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Preliminary Assessment/Site Investigation Report for Sites 47 and 48 Naval Weapons Station Earle Colts Neck, New Jersey

Contract No. N62472-92-D-1296
Contract Task Order No. 0100

Prepared for

Department of the Navy
Engineering Field Activity North East
10 Industrial Highway
Mail Stop No. 82
Lester, Pennsylvania 19113-2090

Prepared by

EA Engineering, Science, and Technology, Inc.
485 Route One South
Building C, Suite 260
Iselin, New Jersey 08830
(732) 404-9370

January 2004
FINAL
Project No. 296.0100

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January 27, 2004

Christopher J. Keflish
CTO Manager

Date

January 27, 2004

Kenneth Kilmer
Program Manager

Date

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LIST OF ACRONYMS

CFR	Code of Federal Regulations
EFANE	Engineering Field Activity North East
EPA	(U.S.) Environmental Protection Agency
N.J.A.C.	New Jersey Administrative Code
NJDEP	New Jersey Department of Environmental Protection
NWS	Naval Weapons Station
PA/SI	Preliminary Assessment/Site Investigation
RCRA	Resource Conservation and Recovery Act
TCLP	Toxicity Characteristic Leachate Procedure
UXO	Unexploded ordnance

1. INTRODUCTION

1.1 SCOPE AND OBJECTIVES

Under Contract No. N62472-92-D-1296, Contract Task Order No. 0100, EA Engineering, Science, and Technology, Inc. was tasked by the U.S. Navy Engineering Field Activity North East (EFANE) to perform a Preliminary Assessment/Site Inspection (PA/SI) for Sites 47 and 48, at Naval Weapons Station (NWS) Earle in Colts Neck, New Jersey. The location of NWS Earle is depicted in Figure 1. The objectives of these activities are as follows:

- To complete an assessment of the significance of slight exceedances of pesticide standards in ground water beneath Site 47, the former Pesticide Shop. These exceedances were observed prior to completion of a removal action in this area. The purpose of confirmatory sampling was to assess whether the exceedances have been mitigated by completion of the removal action. A preliminary assessment was not required or performed for site 47.

- To complete an initial assessment of the horizontal and vertical extent of batteries at Site 48 and to assess the presence or absence of impacts to soil media (soil, ground water, surface water, and sediment) from past mine actuator disposal activities

1.2 FIELD INVESTIGATION ACTIVITIES

1.2.1 Site 47 – Former Pesticide Shop

Site 47 is the designation for a former pesticide shop located in the administrative area of NWS Earle (Figure 2). A recently completed removal action included demolition of the shop and excavation of impacted soils (Foster Wheeler 2000a). The primary objective of the confirmatory sampling at Site 47 was to assess the concentrations of Endosulfan I in site ground-water following the remedial action, and compare with New Jersey Class IIA Ground-Water Quality Standards to assess the need for further remedial action. To satisfy this objective, project activities at Site 47 consisted of collection of ground-water grab samples via direst push sampling technology at up to 6 locations, including those at which historical exceedances of ground-water quality standards were observed.

1.2.2 Site 48 – Mine Battery Disposal Area

The Site 48 Mine Battery Disposal Area (Figure 3), located along the northern fence line of NWS Earle has not been investigated in the past. Therefore, certain information is needed to assess whether a formal Remedial Investigation is required. The primary objectives of the PA/SI in the Site 48 Mine Battery Disposal Area were:

- To complete an initial assessment of the horizontal and vertical extent of batteries at the site

- To assess the presence or absence of impacts to site media (soil, ground water, surface water, and sediment) from past actuator disposal activities.

To satisfy these objectives, project activities at Site 48 included the following:

- Review of available historical information for the site

- Performance of an unexploded ordnance (UXO) survey in the terrestrial portions of Site 48 to identify potential UXO prior to sampling activities

- Collection of ground-water samples using direct-push technology and U.S. Environmental Protection Agency (EPA) Low-Flow (minimal drawdown) procedure to assess the potential for impacts related to historical disposal activities.

- Excavation of test pits to attempt to identify areas of significant battery disposal, to assess potential soil impacts resulting from disposal, and to assess the horizontal and vertical extents of actuator disposal at the site

- Collection of surface water and sediment samples from West Pond and the adjacent Mine Brook to assess the potential for impacts to surface waters in Site 48 related to historic disposal activities.

