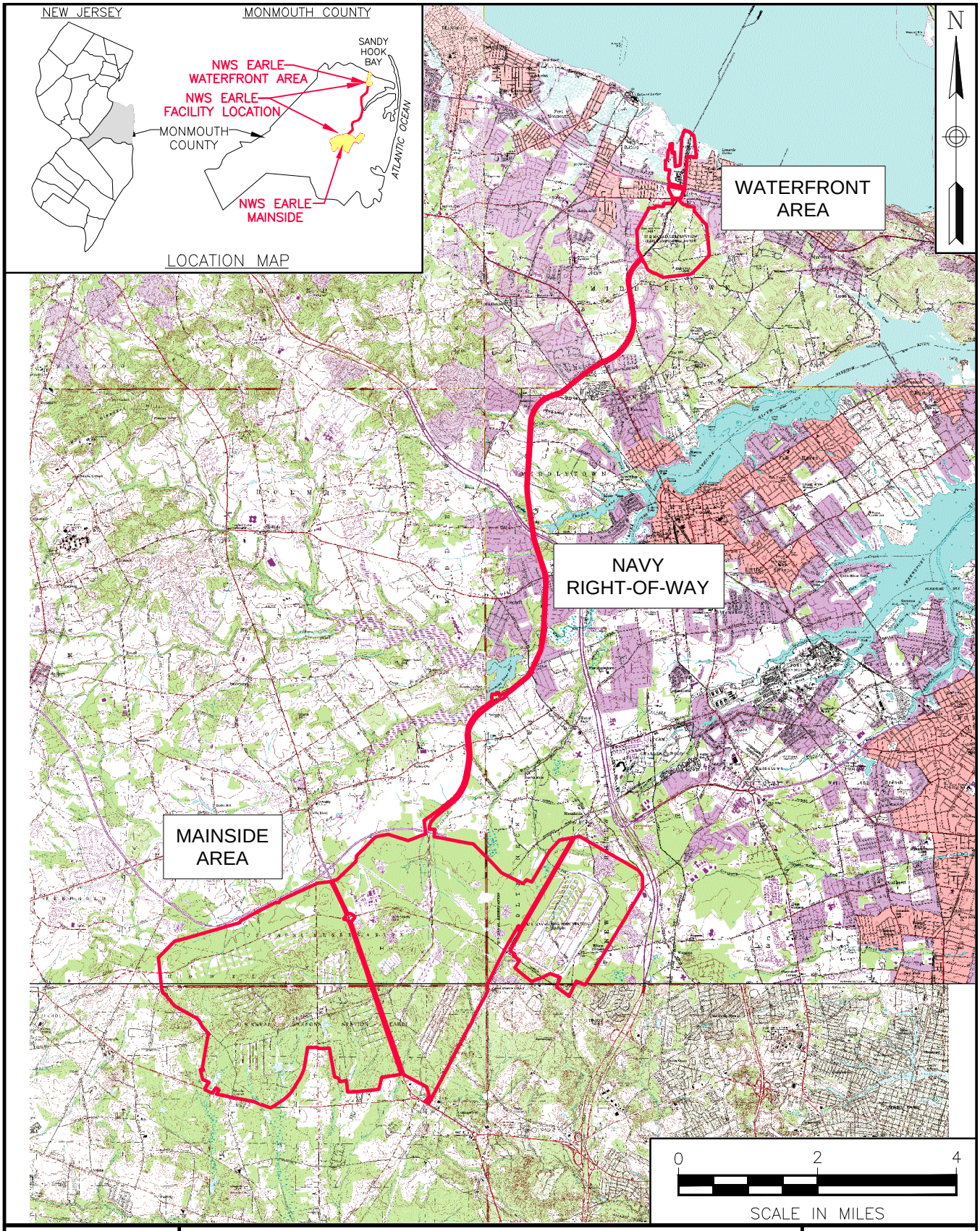
NSL = No Screening Level Available

Footnotes:
1 - Average of detected concentrations only.
2 - Average of all analytical results including one-half of the detection limit for non-detects and B qualified data.
3 - Chemicals with EEQs for birds or mammals greater than 1.0 or bioaccumulative chemicals without bird or mammal screening values are retained for food chain modeling.
4 - Aluminum is considered a COPC only when the soil pH is less than 5.5.
5 - Iron is not expected to be toxic to plants with a soil pH between 5 and 8.
6 - Evaluated indirectly by evaluating risks from the semivolatile and volatile chemicals.

Associated Samples
09-001-T007
09-002-T010
09-003-T001
09-004-T001
09-005-T001
09-006-T008

FIGURES

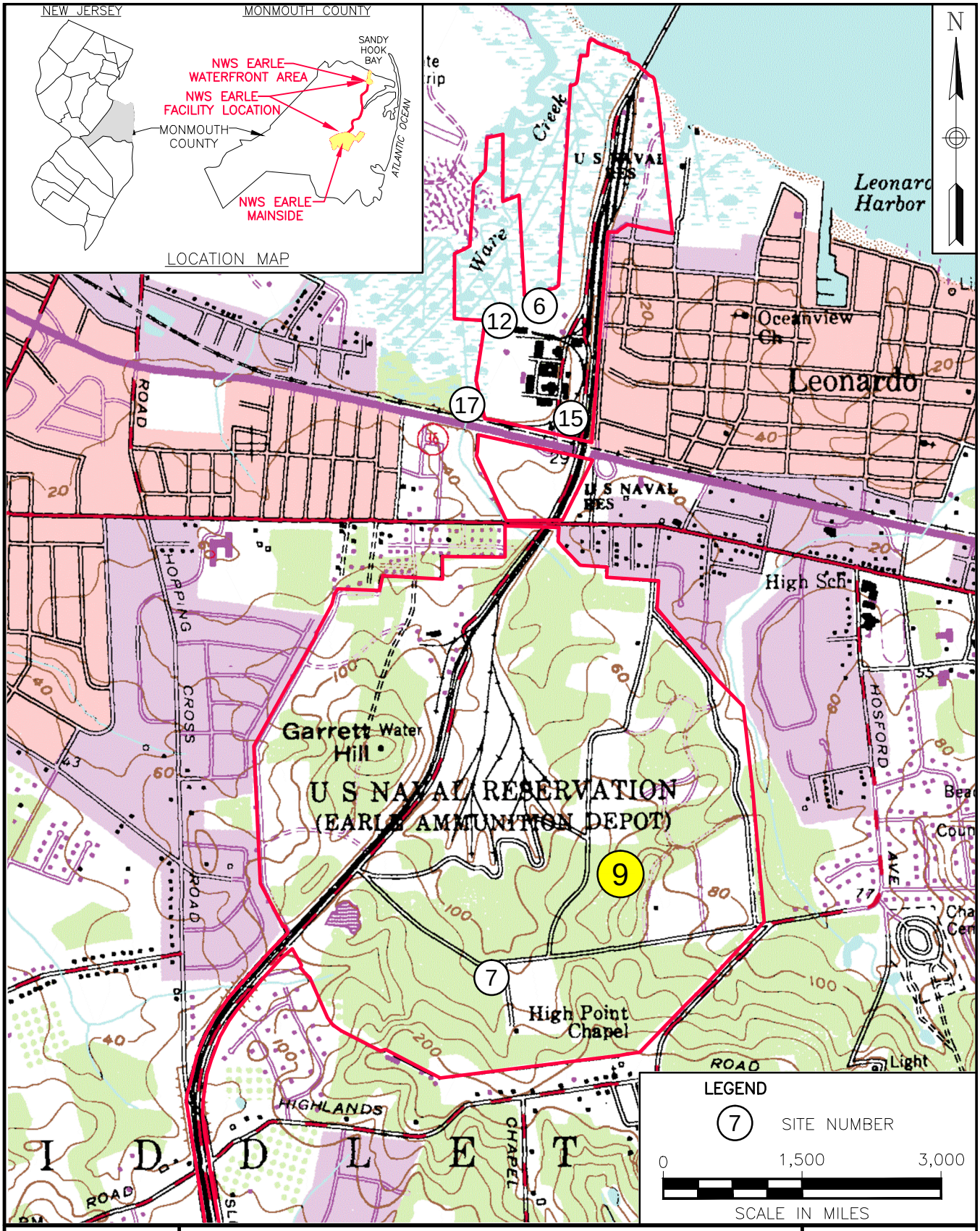
112G02091\0830\112G2091CM01-1.DWG 03/18/13 MKB



TETRA TECH

FACILITY LOCATION MAP
SITE 9 – LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE
COLTS NECK, NEW JERSEY

SCALE	AS NOTED
FILE	112G02091CM01-1
REV	0
DATE	03/18/13
FIGURE NUMBER	FIGURE 1-1

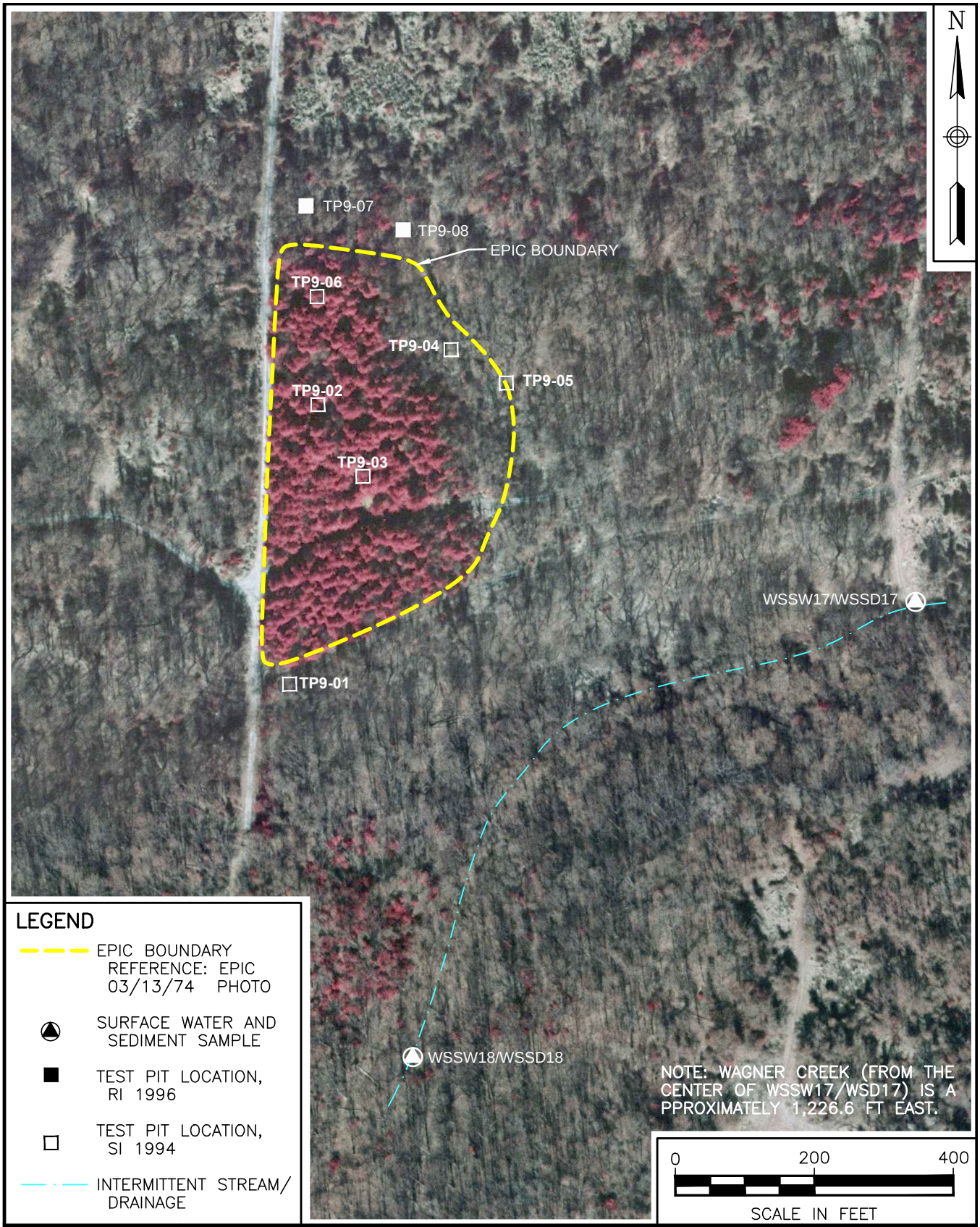


TETRA TECH

SITE LOCATION MAP
SITE 9 – LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE
COLTS NECK, NEW JERSEY

SCALE	AS NOTED
FILE	112G02091CM01-5
REV	0
DATE	03/18/13
FIGURE NUMBER	FIGURE 1-2

112G02091\0830\112G2091GM03.DWG 03/18/13 MKB



TETRA TECH

SITE MAP
SITE 9 – LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION
COLTS NECK, NEW JERSEY

SCALE	AS NOTED
FILE	112G2091GM03
REV	0
DATE	03/18/13
FIGURE NUMBER	FIGURE 1–3

112G02091\0810\112G2091GM02-1.DWG 03/18/13 MKB

N

WSSW20/WSSD20

WSSW19/WSSD19

WAGNER CREEK

DIRT ROAD

PF01B

TP9-07

TP9-08

TP9-06

TP9-04

TP9-05

TP9-02

TP9-03

STONE FOUNDATION

EPIC BOUNDARY

TP9-01

PF01A

WSSW17/WSSD17

INTERMITTENT STREAM

WSSW18/WSSD18

PF01C

0 200 400

SCALE IN FEET

LEGEND

- EPIC BOUNDARY REFERENCE: EPIC 03/13/74 PHOTO
- SURFACE WATER AND SEDIMENT SAMPLE
- TEST PIT LOCATION, RI 1996
- TEST PIT LOCATION, SI 1994
- WETLANDS DELINEATION SOURCE: US FISH & WILDLIFE SERVICE NATIONAL WETLAND INVENTORY
- WOODLAND AREA
- PINE TREE AREA
- WETLANDS
- STREAM SOURCE: USGS TOPOGRAPHIC QUAD
- INTERMITTENT STREAM/DRAINAGE

TETRA TECH

SAMPLE LOCATIONS AND SITE FEATURES SITE 9 – LANDFILL SOUTHEAST OF "P" BARRICADES NAVAL WEAPONS STATION EARLE COLTS NECK, NEW JERSEY

FILE	SCALE
112G2091GM02-1	AS NOTED
FIGURE NUMBER	REV / DATE
FIGURE 1-4	0 / 03/18/13

APPENDIX A

2009 SITE 9 PHOTOS

Site 9- Landfill Southeast of "P" Barricades
Naval Weapons Station Earle
February 2009

APPENDIX B

1994 SI TEST PIT LOGS

Borehole Location Data **ROY F. WESTON, Inc.**

BOREHOLE ID : TP9-01 SITE NAME/NO: EARLE
BEGIN DATE : 05/15/92 END DATE : 05/15/92

LOGGER/COMPANY : T. MCCANN

BOREHOLE COMPLETED IN (<O>verburden <B>edrock) :

TOTAL DEPTH : 7.00 DEPTH TO BEDROCK : 0.00

BOREHOLE DIAMETER #1: 0.00
INTERVAL: 0.00 ft. to 0.00 ft. BGS
METHOD : FLUID :
BOREHOLE DIAMETER #2:
INTERVAL:
METHOD : FLUID :
BOREHOLE DIAMETER #3:
INTERVAL:
METHOD : FLUID :

DRILLING COMPANY : EMPIRE SOILS
DRILLER : KEVIN HIGGINS
DRILL RIG TYPE : BACK HOE

	ESTIMATED	SURVEYED
SURFACE ELEVATION :	0.000	
N. COORDINATE :	0.0000	
E. COORDINATE :	0.0000	

WELL PERMIT.....(Y)es (N)o: N PERMIT # :

HOLE ABANDONED...(Y)es (N)o: N
WELL INSTALLED...(Y)es (N)o: N
WELL CLUSTER.....(Y)es (N)o: N No. OF WELLS : 0
WELL NEST.....(Y)es (N)o: N No. OF WELLS : 0
PUMPS INSTALLED..(Y)es (N)o: N TYPE DEPTH
PURGE : 0.00
SAMPLE : 0.00

BOREHOLE TESTING
BOREHOLE GEOPHYSICS.....(Y)es (N)o: N
SLUG TESTS.....(Y)es (N)o: N
PACKER TESTS.....(Y)es (N)o: N
PUMPING TESTS.....(Y)es (N)o: N

COMMENTS :
Upgradient test pit. Sample taken: 09-001-T007 (MS/MSD) 4-7ft.

Borehole Log

ROY F. WESTON, Inc.

CLIENT : EARLE		TOTAL DEPTH	: 7.00
SITE NAME : NWS EARLE		LOGGER	: T. MCCANN
WELL ID : TP9-01		DRILLING COMPANY	: EMPIRE SOILS
NORTHING : 0.0000 estimated		DRILLING RIG	: BACK HOE
EASTING : 0.0000 estimated		DATE STARTED	: 05/15/92
ELEVATION : 0.000 estimated		DATE COMPLETED	: 05/15/92

ELEVATION	DEPTH	MATERIAL	% RECOVERY	CLASSIFICATION	COLOR	STRENGTH	MOISTURE	BLOW COUNT	FIELD INSTRUMENT READING	COMMENTS
				Poorly graded sand, SP	BROWN YELLOW	LSE	MST		HNU 0.0	
-1	1									
-2	2			Clayey sand, SC	YELLOW BROWN	LSE	MST		HNU 0.0	Slight clay/cohesiveness increasing with depth.
-3	3									
-4	4									
-5	5									
-6	6									
-7	7									
-8	8									
-9	9									
-10	10									

Borehole Location Data **ROY F. WESTON, Inc.**

BOREHOLE ID : TP9-02 SITE NAME/NO: EARLE
BEGIN DATE : 05/15/92 END DATE : 05/15/92

LOGGER/COMPANY : T. MCCANN

BOREHOLE COMPLETED IN (<O>verburden <B>edrock) : O

TOTAL DEPTH : 10.00 DEPTH TO BEDROCK : 0.00

BOREHOLE DIAMETER #1: 0.00
INTERVAL: 0.00 ft. to 0.00 ft. BGS
METHOD : FLUID :
BOREHOLE DIAMETER #2:
INTERVAL:
METHOD : FLUID :
BOREHOLE DIAMETER #3:
INTERVAL:
METHOD : FLUID :

DRILLING COMPANY : EMPIRE SOILS
DRILLER : KEVIN HIGGINS
DRILL RIG TYPE : JOHN DEERE BACKHOE

	ESTIMATED	SURVEYED
SURFACE ELEVATION :	0.000	
N. COORDINATE :	0.0000	
E. COORDINATE :	0.0000	

WELL PERMIT.....(Y)es (N)o: N PERMIT # :

HOLE ABANDONED...(Y)es (N)o: Y
WELL INSTALLED...(Y)es (N)o: N
WELL CLUSTER.....(Y)es (N)o: N No. OF WELLS : 0
WELL NEST.....(Y)es (N)o: N No. OF WELLS : 0
PUMPS INSTALLED..(Y)es (N)o: N

	TYPE	DEPTH
PURGE :		0.00
SAMPLE :		0.00

BOREHOLE TESTING
BOREHOLE GEOPHYSICS.....(Y)es (N)o: N
SLUG TESTS.....(Y)es (N)o: N
PACKER TESTS.....(Y)es (N)o: N
PUMPING TESTS.....(Y)es (N)o: N

COMMENTS :
TP9-02 is in central area of landfill. Sample taken: 09-002-T010, 6-10 ft.

Borehole Log

ROY F. WESTON, Inc.