- Collection of background soil, sediment, and surface water samples to supplement previous background investigations and to further assess whether concentrations of target analytes detected in the various media above applicable cleanup criteria are due to natural or background conditions.

1.3 REPORT ORGANIZATION

The organization of the remaining sections of this report is summarized below:

- Section 2 presents a description of the site background, including site location, site history, discussions of individual areas of investigation, and descriptions of geology and hydrogeology as observed during field activities.

- Section 3 presents a discussion of methods and procedures employed for field investigations.

- Section 4 summarizes the results of the site investigations for each area investigated.

- Section 5 presents conclusions and recommendations for further investigation, based on the results of the PA/SI activities.

A list of references used in conducting the PA/SI and preparing this report follows Section 5. Presented as appendixes to this report are analytical data packages (Appendix A), associated data validation reports (Appendix B), a photographic log of site investigation activities (Appendix C), a background summary (Appendix D), and risk assessment screening and background statistical analyses (Appendix E).

2. SITE BACKGROUND

2.1 SITE LOCATION

NWS Earle, located in Monmouth County, New Jersey, is tasked with the primary responsibility of supply of ordnance to the Naval fleet. NWS Earle consists of an inland 10,248-acre Main Base connected to a 706-acre Waterfront Area by a Navy-controlled right-of-way (Normandy Road) containing a private road and rail line (Figure 1). Due to the large size of NWS Earle, surrounding properties include a wide variety of residential, commercial, and other uses.

NWS Earle was named to the EPA National Priority List on 30 August 1990. A comprehensive Remedial Investigation was completed in July 1996 and a Remedial Investigation Addendum was completed in January 1998 by Brown & Root Environmental. Several removal actions have been completed and four Records of Decision have been signed addressing a total of 12 sites.

2.2 INDIVIDUAL SITE HISTORIES

As noted above, two sites are included in the scope of this PA/SI. The former Pesticide Shop and the Mine Battery Disposal Site were identified after completion of the Remedial Investigation. These areas are discussed individually below.

2.2.1 Site 47 – Former Pesticide Shop

The former pesticide shop for the base was located in the administrative area of NWS Earle (Figure 2). The pesticide shop consisted of a 12 × 28 ft concrete block building used as a storage and mixing facility during the 1980s. A 10 × 14 ft concrete pad outside the building was used for rinsing of spray equipment and cleaning of empty containers. Rinsate may have been discharged or sprayed to the ground outside the building during these operations. Remaining pesticides and herbicides were removed from the building in 1991, when NWS Earle discontinued internal pesticide use in favor of outsourced pest management services.

Soil samples were taken near the concrete pad in 1998 when a residual pesticide odor was detected during wet weather. Elevated concentrations of chlordane, dichlorodiphenyl-trichloroethane, and breakdown products were found in surface soil; as a result, a soil removal action was initiated. In March 1999, Foster Wheeler Environmental Corporation prepared a report that delineated areas suitable for removal action. The removal action was subsequently performed during 2000 and included demolition of the shop and an associated septic system, and excavation of impacted soils, as described in the Removal Action Report (Foster Wheeler 2000b). In addition to identifying impacted areas for removal, the initial study included a limited ground-water investigation. The study concluded additional investigation was warranted in two areas where pesticide impact to ground water was detected. The Removal Action Report verified that soil cleanup to New Jersey's residential criteria for direct contact to soils was achieved by the removal. However, several ground-water grab samples were reported to contain

Endosulfan I at concentrations slightly above the New Jersey's Ground-Water Quality Standard for that compound.

2.2.2 Site 48 – Mine Battery Disposal Site

Site 48 is located along the northern fenceline of the base, as depicted in Figure 3, and consists of a cleared area within a wooded area that contains a pond (West Pond). Historic aerial photos indicate that the area was the location of a farm prior to acquisition by the Navy during the 1950s. The area has since filled in with woodland growth in many areas, with only the low-lying wetland areas remaining open. Evidence of historic dumping of household waste, likely related to the former farm, was observed at the east end of the pond.

In 1998, a NWS Earle employee hunting on NWS Earle property to the west of Highway 34 observed numerous small cylindrical objects on the ground surface. These objects were originally thought to be inert batteries from an obsolete type of mine, but were subsequently identified in the field as actuator assemblies, also inert, containing small battery cells. Historical aerial photos and the recollection of a long-term NWS Earle equipment operator indicate that the area of the disposal site is approximately 3-4 acres.