CLIENT	: EARLE	TOTAL DEPTH	: 10.00
SITE NAME	: NWS EARLE	LOGGER	: T. MCCANN
WELL ID	: TP9-02	DRILLING COMPANY	: EMPIRE SOILS
NORTHING	: 0.0000 estimated	DRILLING RIG	: JOHN DEERE BACKHOE
EASTING	: 0.0000 estimated	DATE STARTED	: 05/15/92
ELEVATION	: 0.000 estimated	DATE COMPLETED	: 05/15/92

ELEVATION	DEPTH	MATERIAL	% RECOVERY	CLASSIFICATION	COLOR	STRENGTH	MOISTURE	BLOW COUNT	FIELD INSTRUMENT READING	COMMENTS
				Poorly graded sand with clay, SP-SC		FRM	MST			Fill material? Topsoil.
-1	1			Clayey sand, SC	DK YELLOW BRN	SFT	MST		HNU 0.0	Fill material. Clay lenses.
-2	2									
-3	3									
-4	4									
-5	5									
-6	6			Clayey sand, SC	BROWN	SFT			HNU 0.0	Fill material. Piece of cement. Trace brick fragments. No water in hole.
-7	7									
-8	8									
-9	9									
-10	10									

Borehole Location Data **ROY F. WESTON, Inc.**

BOREHOLE ID : TP9-03 SITE NAME/NO: EARLE
BEGIN DATE : 05/15/92 END DATE : 05/15/92

LOGGER/COMPANY : T. MCCANN

BOREHOLE COMPLETED IN (<O>verburden <B>edrock) : O

TOTAL DEPTH : 9.00 DEPTH TO BEDROCK : 0.00

BOREHOLE DIAMETER #1: 0.00
INTERVAL: 0.00 ft. to 0.00 ft. BGS
METHOD : FLUID :
BOREHOLE DIAMETER #2:
INTERVAL:
METHOD : FLUID :
BOREHOLE DIAMETER #3:
INTERVAL:
METHOD : FLUID :

DRILLING COMPANY : EMPIRE SOILS
DRILLER : KEVIN HIGGINS
DRILL RIG TYPE : BACK HOE

	ESTIMATED	SURVEYED
SURFACE ELEVATION :	0.000	
N. COORDINATE :	0.0000	
E. COORDINATE :	0.0000	

WELL PERMIT.....(Y)es (N)o: N PERMIT # :

HOLE ABANDONED...(Y)es (N)o: Y
WELL INSTALLED...(Y)es (N)o: N
WELL CLUSTER.....(Y)es (N)o: N No. OF WELLS : 0
WELL NEST.....(Y)es (N)o: N No. OF WELLS : 0
PUMPS INSTALLED..(Y)es (N)o: N TYPE DEPTH
PURGE : 0.00
SAMPLE : 0.00

BOREHOLE TESTING
BOREHOLE GEOPHYSICS.....(Y)es (N)o: N
SLUG TESTS.....(Y)es (N)o: N
PACKER TESTS.....(Y)es (N)o: N
PUMPING TESTS.....(Y)es (N)o: N

COMMENTS :
Sample taken: 09-003-T009 (6 - 9 ft).

Borehole Log **ROY F. WESTON, Inc.**

CLIENT : EARLE		TOTAL DEPTH	: 9.00
SITE NAME : NWS EARLE		LOGGER	: T. MCCANN
WELL ID : TP9-03		DRILLING COMPANY	: EMPIRE SOILS
NORTHING : 0.0000 estimated		DRILLING RIG	: BACK HOE
EASTING : 0.0000 estimated		DATE STARTED	: 05/15/92
ELEVATION : 0.000 estimated		DATE COMPLETED	: 05/15/92

ELEVATION	DEPTH	MATERIAL	% RECOVERY	CLASSIFICATION	COLOR	STRENGTH	MOISTURE	BLOW COUNT	FIELD INSTRUMENT READING	COMMENTS
				Poorly graded sand, SP	BROWN YELLOW	LSE	MST		HNU 0.0	0-0.8' surface soil (silty sandy loam).
-4	4			Silty sand, SM	V DK GRAY BRN	SFT	MST		HNU 0.0	Iron veins surrounded by iron staining. "Bog Iron" 6-8'.

-1 1
-2 2
-3 3
-5 5
-6 6
-7 7
-8 8
-9 9
-10 10

Borehole Location Data **ROY F. WESTON, Inc.**

BOREHOLE ID : TP9-04 SITE NAME/NO: EARLE
BEGIN DATE : 05/15/92 END DATE : 05/15/92

LOGGER/COMPANY : T. MCCANN

BOREHOLE COMPLETED IN (<O>verburden <B>edrock) :

TOTAL DEPTH : 9.50 DEPTH TO BEDROCK : 0.00

BOREHOLE DIAMETER #1: 0.00
INTERVAL: 0.00 ft. to 0.00 ft. BGS
METHOD : FLUID :
BOREHOLE DIAMETER #2:
INTERVAL:
METHOD : FLUID :
BOREHOLE DIAMETER #3:
INTERVAL:
METHOD : FLUID :

DRILLING COMPANY : EMPIRE SOILS
DRILLER : KEVIN HIGGINS
DRILL RIG TYPE : BACK HOE

	ESTIMATED	SURVEYED
SURFACE ELEVATION :	0.000	
N. COORDINATE :	0.0000	
E. COORDINATE :	0.0000	

WELL PERMIT.....(Y)es (N)o: N PERMIT # :

HOLE ABANDONED...(Y)es (N)o: Y
WELL INSTALLED...(Y)es (N)o: N
WELL CLUSTER.....(Y)es (N)o: N No. OF WELLS : 0
WELL NEST.....(Y)es (N)o: N No. OF WELLS : 0
PUMPS INSTALLED..(Y)es (N)o: N

	TYPE	DEPTH
PURGE :		0.00
SAMPLE :		0.00

BOREHOLE TESTING
BOREHOLE GEOPHYSICS.....(Y)es (N)o: N
SLUG TESTS.....(Y)es (N)o: N
PACKER TESTS.....(Y)es (N)o: N
PUMPING TESTS.....(Y)es (N)o: N

COMMENTS :
Sample taken: 09-004-T005 (3 to 5 ft).

Borehole Log **ROY F. WESTON, Inc.**

CLIENT : EARLE		TOTAL DEPTH	: 9.50
SITE NAME : NWS EARLE		LOGGER	: T. MCCANN
WELL ID : TP9-04		DRILLING COMPANY	: EMPIRE SOILS
NORTHING : 0.0000 estimated		DRILLING RIG	: BACK HOE
EASTING : 0.0000 estimated		DATE STARTED	: 05/15/92
ELEVATION : 0.000 estimated		DATE COMPLETED	: 05/15/92

ELEVATION	DEPTH	MATERIAL	% RECOVERY	CLASSIFICATION	COLOR	STRENGTH	MOISTURE	BLOW COUNT	FIELD INSTRUMENT READING	COMMENTS
				Silty sand, SM	YELLOW BROWN	LSE	MST		HNU 0.0	Fill material. Steel sheeting, metal bands, burnt wood and timber.
-4	4			Silty sand, SM	DK YELLOW BRN	SFT	MST		HNU 0.0	Less silt and clay with depth; fine sand.

-1 1 -2 2 -3 3 -4 4 -5 5 -6 6 -7 7 -8 8 -9 9 -10 10

Borehole Location Data **ROY F. WESTON, Inc.**

BOREHOLE ID : TP9-05 SITE NAME/NO: EARLE
BEGIN DATE : 05/15/92 END DATE : 05/15/92

LOGGER/COMPANY : T. MCCANN

BOREHOLE COMPLETED IN (<O>verburden <B>edrock) : O

TOTAL DEPTH : 8.00 DEPTH TO BEDROCK : 0.00

BOREHOLE DIAMETER #1: 0.00
INTERVAL: 0.00 ft. to 0.00 ft. BGS
METHOD : FLUID :
BOREHOLE DIAMETER #2:
INTERVAL:
METHOD : FLUID :
BOREHOLE DIAMETER #3:
INTERVAL:
METHOD : FLUID :

DRILLING COMPANY : EMPIRE SOILS
DRILLER : KEVIN HIGGINS
DRILL RIG TYPE : BACK HOE

	ESTIMATED	SURVEYED
SURFACE ELEVATION :	0.000	
N. COORDINATE :	0.0000	
E. COORDINATE :	0.0000	

WELL PERMIT.....(Y)es (N)o: N PERMIT # :

HOLE ABANDONED...(Y)es (N)o: Y
WELL INSTALLED...(Y)es (N)o: N
WELL CLUSTER.....(Y)es (N)o: N No. OF WELLS : 0
WELL NEST.....(Y)es (N)o: N No. OF WELLS : 0
PUMPS INSTALLED..(Y)es (N)o: N TYPE DEPTH
PURGE : 0.00
SAMPLE : 0.00

BOREHOLE TESTING
BOREHOLE GEOPHYSICS.....(Y)es (N)o: N
SLUG TESTS.....(Y)es (N)o: N
PACKER TESTS.....(Y)es (N)o: N
PUMPING TESTS.....(Y)es (N)o: N

COMMENTS :
4" "I" bar, steel banding and sheeting, wood beams on ground surface. Sample taken: 09-005-T006 (3-6 ft.).

Borehole Log

ROY F. WESTON, Inc.

CLIENT	: EARLE	TOTAL DEPTH	: 8.00
SITE NAME	: NWS EARLE	LOGGER	: T. MCCANN
WELL ID	: TP9-05	DRILLING COMPANY	: EMPIRE SOILS
NORTHING	: 0.0000 estimated	DRILLING RIG	: BACK HOE
EASTING	: 0.0000 estimated	DATE STARTED	: 05/15/92
ELEVATION	: 0.000 estimated	DATE COMPLETED	: 05/15/92

ELEVATION	DEPTH	MATERIAL	% RECOVERY	CLASSIFICATION	COLOR	STRENGTH	MOISTURE	BLOW COUNT	FIELD INSTRUMENT READING	COMMENTS
				Silty sand, SM	DK YELLOW-BRN	SFT	MST		HNU 0.0	Fill material. Some roots systems garbage bag. Plaster sheeting, wood.
-1	1									
-2	2									
-3	3									
-4	4									
				Silty sand, SM	DK YELLOW-BRN	FRM	MST		HNU 0.0	
-5	5									
-6	6									
-7	7									
-8	8									
-9	9									
-10	10									

Borehole Location Data — *ROY F. WESTON, Inc.*

BOREHOLE ID : TP9-06 *SITE NAME/NO:* EARLE
BEGIN DATE : 05/15/92 *END DATE :* 05/15/92

LOGGER/COMPANY : T. MCCANN

BOREHOLE COMPLETED IN (<O>verburden <B>edrock) : O

TOTAL DEPTH : 0.00 *DEPTH TO BEDROCK :* 0.00

BOREHOLE DIAMETER #1: 0.00
INTERVAL: 0.00 ft. to 0.00 ft. BGS
METHOD : *FLUID :*
BOREHOLE DIAMETER #2:
INTERVAL:
METHOD : *FLUID :*
BOREHOLE DIAMETER #3:
INTERVAL:
METHOD : *FLUID :*

DRILLING COMPANY : EMPIRE SOILS
DRILLER : KEVIN HIGGINS
DRILL RIG TYPE : BACK HOE

	ESTIMATED	*SURVEYED*
SURFACE ELEVATION :	0.000	
N. COORDINATE :	0.0000	
E. COORDINATE :	0.0000	

WELL PERMIT.....(Y)es (N)o: N *PERMIT # :*

HOLE ABANDONED...(Y)es (N)o: N
WELL INSTALLED...(Y)es (N)o: N
WELL CLUSTER.....(Y)es (N)o: N *No. OF WELLS :* 0
WELL NEST.....(Y)es (N)o: N *No. OF WELLS :* 0
PUMPS INSTALLED..(Y)es (N)o: N

	TYPE	*DEPTH*
PURGE :		0.00
SAMPLE :		0.00

BOREHOLE TESTING
BOREHOLE GEOPHYSICS.....(Y)es (N)o: N
SLUG TESTS.....(Y)es (N)o: N
PACKER TESTS.....(Y)es (N)o: N
PUMPING TESTS.....(Y)es (N)o: N

COMMENTS :
Sample taken: 09-006-T008 (5-8 ft.).

Borehole Log — *ROY F. WESTON, Inc.*

CLIENT : EARLE		TOTAL DEPTH	: 0.00
SITE NAME : NWS EARLE		LOGGER	: T. MCCANN
WELL ID : TP9-06		DRILLING COMPANY	: EMPIRE SOILS
NORTHING : 0.0000 estimated		DRILLING RIG	: BACK HOE
EASTING : 0.0000 estimated		DATE STARTED	: 05/15/92
ELEVATION : 0.000 estimated		DATE COMPLETED	: 05/15/92

ELEVATION	DEPTH	MATERIAL	% RECOVERY	CLASSIFICATION	COLOR	STRENGTH	MOISTURE	BLOW COUNT	FIELD INSTRUMENT READING	COMMENTS
				Silty sand, SM	BROWN YELLOW	FRM	MST		HNU 0.0	0 to 0.8' topsoil sandy loam. One block of 4"x4" wood. Fill material.
-1	1									
-2	2									
-3	3			Silty sand, SM	OLIVE BROWN	SFT	MST		HNU 0.0	1' band iron staining at 6-7': "Bog Iron".
-4	4									
-5	5									
-6	6									
-7	7									
-8	8									
-9	9									
-10	10									

Borehole Log

ROY F. WESTON, Inc.

CLIENT	: EARLE	TOTAL DEPTH	: 0.00
SITE NAME	: NWS EARLE	LOGGER	: T. MCCANN
WELL ID	: TP9-06	DRILLING COMPANY	: EMPIRE SOILS
NORTHING	: 0.0000 estimated	DRILLING RIG	: BACK HOE
EASTING	: 0.0000 estimated	DATE STARTED	: 05/15/92
ELEVATION	: 0.000 estimated	DATE COMPLETED	: 05/15/92

ELEVATION	DEPTH	MATERIAL	% RECOVERY	CLASSIFICATION	COLOR	STRENGTH	MOISTURE	BLOW COUNT	FIELD INSTRUMENT READING	COMMENTS
				Silty sand, SM	OLIVE BROWN	SFT	MST		HNU 0.0	1' band iron staining at 6-7': "Bog Iron".
-11	11									
-12	12									
-13	13									
-14	14									
-15	15									
-16	16									
-17	17									
-18	18									
-19	19									
-20	20									

APPENDIX C

1994 SI TEST PIT SOIL ANALYTICAL RESULTS

TABLE C-1
TEST PIT SOIL ANALYTICAL RESULTS
1994 SITE INVESTIGATION
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE

SAMPLE LOCATION	TP9-01		TP9-02		TP9-03		TP9-04		TP9-05		TP9-06	
SAMPLE NOMENCLATURE	09-001-T007		09-002-T010		09-003-T001		09-004-T001		09-005-T001		09-006-T008	
SAMPLE DEPTH	4 - 7 feet bgs		6 -10 feet bgs		6 - 9 feet bgs		3 - 5 feet bgs		3 - 6 feet bgs		5 - 8 feet bgs	
INORGANICS	**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**	
aluminum	2,320		9,070		6,090		7,350		6,280		9,220	
antimony	8.41	U	9.04	U	8.87	U	7.47	U	8.4	U	9.03	U
arsenic	6		7.9		13.2		6.5		6.3		8.8	
barium	5	B	13.5	B	7.7	B	20.4	B	31.8	B	10.1	B
beryllium	0.3	B	1.2	B	0.52	B	0.72	B	0.58	B	0.93	B
cadmium	0.93	U	1.03	U	0.99	U	0.85	U	0.96	U	1.01	U
calcium	110	B	242	B	141	B	750	B	799	B	89.5	B
chromium, total	10.9		16.2		21		19.4		16.9		25.8	
cobalt	2.1	B	4.3	B	2.3	B	4.6	B	3.9	B	4	B
copper	3	B	4.2	B	4.1	B	4.9	B	6.3		3.1	B
iron	8,580		36,300		22,300		33,300		27,600		26,600	
lead	5.5		5.6		9.9		12.7		17.4		6.9	
magnesium	147	B	1,210	B	911	B	1,100		893	B	1,520	
manganese	59.2		112		24.4		104		168		28.1	
mercury	0.06	U	0.07	U	0.06	U	0.05	U	0.06	U	0.06	U
nickel	4.2	U	4.65	U	4.45	U	3.82	U	4.33	U	4.53	U
potassium	209	U	1,840		1,970		2,040		1,420		4,120	
selenium	0.47	U	0.51	U	0.48	U	0.41	U	0.48	U	0.5	U
silver	1.87	U	2.7		1.97	U	2.5		2.2	B	2.01	U
sodium	42.6	B	52.8	B	47.8	B	50.5	B	36.5	B	51.3	B
thallium	0.47	U	0.51	U	0.48	U	0.41	U	0.48	U	0.5	U
vanadium	23.2		5.7	B	20.8		11		11.7	B	11.5	B
zinc	5.3		39.8		17.5		60.3		44.6		60.1	
cyanide	1.17	U	1.31	U	1.27	U	1.07	U	1.21	U	1.57	
SEMIVOLATILES	**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**	
1,2,4-trichlorobenzene	390	U	440	U	440	U	410	U	400	U	420	U
1,2-dichlorobenzene	390	U	440	U	440	U	410	U	400	U	420	U
1,3-dichlorobenzene	390	U	440	U	440	U	410	U	400	U	420	U
1,4-dichlorobenzene	390	U	440	U	440	U	410	U	400	U	420	U
2,2'-oxybis(2-chloropropane)	390	U	440	U	440	U	410	U	400	U	420	U
2,4,5-trichlorophenol	980	U	1100	U	1100	U	1000	U	1000	U	1000	U
2,4,6-trichlorophenol	390	U	440	U	440	U	410	U	400	U	420	U
2,4-dichlorophenol	390	U	440	U	440	U	410	U	400	U	420	U
2,4-dimethylphenol	390	U	440	U	440	U	410	U	400	U	420	U
2,4-dinitrophenol	980	U	1100	U	1100	U	1000	U	1000	U	1000	U
2,4-dinitrotoluene	390	U	440	U	440	U	410	U	400	U	420	U
2,6-dinitrotoluene	390	U	440	U	440	U	410	U	400	U	420	U
2-chloronaphthalene	390	U	440	U	440	U	410	U	400	U	420	U
2-chlorophenol	390	U	440	U	440	U	410	U	400	U	420	U
2-methylnaphthalene	390	U	440	U	440	U	410	U	400	U	420	U
2-methylphenol	390	U	440	U	440	U	410	U	400	U	420	U
2-nitroaniline	980	U	1100	U	1100	U	1000	U	1000	U	1000	U

TABLE C-1
TEST PIT SOIL ANALYTICAL RESULTS
1994 SITE INVESTIGATION
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE

SAMPLE LOCATION	TP9-01		TP9-02		TP9-03		TP9-04		TP9-05		TP9-06	
SAMPLE NOMENCLATURE	09-001-T007		09-002-T010		09-003-T001		09-004-T001		09-005-T001		09-006-T008	
SAMPLE DEPTH	4 - 7 feet bgs		6 -10 feet bgs		6 - 9 feet bgs		3 - 5 feet bgs		3 - 6 feet bgs		5 - 8 feet bgs	
2-nitrophenol	390	U	440	U	440	U	410	U	400	U	420	U
3,3'-dichlorobenzidine	390	U	440	U	440	U	410	U	400	U	420	U
3-nitroaniline	980	U	1100	U	1100	U	1000	U	1000	U	1000	U
4,6-dinitro-2-methylphenol	980	U	1100	U	1100	U	1000	U	1000	U	1000	U
4-bromophenyl-phenylether	390	U	440	U	440	U	410	U	400	U	420	U
4-chloro-3-methylphenol	390	U	440	U	440	U	410	U	400	U	420	U
4-chloroaniline	390	U	440	U	440	U	410	U	400	U	420	U
4-chlorophenyl-phenylether	390	U	440	U	440	U	410	U	400	U	420	U
4-methylphenol	390	U	440	U	440	U	410	U	400	U	420	U
4-nitroaniline	980	U	1100	U	1100	U	1000	U	1000	U	1000	U
4-nitrophenol	980	U	1100	U	1100	U	1000	U	1000	U	1000	U
N-nitroso-di-n-propylamine	390	U	440	U	440	U	410	U	400	U	420	U
N-nitrosodiphenylamine	390	U	440	U	440	U	410	U	400	U	420	U
acenaphthene	390	U	440	U	440	U	410	U	400	U	420	U
acenaphthylene	390	U	440	U	440	U	410	U	400	U	420	U
anthracene	390	U	440	U	440	U	410	U	400	U	420	U
benzo(a)anthracene	390	U	440	U	440	U	410	U	400	U	420	U
benzo(a)pyrene	390	U	440	U	440	U	410	U	400	U	420	U
benzo(b)fluoranthene	390	U	440	U	440	U	410	U	400	U	420	U
benzo(g,h,i)perylene	390	U	440	U	440	U	410	U	400	U	420	U
benzo(k)fluoranthene	390	U	440	U	440	U	410	U	400	U	420	U
bis(2-chloroethoxy)methane	390	U	440	U	440	U	410	U	400	U	420	U
bis(2-chloroethyl)ether	390	U	440	U	440	U	410	U	400	U	420	U
bis(2-ethylhexyl)phthalate	390	U	35	J	440	U	410	U	26	J	34	J
butylbenzylphthalate	390	U	440	U	440	U	410	U	400	U	420	U
carbazole	390	U	440	U	440	U	410	U	400	U	420	U
chrysene	390	U	440	U	440	U	410	U	400	U	420	U
di-n-butylphthalate	23	J	37	J	25	J	28	J	25	J	21	J
di-n-octylphthalate	390	U	440	U	440	U	410	U	400	U	420	U
dibenz(a,h)anthracene	390	U	440	U	440	U	410	U	400	U	420	U
dibenzofuran	390	U	440	U	440	U	410	U	400	U	420	U
diethylphthalate	390	U	440	U	440	U	410	U	400	U	420	U
dimethylphthalate	390	U	440	U	440	U	410	U	400	U	420	U
fluoranthene	390	U	440	U	440	U	410	U	400	U	420	U
fluorene	390	U	440	U	440	U	410	U	400	U	420	U
hexachlorobenzene	390	U	440	U	440	U	410	U	400	U	420	U
hexachlorobutadiene	390	U	440	U	440	U	410	U	400	U	420	U
hexachlorocyclopentadiene	390	U	440	U	440	U	410	U	400	U	420	U
hexachloroethane	390	U	440	U	440	U	410	U	400	U	420	U
indeno(1,2,3-cd)pyrene	390	U	440	U	440	U	410	U	400	U	420	U
isophorone	390	U	440	U	440	U	410	U	400	U	420	U
naphthalene	390	U	440	U	440	U	410	U	400	U	420	U
nitrobenzene	390	U	440	U	440	U	410	U	400	U	420	U
pentachlorophenol	980	U	1100	U	1100	U	1000	U	1000	U	1000	U

TABLE C-1
TEST PIT SOIL ANALYTICAL RESULTS
1994 SITE INVESTIGATION
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE

SAMPLE LOCATION	TP9-01		TP9-02		TP9-03		TP9-04		TP9-05		TP9-06	
SAMPLE NOMENCLATURE	09-001-T007		09-002-T010		09-003-T001		09-004-T001		09-005-T001		09-006-T008	
SAMPLE DEPTH	4 - 7 feet bgs		6 -10 feet bgs		6 - 9 feet bgs		3 - 5 feet bgs		3 - 6 feet bgs		5 - 8 feet bgs	
phananthrene	390	U	440	U	440	U	410	U	400	U	420	U
phenol	390	U	440	U	440	U	410	U	400	U	420	U
pyrene	390	U	440	U	440	U	410	U	400	U	420	U
VOLATILES	**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**	
1,1,1-trichloroethane	12	U	13	U	13	U	11	U	12	U	13	U
1,1,2,2-tetrachloroethane	12	U	13	U	13	U	11	U	12	U	13	U
1,1,2-trichloroethane	12	U	13	U	13	U	11	U	12	U	13	U
1,1-dichloroethane	12	U	13	U	13	U	11	U	12	U	13	U
1,1-dichloroethene	12	U	13	U	13	U	11	U	12	U	13	U
1,2-dichloroethane	12	U	13	U	13	U	11	U	12	U	13	U
1,2-dichloroethene (total)	12	U	13	U	13	U	11	U	12	U	13	U
1,2-dichloropropane	12	U	13	U	13	U	11	U	12	U	13	U
2-butanone	12	U	13	U	13	U	11	U	12	U	13	U
2-hexanone	12	U	13	U	13	U	11	U	12	U	13	U
4-methyl-2-pentanone	12	U	13	U	13	U	11	U	12	U	13	U
acetone	12	U	17	U	22	U	12	U	22	U	34	U
benzene	12	U	13	U	13	U	11	U	12	U	13	U
bromodichloromethane	12	U	13	U	13	U	11	U	12	U	13	U
bromoform	12	U	13	U	13	U	11	U	12	U	13	U
bromomethane	12	U	13	U	13	U	11	U	12	U	13	U
carbon disulfide	12	U	13	U	13	U	11	U	12	U	13	U
carbon tetrachloride	12	U	13	U	13	U	11	U	12	U	13	U
chlorobenzene	12	U	13	U	13	U	11	U	12	U	13	U
chloroethane	12	U	13	U	13	U	11	U	12	U	13	U
chloroform	1	J	1	J	13	U	11	U	12	U	13	U
chloromethane	12	U	13	U	13	U	11	U	12	U	13	U
cis-1,3-dichloropropene	12	U	13	U	13	U	11	U	12	U	13	U
dibromochloromethane	12	U	13	U	13	U	11	U	12	U	13	U
ethylbenzene	12	U	13	U	13	U	11	U	12	U	13	U
methylene chloride	12	U	13	U	17	U	12	U	13	U	21	U
styrene	12	U	13	U	13	U	11	U	12	U	13	U
tetrachloroethene	12	U	13	U	13	U	11	U	12	U	13	U
toluene	12	U	13	U	13	U	11	U	12	U	13	U
trans-1,3-dichloropropene	12	U	13	U	13	U	11	U	12	U	13	U
trichloroethene	12	U	13	U	13	U	11	U	12	U	13	U
vinyl chloride	12	U	13	U	13	U	11	U	12	U	13	U
xylene (total)	12	U	13	U	13	U	11	U	12	U	13	U
PESTICIDES	**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**	
4,4'-DDD	3.8	U	4.3	U	4.3	U	4.1	U	0.41	J	4.2	U
4,4'-DDE	3.8	U	4.3	U	4.3	U	0.41	J	1.2	J	4.2	U
4,4'-DDT	3.8	U	4.3	U	4.3	U	0.82	J	0.41	JP	4.2	U
aldrin	1.9	U	2.2	U	2.2	U	2.1	U	2	U	2.1	U
alpha-BHC	1.9	U	2.2	U	2.2	U	2.1	U	2	U	2.1	U

TABLE C-1
TEST PIT SOIL ANALYTICAL RESULTS
1994 SITE INVESTIGATION
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE
PAGE 4 OF 5

SAMPLE LOCATION	TP9-01		TP9-02		TP9-03		TP9-04		TP9-05		TP9-06	
SAMPLE NOMENCLATURE	09-001-T007		09-002-T010		09-003-T001		09-004-T001		09-005-T001		09-006-T008	
SAMPLE DEPTH	4 - 7 feet bgs		6 -10 feet bgs		6 - 9 feet bgs		3 - 5 feet bgs		3 - 6 feet bgs		5 - 8 feet bgs	
alpha-chlordane	1.9	U	22	U	22	U	2.1	U	2	U	2.1	U
beta-BHC	1.9	U	2.2	U	2.2	U	2.1	U	2	U	2.1	U
delta-BHC	1.9	U	2.2	U	2.2	U	2.1	U	2	U	2.1	U
dieldrin	3.8	U	4.3	U	4.3	U	4.1	U	4.1	U	4.2	U
endosulfan I	1.9	U	2.2	U	2.2	U	2.1	U	2	U	2.1	U
endosulfan II	3.8	U	4.3	U	4.3	U	4.1	U	4.1	U	4.2	U
endosulfan sulfate	3.8	U	4.3	U	4.3	U	4.1	U	4.1	U	4.2	U
endrin	3.8	U	4.3	U	4.3	U	4.1	U	4.1	U	4.2	U
endrin aldehyde	3.8	U	4.3	U	4.3	U	4.1	U	4.1	U	4.2	U
endrin ketone	3.8	U	4.3	U	4.3	U	4.1	U	4.1	U	4.2	U
gamma-BHC (Lindane)	1.9	U	2.2	U	2.2	U	2.1	U	2	U	2.1	U
gamma-chlordane	1.9	U	22	U	22	U	2.1	U	2	U	2.1	U
heptachlor	1.9	U	2.2	U	2.2	U	2.1	U	2	U	2.1	U
heptachlor epoxide	1.9	U	2.2	U	2.2	U	2.1	U	2	U	2.1	U
methoxychlor	19	U	22	U	22	U	93		20	U	21	U
toxaphene	190	U	220	U	220	U	210	U	200	U	210	U
PESTICIDES	**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**	
Aroclor-1016	38	U	43	U	43	U	41	U	41	U	42	U
Aroclor-1221	77	U	87	U	87	U	82	U	81	U	84	U
Aroclor-1232	38	U	43	U	43	U	41	U	41	U	42	U
Aroclor-1242	38	U	43	U	43	U	41	U	41	U	42	U
Aroclor-1248	38	U	43	U	43	U	41	U	41	U	42	U
Aroclor-1254	38	U	43	U	43	U	41	U	41	U	42	U
Aroclor-1260	36	U	43	U	43	U	41	U	41	U	42	U
MISCELLANEOUS	**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**	
petroleum hydrocarbons	4.7	J	5.1	U	4.3	J	4.8	U	3.6	J	5.1	U

TABLE C-1
TEST PIT SOIL ANALYTICAL RESULTS
1994 SITE INVESTIGATION
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE

Footnotes to sample results:

NA	Not Sampled
J	Value is estimated because concentration is below the quantitation limit or because of exceedances of data validation quality control criteria.
JP	Value is estimated because concentration is below the quantitation limit or because of exceedances of data validation quality control criteria.
B	Analyte also detected in a the blank sample.
U	Compound or element was not detected. Value is the detection limit (inorganics) or quantitation limit (organics).
bgs	Below Ground Surface

Sample Data Source:
Weston (Roy F. Weston, Inc.), 1994. Installation Restoration Program Site Investigation for 16 Sites at NWS Earle, Colts Neck, NJ. West Chester, PA. January.