An initial interview indicated a significant number of actuators were dumped in the area adjacent to West Pond. However, an interview with a NWS Earle environmental engineer during the Site Investigation field activities further defined the source and disposition of the actuators. The engineer indicated that a mine disassembly building was historically operated at NWS Earle to disassemble obsolete mines and associated equipment. As part of the disassembly process, the battery and actuator/timing housing was separated from each mine. The actuators consisted of electronic components and batteries, a central electronics core with stacks of small batteries. Several hundred of the actuator/timing housings were reportedly discarded in West Pond between layers of sawdust.

During the 1980s, this procedure was re-evaluated and it was subsequently determined that these parts should not remain in the pond. An attempt was made to dredge the pond, using a mechanical arm dredge to remove sediment and batteries from the southern bank. The arm of the dredge was able to reach approximately one-third of the distance across the pond, thus neither the center of the pond nor the northern portion was dredged. The dredge spoils from this activity were spread in the cleared area to the south of and southwest of the pond, and visible actuators were reportedly collected and removed from the area. During the field investigation completed for the PA/SI, actuators were observed to the west and south of the pond, and along the bottom of the undredged areas of the pond.

No further information regarding Site 48 was available from NWS Earle sources.

2.3 GEOLOGY AND HYDROGEOLOGY

NWS Earle is located in the Coastal Plain Physiographic Province of Monmouth County, New Jersey. The formations in Monmouth County are unconsolidated marine deposits

composed primarily of stratified sand, silt, clay, and some gravel (McCormack, et al., 1955). The formations are Quaternary, Tertiary, or Cretaceous in age. The formations at Sites 47 and 48 are primarily Tertiary and Cretaceous in age. The formations in the areas of Sites 47 and 48 include (beginning with the most recent), the Cohansey Sand, Kirkwood Sand, Shark River Marl, Manasquan Marl, Vincetown Sand, Hornerstown Marl, Red Bank and Tinton Sands, Mount Laurel and Wenonah Sands, Marshalltown, Englishtown Sand, Woodbury Clay, Merchantville Clay, and the Magothy and Raritan Formations (McCormack, et al., 1955). The depth to bedrock throughout Monmouth County is generally greater than 100 ft.

Subsurface soils were not investigated as part of the scope of the PA/SI; therefore, limited information regarding the local geology is available. Discrete ground-water grab samples were collected using direct-push samplers at Sites 47 and 48, and shallow soil samples were collected from test pits at Site 48. The geology underlying NWS Earle in the area of Site 47 is predominantly layered silty sands, sands, and lesser amounts of clay. Small amounts (less than 10 percent) of gravel may be mixed in the surface soil, but typically is not present at depth. Soil colors can be widely variable due to the number of geological formations. The geology in the area of Site 48 is predominantly stratified silty to clayey sand and sandy to silty clays. The primary formation at Site 48 is the Hornerstown Marl, which is sometimes referred to as "greensands" due to the high glauconite content (McCormack, et al., 1955). Glauconite is a hydrous potassium iron silicate mineral, typically green in color. Glauconite is commonly found in marine sedimentary deposits and usually occurs as rounded silt and sand grains (McCormack, et al., 1955).

Naturally occurring concentrations of metals, including lead and arsenic, are found throughout New Jersey (New Jersey Department of Environmental Protection [NJDEP] 2001). Based upon a NJDEP survey of background metals concentrations in soils, naturally occurring arsenic concentrations ranged from 0.02 to 22.7 mg/kg and naturally occurring lead concentrations ranged from approximately 1.2 to 150 mg/kg (Fields, et al., 1993). Soil samples containing a higher concentration of clay generally correlated to higher metal concentrations, with arsenic detected up to 40 mg/kg (Fields, et al., 1993 and Barringer, et al., 1998). Soils containing glauconite have been reported to commonly contain arsenic concentrations between 20 and 40 mg/kg and range up to 260 mg/kg (Schick, Personal comm., 1998).