APPENDIX D

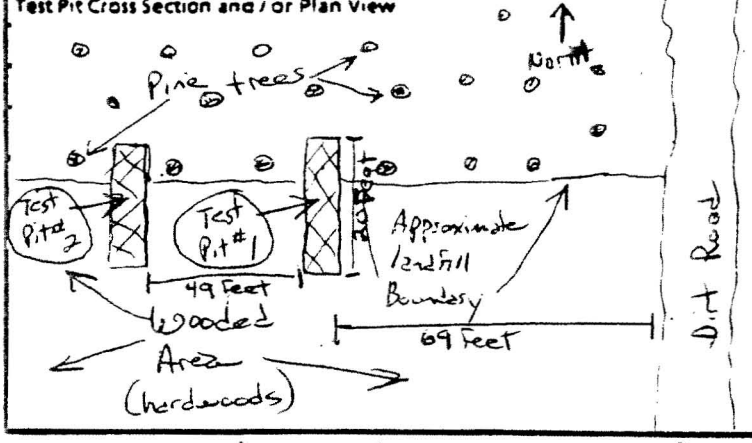
1996 RI TEST PIT LOGS

TEST PIT LOG — **Brown & Root Environmental**

PROJECT: NWS Earle CTO-147 TEST PIT NO.: TP01
PROJECT NO.: 5803 DATE: 12-05-95
LOCATION: Landfill southeast of "P" barracks (Site #9)
FIELD GEOLOGIST: Vincent Shickora

DEPTH (ft.)	LITHOLOGY CHANGE (Depth, ft.)	MATERIAL DESCRIPTION (Soil Density / Consistency, Color)	USCS	REMARKS
0.0		Olive Brown silt and clay with small		0 ppm HNU
		amount of weathered sandstone/siltstone		clean fill or native soil
		fragments. (dry to damp)		No waste or debris seen
1.5				
		Orange Brown Sandy silt and clay		0 ppm
		with small amount of weathered		Clean fill or Native soil
		sandstone fragments (moist)		No wastes or debris seen
4.8				
		orange-brown very fine silty clay		0 ppm
		with large amount of highly weathered		clean fill or native soil
		sandstone/siltstone fragments		No wastes
7.0		(dry to damp)		
		Greenish gray - Black highly weathered		0 ppm
		Sandstone (possible saprolite)		clean fill or native soil
8.5				No wastes

Test Pit Cross Section and / or Plan View



See above for cross section description

REMARKS Test Pit excavated approximately 7 feet into Pine tree at the Pine tree/ wooded Area boundary and extended into wooded area roughly 12 Feet
Total Test Pit length → 20 feet Total Test Pit width → 3 feet
Total depth excavated → 8.5 feet

PHOTO LOG
No photos collected

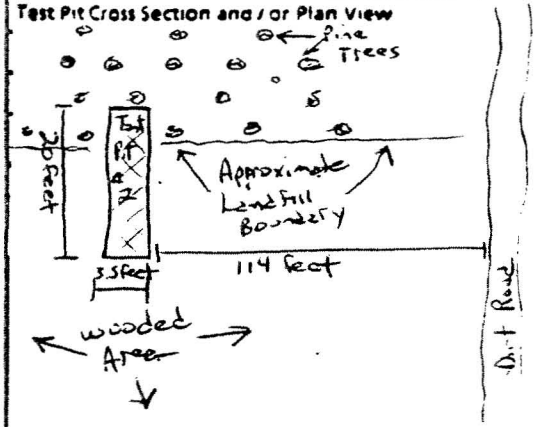
TEST PIT TP01

TEST PIT LOG — **Brown & Root Environmental**

PROJECT: NWS Earle CTO-147 TEST PIT NO.: TP02
PROJECT NO.: 5803 DATE: 12-05-95
LOCATION: Landfill southeast of "P" barracks (site #9)
FIELD GEOLOGIST: Vincent Shickora

DEPTH (ft.)	LITHOLOGY CHANGE (Depth ft.)	MATERIAL DESCRIPTION (Soil Density / Consistency, Color)	USCS	REMARKS
0.0		Olive-Brown silt and clay with		0 ppm HNU
		small amount of weathered sandstone		No waste material or
2.2		fragments (damp to moist)		landfill debris seen
		Orange brown sandy silt and clay		0 ppm
		with small amount of highly		clean fill or native soil
		weathered sandstone fragments (moist)		No wastes seen.
5.0				
		orange-rust-brown very fine silty clay		0 ppm
		with large amount of highly weathered		clean fill or native soil
7.5		sandstone/siltstone frags (moist)		No wastes seen.
		(possible saprolite)		
		Greenish Gray highly weathered sandstone		0 ppm - Native Soil
8.5		(dry to damp)		No waste seen

Test Pit Cross Section and / or Plan View



See above for cross section description

REMARKS Test pit was placed approximately 8 feet into the pine trees at the pine tree/wooded area boundary and extended into wooded area roughly 12 feet. Total Test Pit length → 20 feet Test Pit width → 3.5 feet. Total depth → 8.5 feet

PHOTO LOG
No photos collected

TEST PIT TP02

APPENDIX E

1996 RI SURFACE WATER AND SEDIMENT ANALYTICAL RESULTS

TABLE E-1
SURFACE WATER ANALYTICAL RESULTS
1996 REMEDIAL INVESTIGATION
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE

Parameter	SAMPLE LOCATION									
	WS SW 17		WS SW 17 DUP		WS SW 18		WS SW 19		WS SW 20	
INORGANICS	µg/L		µg/L		µg/L		µg/L		µg/L	
aluminum	1,480	J	4,570	J	7,880	J	820	J	16600	J
antimony	2.8		4.4		2.5	U	2.5	U	2.5	U
arsenic	9.5		18.8	J	18.9		6.6		25.4	
barium	39.0		79.9		89.0		41.1		133	
beryllium	0.40		0.79		0.84		0.19		2.2	
cadmium	0.17	U	0.17	U	0.34		0.17	U	0.17	U
calcium	5,970		6,490		4,640		9,930		9,640	
chromium, total	3.4		10.1		14.0		2.1		37.5	
cobalt	2.5		4.0		4.2		1.6		17.8	
copper	18.7		25.4	J	28.7	J	14.4		31.7	J
cyanide	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
iron	14,200	J	36,100	J	11,000		17,200		56,400	
lead	14.2	J	33.9	J	50.4		5.5		49.0	
magnesium	2,770		3,500		3,020		2,750		6,720	
manganese	106		150		68.3		185		1,050	
mercury	0.051		0.10		0.14		0.038		0.14	
nickel	9.3		16.3		13.5		6.6		29.7	
potassium	3,040		4,350		1,710		3,630		6,470	
selenium	2.5	UJ	5.3	J	3.2	J	4.9	J	3.3	J
silver	0.63	U	0.63	U	0.74		0.63	U	0.63	U
sodium	11,900	R	13,100	R	10,500	R	11,900	R	15,100	R
thallium	4.1		3.0	U	3.0	U	3.0	U	4.3	
vanadium	7.2		20.2		35.4		3.5		45.2	
zinc	33.2	J	64.3	J	70.4	J	25.2	J	127.0	J
SEMIVOLATILES	µg/L		µg/L		µg/L		µg/L		µg/L	
1,2,4-trichlorobenzene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
1,2-dichlorobenzene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
1,3-dichlorobenzene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
1,4-dichlorobenzene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
2,2'-oxybis(1-chloropropane)	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
2,4,5-trichlorophenol	25.0	U	25.0	U	25.0	U	25.0	U	25.0	U
2,4,6-trichlorophenol	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
2,4-dichlorophenol	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
2,4-dimethylphenol	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
2,4-dinitrophenol	25.0	UJ	25.0	UJ	25.0	U	25.0	UJ	25.0	U
2,4-dinitrotoluene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
2,6-dinitrotoluene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U

TABLE E-1
SURFACE WATER ANALYTICAL RESULTS
1996 REMEDIAL INVESTIGATION
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE

Parameter	SAMPLE LOCATION									
	WS SW 17		WS SW 17 DUP		WS SW 18		WS SW 19		WS SW 20	
2-chloronaphthalene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
2-chlorophenol	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
2-methylnaphthalene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
2-methylphenol	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
2-nitroaniline	25.0	U	25.0	U	25.0	U	25.0	U	25.0	U
2-nitrophenol	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
3,3'-dichlorobenzidine	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
3-nitroaniline	25.0	U	25.0	U	25.0	U	25.0	U	25.0	U
4,6-dinitro-2-methylphenol	25.0	U	25.0	U	25.0	U	25.0	U	25.0	U
4-bromophenyl-phenylether	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
4-chloro-3-methylphenol	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
4-chloroaniline	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
4-chlorophenyl-phenylether	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
4-methylphenol	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
4-nitroaniline	25.0	U	25.0	U	25.0	U	25.0	U	25.0	U
4-nitrophenol	25.0	UJ	25.0	UJ	25.0	U	25.0	UJ	25.0	U
N-nitroso-di-n-propylamine	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
N-nitrosodiphenylamine	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
acenaphthene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
acenaphthylene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
anthracene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
benzo(a)anthracene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
benzo(a)pyrene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
benzo(b)fluoranthene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
benzo(g,h,i)perylene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
benzo(k)fluoranthene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
bis(2-chloroethoxy)methane	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
bis(2-chloroethyl)ether	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
bis(2-ethylhexyl)phthalate	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
butylbenzylphthalate	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
carbazole	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
chrysene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
di-n-butylphthalate	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
di-n-octylphthalate	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
dibenz(a,h)anthracene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
dibenzofuran	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
fluoranthene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
fluorene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U

TABLE E-1
SURFACE WATER ANALYTICAL RESULTS
1996 REMEDIAL INVESTIGATION
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE

Parameter	SAMPLE LOCATION									
	WS SW 17		WS SW 17 DUP		WS SW 18		WS SW 19		WS SW 20	
hexachlorobenzene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
hexachlorobutadiene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
hexachlorocyclopentadiene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
hexachloroethane	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
indeno(1,2,3-cd)pyrene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
isophorone	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
naphthalene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
nitrobenzene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
pentachlorophenol	25.0	U	25.0	U	25.0	UJ	25.0	U	25.0	UJ
phenanthrene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
phenol	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
pyrene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
VOLATILES	**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**	
1,1,1-trichloroethane	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
1,1,2,2-tetrachloroethane	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
1,1,2-trichloroethane	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
1,1-dichloroethane	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
1,1-dichloroethene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
1,2-dichloroethane	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
1,2-dichloroethene (total)	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
1,2-dichloropropane	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
2-butanone	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
2-hexanone	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
4-methyl-2-pentanone	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
acetone	11.0	U	12.0	U	10.0	U	10.0	U	10.0	U
benzene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
bromodichloromethane	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
bromoform	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
bromomethane	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
carbon disulfide	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
carbon tetrachloride	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
chlorobenzene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
chloroethane	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
chloroform	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
chloromethane	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
cis-1,3-dichloropropene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
dibromochloromethane	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
ethylbenzene	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U

TABLE E-1
SURFACE WATER ANALYTICAL RESULTS
1996 REMEDIAL INVESTIGATION
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE

Parameter		SAMPLE LOCATION									
		WS SW 17		WS SW 17 DUP		WS SW 18		WS SW 19		WS SW 20	
methylene chloride		10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
styrene		10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
tetrachloroethene		10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
toluene		10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
trans-1,3-dichloropropene		10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
trichloroethene		10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
vinyl chloride		10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
xylene (total)		10.0	U	10.0	U	10.0	U	10.0	U	10.0	U
MISCELLANEOUS											
ammonia nitrogen	mg/L	0.30	J	0.40	J	0.70	J	1.0	U	0.3	J
biochemical oxygen demand	mg/L	4.0		4.0		5.0		1.8	J	3	
chemical oxygen demand	mg/L	56.0	J	150	J	390		32.0		70.0	
chloride	mg/L	13.0		13.0		11.0		12.0		17.0	
nitrate nitrogen	mg/L	0.50	U	0.26	J	0.32	J	0.38	J	0.43	J
total hardness	mg/L	18.0		17.0		19.0		6.0		27.0	
total organic carbon	mg/L	9.0		10.0		NA		NA		NA	
total phosphorus as PO4	mg/L	6.3	J	2.9	J	3.8		3.1		3.4	
turbidity	NTU	15.3		22.0		66.0		37.0		175.0	

Footnotes to sample results:

NA	Not Sampled
J	Value is estimated because concentration is below the quantitation limit or because of exceedances of data validation quality control criteria.
R	Positive result is considered rejected based on exceedance of data validation quality control criteria.
U	Compound or element was not detected. Value is the detection limit (inorganics) or quantitation limit (organics).
UJ	Not detected. Detection limit or quantitation limit shown is considered estimated due to exceedance of data validation quality control criteria.

Sample Data Source:
Brown & Root Environmental. 1996. Remedial Investigation Report for Naval Weapons Station Earle, Colts Neck, New Jersey. Wayne, Pennsylvania. July.

TABLE E-2
SEDIMENT ANALYTICAL RESULTS
1996 REMEDIAL INVESTIGATION
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE

Parameters	SAMPLE LOCATION									
	WS SD 17		WS SD 17 DUP		WS SD 18		WS SD 19		WS SD 20	
INORGANICS	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
aluminum	10,300	J	10,500	J	1,530		3,010		8,680	
arsenic	32.9	J	26.2	J	3.2		12.2		11.7	
barium	69.9	J	92.2	J	7.4		40.9		42.7	
beryllium	1.2	J	1.3	J	0.21	U	0.64		1.3	
cadmium	1.3	UJ	1.4	UJ	0.73	U	0.66	U	0.77	U
calcium	765	J	927	J	143		638		821	
chromium, total	47.5	J	41.2	J	4.4		7.9		25.8	
cobalt	4.2	J	5.1	J	1.4	U	1.5		7.2	
copper	20.7	J	21.5	J	2.4		1.5		7.6	
cyanide	0.62	UJ	0.71	UJ	0.36	UJ	0.33	UJ	0.37	UJ
iron	61,500	J	52,600	J	3,130		37,200		28,200	
lead	46.3	J	55.9	J	9.6	J	6.6	J	19.3	J
magnesium	1,780	J	1,470	J	182		504		1780	J
manganese	56.9	J	73.8	J	4.7		74.6	J	172	J
mercury	0.11	J	0.14	J	0.0094	U	0.0086	U	0.032	
nickel	8.3	J	10.9	J	2.3	U	2.9		12	
potassium	3,960	J	2,620	J	317		1,140		3,850	
selenium	5.4	J	5.6	J	0.73	U	1.8	J	1.4	J
silver	2.2	UJ	2.3	UJ	1.2	U	1.1	U	1.3	U
sodium	120	J	79.8	J	13.9		36.8		63.2	
thallium	3.4	J	1.9	J	0.87	U	0.79	U	0.92	U
vanadium	57.7	J	54.9	J	8.0		11.2		28.3	
zinc	58.0	J	73.1	J	6.0	J	38.7	J	49.5	J
SEMIVOLATILES	µg/kg		µg/kg		µg/kg		µg/kg		µg/kg	
1,2,4-trichlorobenzene	900	UJ	950	UJ	480	U	440	U	510	U
1,2-dichlorobenzene	900	UJ	950	UJ	480	U	440	U	510	U
1,3-dichlorobenzene	900	UJ	950	UJ	480	U	440	U	510	U
1,4-dichlorobenzene	900	UJ	950	UJ	480	U	440	U	510	U
2,2'-oxybis(1-chloropropane)	900	UJ	950	UJ	480	U	440	U	510	U
2,4,5-trichlorophenol	2,200	UJ	2,400	UJ	1,200	U	1,100	U	1,300	U
2,4,6-trichlorophenol	900	UJ	950	UJ	480	U	440	U	510	U
2,4-dichlorophenol	900	UJ	950	UJ	480	U	440	U	510	U
2,4-dimethylphenol	900	UJ	950	UJ	480	U	440	U	510	U
2,4-dinitrophenol	2,200	UJ	2,400	UJ	1,200	UJ	1,100	UJ	1,300	UJ
2,4-dinitrotoluene	900	UJ	950	UJ	480	U	440	U	510	U
2,6-dinitrotoluene	900	UJ	950	UJ	480	U	440	U	510	U
2-chloronaphthalene	900	UJ	950	UJ	480	U	440	U	510	U
2-chlorophenol	900	UJ	950	UJ	480	U	440	U	510	U
2-methylnaphthalene	900	UJ	950	UJ	480	U	440	U	510	U
2-methylphenol	900	UJ	950	UJ	480	U	440	U	510	U

TABLE E-2
SEDIMENT ANALYTICAL RESULTS
1996 REMEDIAL INVESTIGATION
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE

Parameters	SAMPLE LOCATION									
	WS SD 17		WS SD 17 DUP		WS SD 18		WS SD 19		WS SD 20	
2-nitroaniline	2,200	UJ	2,400	UJ	1,200	U	1,100	U	1,300	U
2-nitrophenol	900	UJ	950	UJ	480	U	440	U	510	U
3,3'-dichlorobenzidine	900	UJ	950	UJ	480	U	440	U	510	U
3-nitroaniline	2,200	UJ	2,400	UJ	1,200	U	1,100	U	1,300	U
4,6-dinitro-2-methylphenol	2,200	UJ	2,400	UJ	1,200	U	1,100	U	1,300	U
4-bromophenyl-phenylether	900	UJ	950	UJ	480	U	440	U	510	U
4-chloro-3-methylphenol	900	UJ	950	UJ	480	U	440	U	510	U
4-chloroaniline	900	UJ	950	UJ	480	U	440	U	510	U
4-chlorophenyl-phenylether	900	UJ	950	UJ	480	U	440	U	510	U
4-methylphenol	900	UJ	950	UJ	480	U	440	U	510	U
4-nitroaniline	2,200	UJ	2,400	UJ	1,200	U	1,100	U	1,300	U
4-nitrophenol	2,200	UJ	2,400	UJ	1,200	UJ	1,100	UJ	1,300	UJ
N-nitroso-di-n-propylamine	900	UJ	950	UJ	480	U	440	U	510	U
N-nitrosodiphenylamine	900	UJ	950	UJ	480	U	440	U	510	U
acenaphthene	900	UJ	950	UJ	480	U	440	U	510	U
acenaphthylene	900	UJ	950	UJ	480	U	440	U	510	U
anthracene	900	UJ	950	UJ	480	U	440	U	510	U
benzo(a)anthracene	900	UJ	950	UJ	480	U	440	U	510	U
benzo(a)pyrene	900	UJ	950	UJ	480	U	440	U	510	U
benzo(b)fluoranthene	900	UJ	950	UJ	480	U	440	U	510	U
benzo(g,h,i)perylene	900	UJ	950	UJ	480	U	440	U	510	U
benzo(k)fluoranthene	900	UJ	950	UJ	480	U	440	U	510	U
bis(2-chloroethoxy)methane	900	UJ	950	UJ	480	U	440	U	510	U
bis(2-chloroethyl)ether	900	UJ	950	UJ	480	U	440	U	510	U
bis(2-ethylhexyl)phthalate	900	U	950	U	480	U	440	U	510	U
butylbenzyl phthalate	900	UJ	97.0	J	480	U	440	U	510	U
carbazole	900	UJ	950	UJ	480	U	440	U	510	U
chrysene	900	UJ	950	UJ	480	U	440	U	510	U
di-n-butylphthalate	900	UJ	950	UJ	480	U	66.0	J	1300	
di-n-octylphthalate	900	UJ	950	UJ	480	U	440	U	510	U
dibenz(a,h)anthracene	900	UJ	950	UJ	480	U	440	U	510.0	U
dibenzofuran	900	UJ	950	UJ	480	U	440	U	510	U
diethylphthalate	900	UJ	110	J	480	U	45.0	J	52	J
dimethylphthalate	900	UJ	950	UJ	480	U	440	U	510	U
fluoranthene	130	J	130	J	480	U	440	U	510.0	U
fluorene	900	UJ	950	UJ	480	U	440	U	510	U
hexachlorobenzene	900	UJ	950	UJ	480	U	440	U	510	U
hexachlorobutadiene	900	UJ	950	UJ	480	U	440	U	510	U
hexachlorocyclopentadiene	900	UJ	950	UJ	480	U	440	U	510	U
hexachloroethane	900	UJ	950	UJ	480	U	440	U	55	J
indeno(1,2,3-cd)pyrene	900	UJ	950	UJ	480	U	440	U	510	U

TABLE E-2
SEDIMENT ANALYTICAL RESULTS
1996 REMEDIAL INVESTIGATION
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE

	SAMPLE LOCATION									
Parameters	**WS SD 17**		**WS SD 17 DUP**		**WS SD 18**		**WS SD 19**		**WS SD 20**	
isophorone	900	UJ	950	UJ	480	U	440	U	510	U
naphthalene	900	UJ	950	UJ	480	U	440	U	510	U
nitrobenzene	900	UJ	950	UJ	480	U	440	U	510	U
pentachlorophenol	2,200	UJ	2,400	UJ	1,200	U	1,100	U	1,300	U
phananthrene	900	UJ	950	UJ	480	U	440	U	510	U
phenol	900	UJ	950	UJ	480	U	440	U	120	J
pyrene	900	UJ	110	J	480	UJ	440	UJ	510	UJ
VOLATILES	**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**	
1,1,1-trichloroethane	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U
1,1,2,2-tetrachloroethane	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U
1,1,2-trichloroethane	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U
1,1-dichloroethane	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U
1,1-dichloroethene	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U
1,2-dichloroethane	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U
1,2-dichloroethene (total)	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U
1,2-dichloropropane	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U
2-butanone	45.0	UJ	51.0	UJ	14.0	U	13.0	U	15.0	U
2-hexanone	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U
4-methyl-2-pentanone	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U
acetone	100	UJ	130	UJ	14.0	UJ	13.0	UJ	24.0	U
benzene	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U
bromodichloromethane	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U
bromoform	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U
bromomethane	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U
carbon disulfide	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U
carbon tetrachloride	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U
chlorobenzene	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U
chloroethane	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U
chloroform	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U
chloromethane	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U
cis-1,3-dichloropropene	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U
dibromochloromethane	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U
ethylbenzene	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U
methylene chloride	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U
styrene	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U
tetrachloroethene	27.0	UJ	24.0	J	14.0	UJ	13.0	UJ	46.0	
toluene	27.0	UJ	28.0	UJ	2.0	J	13.0	U	15.0	U
trans-1,3-dichloropropene	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U
trichloroethene	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U
vinyl chloride	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U
xylene (total)	27.0	UJ	28.0	UJ	14.0	UJ	13.0	UJ	15.0	U

TABLE E-2
SEDIMENT ANALYTICAL RESULTS
1996 REMEDIAL INVESTIGATION
SITE 9 - LANDFILL SOUTHEAST OF "P" BARRICADES
NAVAL WEAPONS STATION EARLE

Parameters		SAMPLE LOCATION									
		WS SD 17		WS SD 17 DUP		WS SD 18		WS SD 19		WS SD 20	
MISCELLANEOUS											
ammonia nitrogen	mg/kg	300	J	400	J	100	U	100	U	100	J
biochemical oxygen demand	mg/kg	NA		NA		NA		NA		NA	
chemical oxygen demand	mg/kg	NA		NA		NA		NA		NA	
chloride	mg/kg	22.0	J	25.0	J	24.0	J	4.0	J	9.0	J
nitrate nitrogen	mg/kg	1.2	J	1.5	J	0.9	J	1.2	J	0.8	J
total hardness	mg/kg	NA		NA		NA		NA		NA	
total organic carbon	mg/kg	27,000	J	47,000	J	NA		NA		NA	
total phosphorus as PO4	mg/kg	13,000	J	13,000	J	1,800		6,900		5,500	
turbidity	NTU	NA		NA		NA		NA		NA	
moisture	%	62.8		64.9		31.3		24.3		NA	

Footnotes to sample results:

NA	Not Sampled
J	Value is estimated because concentration is below the quantitation limit or because of exceedances of data validation quality control criteria.
R	Positive result is considered rejected based on exceedance of data validation quality control criteria.
U	Compound or element was not detected. Value is the detection limit (inorganics) or quantitation limit (organics).
UJ	Not detected. Detection limit or quantitation limit shown is considered estimated due to exceedance of data validation quality control criteria.

Sample Data Source:
Brown & Root Environmental. 1996. Remedial Investigation Report for Naval Weapons Station Earle, Colts Neck, New Jersey. Wayne, Pennsylvania. July.

APPENDIX F

1996 RI STATISTICAL EVALUATION BACKGROUND SURFACE AND SUBSURFACE SOILS

Table 31-7

Statistical Evaluation of Background Surface Soil Metals Data
CTO 231, NWS Earle, Colts Neck, New Jersey

Metal	Background Distribution Type Used	No. of Detects	No. of Results	Mean or Geometric Mean mg/kg	Standard Deviation or Log Standard Deviation	Student's t-Distribution Coefficient	95 % Upper Tolerance Limit - mg/kg	
Aluminum	Normal	4	4	3080	1680	2.353	7510	
Antimony	- - -	0	4	- - -	- - -	- - -	- - -	
Arsenic	Normal	4	4	6.71	6.17	2.353	23	
Barium	Normal	4	4	11.3	13.6	2.353	47.1	
Beryllium	Lognormal	1	4	0.112	1.48	2.353	5.55	*
Cadmium	Normal	1	4	0.333	0.159	2.353	0.751	
Calcium	Lognormal	4	4	144	1.47	2.353	6810	*
Chromium	Normal	4	4	34.5	27.7	2.353	107	
Cobalt	Normal	2	4	1.58	2.29	2.353	7.61	
Copper	Normal	4	4	5.03	3.83	2.353	15.1	
Iron	Normal	4	4	26200	26500	2.353	95800	
Lead	Lognormal	4	4	11.4	1.35	2.353	397	*
Magnesium	Normal	4	4	289	233	2.353	901	
Manganese	Normal	4	4	64.2	101	2.353	329	
Mercury	Lognormal	4	4	0.0724	0.798	2.353	0.591	
Nickel	Normal	2	4	2.59	3.12	2.353	10.8	
Potassium	Lognormal	4	4	358	0.922	2.353	4050	
Selenium	Normal	2	4	0.516	0.308	2.353	1.33	
Silver	Normal	2	4	0.345	0.237	2.353	0.967	
Sodium	Normal	4	4	39.2	32	2.353	123	
Thallium	Normal	2	4	0.82	0.74	2.353	2.77	
Vanadium	Lognormal	4	4	29.4	0.731	2.353	201	
Zinc	Lognormal	3	4	4.69	1.74	2.353	461	*

Notes:

(1) Background statistics are calculated assuming the EPA default lognormal distribution, except where this assumption is statistically improbable in cases where a normal distribution assumption is not improbable (based on the W-test using a P level of 0.05).

(2) The tolerance limit defines the concentration range that, on the average, is estimated to contain 95 % of all data points from the background population.

(3) If a site-related sample exceeds the tolerance limit, statistical evidence suggests the sample comes from a population with a different distribution and higher concentrations than the background data.

(*) The EPA Region II test (2X background arithmetic mean) is presented for this metal because the tolerance limit is impractical (large uncertainties are caused by too few sampling points along with a moderate to high lognormal standard deviation).

Table 31-8

Statistical Evaluation of Background Subsurface Soil Metals Data
CTO 231, NWS Earle, Colts Neck, New Jersey

Metal	Background Distribution Type Used	No. of Detects	No. of Results	Mean or Geometric Mean mg/kg	Standard Deviation or Log Standard Deviation	Student's t-Distribution Coefficient	95 % Upper Tolerance Limit - mg/kg
Aluminum	Normal	8	8	2690	1580	1.895	5870
Arsenic	Normal	8	8	6.64	5.21	1.895	17.1
Barium	Normal	8	8	8.96	10.2	1.895	29.5
Beryllium	Lognormal	2	8	0.0738	1.4	1.895	1.22
Cadmium	Normal	1	8	0.288	0.115	1.895	0.52
Calcium	Normal	8	8	289	286	1.895	864
Chromium	Normal	8	8	27.4	22.9	1.895	73.4
Cobalt	Normal	4	8	1.38	1.66	1.895	4.73
Copper	Normal	8	8	4.33	3.42	1.895	11.2
Iron	Normal	8	8	20400	19400	1.895	59500
Lead	Normal	8	8	12.2	13.6	1.895	39.5
Magnesium	Lognormal	8	8	172	1.11	1.895	1600
Manganese	Normal	8	8	46.3	71.1	1.895	189
Mercury	Normal	8	8	0.0648	0.0523	1.895	0.17
Nickel	Normal	4	8	2.38	2.45	1.895	7.3
Potassium	Lognormal	7	8	276	1.15	1.895	2780
Selenium	Normal	2	8	0.397	0.239	1.895	0.877
Silver	Normal	2	8	0.256	0.182	1.895	0.622
Sodium	Normal	8	8	39.7	31.7	1.895	103
Thallium	Normal	4	8	0.688	0.529	1.895	1.75
Vanadium	Lognormal	8	8	27.7	0.622	1.895	96.7
Zinc	Normal	6	8	15.7	17.2	1.895	50.2

Notes:

(1) Background statistics are calculated assuming the EPA default lognormal distribution, except where this assumption is statistically improbable in cases where a normal distribution assumption is not improbable (based on the W-test using a P level of 0.05).

(2) The tolerance limit defines the concentration range that, on the average, is estimated to contain 95 % of all data points from the background population.

(3) If a site-related sample exceeds the tolerance limit, statistical evidence suggests the sample comes from a population with a different distribution and higher concentrations than the background data.