The surficial geology encountered during the test pit investigations at Site 48 was predominantly silty clays and silty sands with some organic material. Dredged material from the West Pond occupies the majority of the surface and shallow subsurface soils immediately south of the pond. Numerous fragments of cemented slag were observed in the dredged material on the south bank of West Pond. The slag material generally consisted of reddish-brown to black very fine sand and silt with numerous air pockets averaging ⅛-in. in diameter. Numerous light-and-dark reddish-brown concentric circles (averaging ⅛-¼-in. in diameter) were observed in the slag material. Construction fill material (i.e., concrete and metal rebar fragments) is widely dispersed in the shallow soils along the access road to Site 48.

Depth to water encountered at Site 47 during direct-push sampling ranged from approximately 17 ft to greater than 25 ft below grade, depending on local topography. Based on direct-push

sampling points and observations during the test pit investigations, depth to water in the area surrounding the West Pond at Site 48 ranged from 0 to greater than approximately 5 ft below grade. Inferred ground-water flow is in a westerly direction across the site. Shallow ground water in the areas of Site 47 and Site 48 is not reportedly used.

3. METHODS AND PROCEDURES

EA performed the activities discussed in this report in accordance with the methods and procedures presented in the Final PA/SI Work Plan dated May 2001 (EA 2001). These procedures are summarized below.

3.1 SAMPLE MANAGEMENT AND RECORDKEEPING PROCEDURES

3.1.1 Sample Designation System

Each sample collected during field activities was assigned a unique sample designation, consisting of no more than 12 characters. The first portion of the designation referred to the site designation specified in the Work Plan, followed by a hyphen (i.e., samples from Site 48 were represented by 48-). A two-letter code followed the site designator for the sample type:

- TP — Test pit (soil)
- DP — Direct-push (soil)
- WP — Well point (ground water)
- MW — Monitoring Well (ground water)
- SD — Sediment
- SW — Surface water.

The sample number is included next; each sample type at each site began with sample No. "1," with each successive sample numbered in ascending order. Samples with associated depth references include the depth interval after the sample number. For example, samples collected every 2 ft from the first test pit at Site 48 were designated 1-TP48-0-2, 1-TP48-2-4, 1-TP48-4-6, etc. For surface water and sediment samples, and direct-push well points, the sample depth was not applicable and was not indicated.

Quality assurance/quality control samples were also given unique sample designations. The sample type was the first portion of the designation, as follows:

- DUP — Duplicate sample
- FB — Field blank
- TB — Trip blank for shipment of samples for volatile organic compound analysis
- MS — Matrix spike
- MSD — Matrix spike duplicate.

The sample number followed the sample type. Sample numbers were assigned sequentially, starting with "1" for each quality assurance/quality control sample type (i.e., 1-TP48-DUP-1, 1-TP48-FB-1). Field personnel recorded the location of field samples corresponding to the quality assurance/quality control sample in the field logbook, but the location of field duplicates was not recorded on chains-of-custody or sample containers to ensure "blind" analysis.

3.1.2 Sample Packaging and Shipping

Shipment of samples was performed in accordance with U.S. Department of Transportation regulations described in 49 Code of Federal Regulations (CFR) 171 and 49 CFR 172, and NEIC procedures (EPA-330). Sample bottles were dropped off and samples were picked up at the site by representatives of the selected analytical laboratory, Chem-Tech Research of Edison, New Jersey. Samples were packaged, preserved, and cooled in accordance with EPA method protocols, and samples were maintained at or below 4°C as required during shipping and pre-analysis storage. Sample handling was performed as detailed in the PA/SI Work Plan (EA 2001).

Each sample was labeled as follows: client's name (U.S. Navy EFANE), EA project number (2960100), location (i.e., Site 47), site name (NWS Earle), sample designation (i.e., 1-TP48-2-4), date and time of collection, and name of sampler on a water-resistant label, which was then covered with clear plastic tape to prevent removal during shipping. Samples were placed in waterproof plastic coolers and secured with bubble packing. Additional bubble packing was inserted to partially cover sample bottles, and bags of ice were placed around, among, and on top of sample bottles to maintain a temperature of <4°C during shipping. The remaining volume of the cooler was then filled with bubble packing of similar packing material prior to transporting to the laboratory.

A chain-of-custody record was prepared for all samples, placed in a waterproof plastic bag, and taped with strapping tape to the inside of the cooler lid. The cooler drain was then taped shut and the lid secured with tape. Custody seals were then numbered, signed, applied to each cooler, and covered with clear plastic tape to prevent removal or damage.

3.1.3 Quality Assurance/Quality Control Samples

The use of standard sampling methods and validated, EPA-approved analytical methods ensures data comparability. Method analytical reporting limits were specified for each constituent in the PA/SI Work Plan (EA 2001). These reporting limits were established based on a review of potential chemical-specific guidance criteria for Sites 47 and 48.

The quality of data obtained in the field for chemical analysis was evaluated using quality assurance/quality control samples. Quality assurance/quality control, in accordance with EPA methods or approved equivalent protocols, is necessary to provide data of sufficient quality for human health and environmental risk assessments. One duplicate sample was collected at each site for each sample delivery group, defined as a maximum of 20 samples collected from each matrix. One equipment rinse blank was obtained at each site for each matrix sampled.

Data obtained for Sites 47 and 48 were validated in accordance with EPA Region 2 guidance under subcontract with Alpha Environmental Consultants, Inc., as discussed in the Quality Assurance Project Plan for the project (EA 2000). Data validation reports are presented in Appendix B.

3.2 FIELD SAMPLING PROCEDURES

Field sampling and analysis were performed in accordance with New Jersey's Technical Requirements for Site Remediation (New Jersey Administrative Code [N.J.A.C.] 7:26E), NJDEP Field Sampling Procedures Manual (NJDEP 1992) and NJDEP Alternative Ground-Water Sampling Techniques Guide (NJDEP 1994). Sampling and field methods for investigation activities for Sites 47 and 48 at NWS Earle are described below.

3.2.1 Soil Sampling

The data quality objectives and scope of work for the collection of soil samples are outlined in this section. Specifically, the relevant field-sampling equipment and procedures utilized during field investigations are described. Soil sampling was performed only at Site 48.

3.2.1.1 Sampling Objectives

The objectives for collection of surficial and subsurface soil samples were to:

- Assess the concentrations of inorganic constituents of concern in the soil and compare these concentrations to established regulatory criteria
- Provide data sufficient to support ecological and human health risk assessments, if required
- Support previous background investigations and to verify target analytes detected in soil are due to natural or background conditions.

3.2.1.2 Sample Locations

Surficial soil samples were collected from test pit locations prior to excavation. Subsurface soil samples were collected from the lowest point in a given test pit, generally 3 ft below ground surface. Test pit locations were to originally be selected using the magnetic survey conducted as part of the UXO clearance (see Section 3.2.5) to identify potential areas of buried actuators. However, since verification in the field confirmed that the actuators did not contain sufficient ferrous metal for detection via magnetometer and, as discussed in Section 2.2.2, actuators were reportedly not buried at the site, test pits were installed based on surface evidence of actuator deposition or soil disturbance, and at other locations selected to provide adequate coverage of the area adjacent to West Pond. A total of 19 test pits were excavated, and a total of 7 surface and 4 subsurface soil samples were collected. Samples were biased toward test pits and locations within test pits where visual evidence of actuator disposal was observed (Figure 4). In the test pits where actuators were observed, no visible staining of the soil or residue was present.

Additional background soil samples were collected from a location southwest of the West Pond, away from areas of possible impacted material. A total of 10 soil samples (5 surface soil and 5 subsurface soil) were collected from 5 separate locations.

3.2.1.3 Sampling Equipment and Procedures

Surface and subsurface soil sampling was originally to have been performed using methods that included direct-push apparatus, hand augers, and test pits. Based on the greater number of test pits installed than originally planned, the non-volatile nature of the target analytes, and the relative ease of sample collection, surface and subsurface samples were collected using dedicated stainless steel trowels and sample containers directly from test pit locations. As a result, direct-push methods were used only for ground-water sample collection as discussed in Section 3.2.2 and hand augers were used during collection of additional site-specific background samples. Hand augers used to collect the samples were cleaned and decontaminated prior to each sample collection in accordance with Section 6 of the Quality Assurance Project Plan (EA 2000). Samples were analyzed for arsenic and cadmium.

As noted above, dedicated stainless steel trowels were used to collect each sample to minimize the potential for cross-contamination. Following completion of site activities, sampling equipment was decontaminated in accordance with Section 6 of the Quality Assurance Project Plan (EA 2000).

3.2.2 Ground-Water Sampling

The direct-push method employed at NWS Earle used a passively placed narrow diameter well point. Water sampling was conducted in accordance with NJDEP's Alternative Ground-Water Sampling Techniques Guide (NJDEP 1994).

In an effort to obtain a less turbid sample from Site 48, a permanent monitoring well was installed near the location of WP-03-48 via hollow-stem auger drilling. This well was sampled using the EPA Low-Flow (minimal drawdown) procedures as outlined in the PA/SI Work Plan (EA 2001).

3.2.2.1 Sampling Objectives

The objectives for ground-water sampling were to:

- Assess the absence or presence and concentrations of chemicals of concern in ground water at Sites 47 and 48, and to compare these concentrations to established regulatory criteria
- Provide data suitable for supporting ecological and human health risk assessments, if required

- Provide data to support or refute the need for further investigation or remediation in these areas.

3.2.2.2 Sample Locations

Six locations were initially selected for direct-push sampling at Site 47. Three of these intended points were located at the north and east edges of the current parking lot for Building C-23, in the approximate location of the former Pesticide Shop. Three additional sampling points were identified at the base of a small wooded hill, approximately 50 ft from the former building area, where a concrete slab and a drainage trench were located, in approximately the same locations as the samples taken during the Foster Wheeler investigation that revealed Endosulfan I concentrations in excess of the applicable Ground-Water Quality Standard. Ground water was not encountered within 25 ft below ground surface at the locations near the former building, and no samples were collected at these locations. Ground water was encountered at a depth of approximately 20 ft below ground surface in the 3 locations at the base of the hill, and samples were collected from these locations (Figure 5). Ground-water samples collected at Site 47 were analyzed for Target Compound List pesticides.

Three well points (WP-01, WP-02, and WP-03) were installed along the western edge of West Pond, a small unnamed tributary to Mine Brook, between the edge of the pond and the service road which runs along the Route 18 border of NWS Earle to assess potential impacts associated with Site 48 at the site boundary (Figure 4). Ground water was encountered at a depth of approximately 5-7 ft below ground surface in this area. Ground-water samples were collected and analyzed for Target Analyte List metals.

A permanent monitoring well (MW-01-48) was installed at Site 48 near the location of WP-03-48 in an effort to obtain a low turbidity ground-water sample to more accurately assess the potential for impact to ground water. The well is located approximately 5 ft south of the dirt patrol road and 750 ft southwest of Mercer Road (Figure 6). The ground-water sample was analyzed for Target Analyte List metals.

3.2.2.3 Sampling Methodology

The direct-push sample probe is "pushed" under hydraulic pressure to the selected sample depth, and a narrow diameter (i.e., <1 in.) slotted polyvinyl chloride casing is lowered into the borehole. The following steps were taken when sampling ground water using the direct-push method:

1. Upon arrival at the site, the direct-push sampler was decontaminated in accordance with the procedures described in Chapter 6 of the Quality Assurance Project Plan (EA 2000) and allowed to air dry.

2. After decontamination, the first section of the direct-push probe was assembled.

3. Prior to sample collection, the push rod was advanced to the water table.

4. A polyvinyl chloride slotted casing was placed into the borehole.

5. Each well point was allowed to sit undisturbed for approximately 24 hours prior to sampling to minimize sample turbidity.

6. Dedicated tubing with a disposable bottom check valve/mini-bailer was then inserted into the polyvinyl chloride casing to collect the sample. Where possible, water quality indicator parameters and depth to water were measured at this point.

7. The tubing, mini-bailer, and polyvinyl chloride casing were then removed from the hole using the system hydraulic cylinder.

The newly installed monitoring well located at Site 48 was developed and sampled following procedures outlined in the PA/SI Work Plan (EA 2001) and the Quality Assurance Project Plan (EA 2000).

Ground-water samples collected at Site 48 were analyzed for Target Analyte List metals. Ground-water samples collected at Site 47 were analyzed for Target Compound List pesticides. None of the samples were filtered prior to analysis

3.2.3 Surface Water and Sediment Sampling

The data quality objectives associated with sampling and analysis of surface water and sediment are presented in this section. Site 48 is the only area where surface water and sediment sampling were conducted. This section summarizes the sampling procedures used for the collection of these samples.

3.2.3.1 Sampling Objectives

The objectives for surface water and sediment sampling are to:

- Assess the absence or presence and concentrations of inorganic constituents of concern in surface water and sediment in West Pond at Site 48 and, if present, to compare these concentrations to established regulatory criteria

- Assess the need for additional remedial investigation activities related to West Pond.

3.2.3.2 Sample Locations

Three surface water and 3 sediment samples were collected from West Pond, and 2 sediment samples and 2 surface water samples from the adjacent tributary to Mine Brook (Figure 5). The West Pond sample sets (i.e., surface water and sediment samples collected from a single location) were collected from areas where submerged actuators were observed. One sample set was collected from the tributary near the point where it exits West Pond, and the second tributary

sample set was obtained downstream of the confluence of this tributary with Mine Brook, prior to its exit from NWS Earle.

Two additional surface water and sediment samples were collected upstream of the junction of the tributary running from Site 48 and the tributary leading offsite to establish background concentrations of target analytes. They were collected using procedures outlined in the PA/SI Work Plan (EA 2001).

3.2.3.3 Sampling Equipment and Procedures

Surface water samples were collected before sediment samples to minimize the presence of suspended solids. Each sample location was approached using a small boat from downstream to minimize disturbance of sediments that might flow into the sampling area. Water quality indicator parameters, including pH, specific conductivity, temperature, and turbidity, were collected prior to sampling, and color of the sample was noted. Surface water samples were collected by slowly immersing the sample container in the surface water. The sample jars were then closed and the labels completed. No other equipment was used for collection of surface water samples.

Sediment samples were collected using a ponar dredge in accordance with the NJDEP Field Sampling Procedures Manual (NJDEP 1992). Sediment samples were transferred directly to sample jars using a dedicated stainless steel trowel. Sediment samples were not decanted to avoid loss of fines.

Surface water and sediment sample locations were marked with stakes immediately following sample collection to permit surveying of horizontal coordinates at a later date.

3.2.4 Location Surveying

At the request of the Navy had requested that an additional survey was conducted to verify sampling locations at Sites 47 and 48 and place a permanent monument with control information in the vicinity of Site 48. This request came in response to survey difficulties identified by EA's subcontractor, Zenith Nadir. Since a permanent monument near Sites 47 and 48 was reportedly destroyed, previously surveyed monitoring wells at Site 19 were used as horizontal control to survey the locations of direct-push samples and test pits installed during the PA/SI activities at Site 47 and Site 48. During interpretation of the site survey data, Zenith Nadir discovered that, based on Global Positioning System readings taken to confirm survey data in the field, the original survey of the Site 19 wells (performed by others) is incorrect by approximately 2 ft. This error was magnified as the survey traversed to Site 48, several miles away.

Upon completion of PA/SI field activities, Zenith Nadir, a State of New Jersey licensed land surveyor, obtained the horizontal and vertical coordinates for newly installed ground-water sampling points, test pit locations, and surface water/sediment sampling stations.

3.2.4.1 Survey Objectives

The locations of newly installed ground-water sampling points, test pit locations, and surface water and sediment sampling stations were surveyed in the field by Zenith Nadir to establish reference elevations and horizontal locations. The data quality objectives for location surveying were to:

- Establish monitoring well and temporary well point reference elevations for static ground-water level measurements
- Establish surface elevations at soil boring locations for development of subsurface cross-sections
- Provide vertical and horizontal control (tied to NWS Earle benchmarks) of sample locations.

To satisfy these objectives, project activities included:

- Horizontal and vertical control conformed to standard third order accuracy, as follows:
  - Horizontal = 1/10,000 or 6 seconds of arc
  - Vertical = 0.05 ft per M, where M = length of loop in miles.
- Back check loops for level runs were performed and closure was confirmed. Horizontal control surveying was tied into established permanent benchmarks at NWS Earle.
- Field data was recorded in bound surveying logbooks with numbered pages.
- Surveying instruments were calibrated prior to the start of work, and calibration was checked at the conclusion.

3.2.5 Unexploded Ordnance Clearance

No evidence of historic disposal of UXO in the investigation areas was found in available documentation. However, because Site 48 is located within the ordnance storage area of NWS Earle and featured disposal of components of mines, UXO clearance was performed prior to and during investigation activities in that area.

3.2.5.1 Objectives

The objectives of the UXO clearance activities were to:

- Detect and identify any UXO disposed of at Site 48, if present

- Allow proper removal of UXO, if present, by Navy personnel
- Maximize the safety of the field team during investigation activities.

3.2.5.2 Equipment and Procedures

EA contracted Explosive Ordnance Technologies, Inc. (EOTI) of Rumson, New Jersey to perform the UXO clearance and test pitting. The UXO clearance was performed in conjunction with excavation of the test pits, in two phases:

- A sweep of Site 48 was conducted using a magnetometer to detect any buried anomalies, which were then uncovered by hand by EOTI.
- Test pits were completed in areas where visual evidence of actuators was present or disposal of actuators was suspected. In these areas, a small trackhoe was used by EOTI to carefully dig several inches, then visually inspect the excavation for evidence of potential UXO, actuators, or other buried objects. Excavation continued in this manner until apparently undisturbed, native soil was observed.

As noted in Section 3.2.1.3, soil samples were collected from the test pits using dedicated, stainless steel trowels. Although few actuators were found in test pits, soil samples were collected from soil directly beneath actuators whenever possible.

4. SUMMARY OF SITE INVESTIGATION RESULTS

Results of the site investigation activities performed in each area are presented below. Analytical results for all samples collected during the PA/SI are in Appendix A.

4.1 SITE 47 – FORMER PESTICIDE SHOP

Analytical results for the ground-water samples collected at Site 47 are presented in Table 1. Sample locations are depicted in Figure 4. Pursuant to N.J.A.C. 7:9-6, each detected concentration was compared to the higher of the NJDEP Category II A Ground Water Quality Criteria and the Practical Quantitation Level. As noted in Table 1, only gamma-chlordane and alpha-chlordane were detected above method detection limits. These constituents were observed to be present in all samples at concentrations below the appropriate criterion for total chlordane of 0.5 μg/L. Endosulfan I, the previous constituent of concern for Site 47, was not detected in any of the samples.

The method detection limit for the pesticide analyses (0.05 μg/L) slightly exceeded the relevant criteria for alpha-BHC (0.02 μg/L) and aldrin (0.04 μg/L). However, these constituents have not previously been detected at Site 47.

The blind duplicate sample was collected from the same location as 10-WP47. Analytical results generally correlated between the samples, with the same constituents detected in similar concentrations. Third party validation was preformed by Alpha Environmental Consultants, Inc. on 22 April 2002. The data validation reports indicate that all results were analyzed in accordance with EPA Region 2 guidelines and finds the data acceptable. A detailed summary of the validation is provided in Appendix B.

4.2 SITE 48 – MINE BATTERY DISPOSAL AREA

Analytical results for soils, ground water, surface water, and sediment at Site 48 are discussed below. Analytical results were compared with background data obtained from the following documents to determine if further investigation was required: (1) The NJDEP's Summary of Selected Soil Constituents and Contaminants at Background Locations in New Jersey, (2) the New Jersey Geological Survey Investigation Report of Baseline Concentrations of Arsenic, Beryllium, and Associated Elements in Glauconite and Glauconitic Soils in the New Jersey Coastal Plain, (3) the Remedial Investigation Report for NWS Earle and the Remedial Investigation Addendum Report for NWS Earle (Brown & Root 1996, 1998), and (4) analytical results from background samples collected at NWSE on 21 March and 10 April 2003.

During the Remedial Investigation performed by Brown & Root Environmental in 1996; 1 ground water, surface water, sediment, surface soil, and subsurface soil sample were collected at 4 separate background locations across the site to determine the background levels of constituents of concern. The samples were collected in areas hydraulically upgradient and where possible, upwind of known or suspected areas of impacted media.

The first background location was situated in the northeastern portion of the mainside. This location is upgradient of the station and several thousand feet from an industrial area of the station. The second location was situated on the north side of Hominy Hills, approximately 1 mi southwest of the intersection of Guadalcanal Road and Asbury Avenue. The third location was situated at the waterfront area approximately 1,000 ft northwest of Highpoint Chapel. This location is upgradient and generally upwind of all industrial operations at the waterfront portion of the station. The fourth location was situated approximately 250 ft east of Site 15. Surface water and sediment samples for background location 4 were collected from the mainside on the south side of Hominy hills, west of the intersection of Route 34 and Midway Road, due to a lack of available surface water and sediment sample locations at the waterfront (Brown & Root 1996).

An additional background study in accordance with N.J.A.C. 7:26E-3.10 was performed on 21 March 2003 by EA Engineering, Science and Technology to support previous background investigations and to verify that the concentrations of target analytes detected in the various media above applicable cleanup criteria are due to natural or background conditions. A total of 10 soil samples was collected, 5 surface soil samples and 5 subsurface samples (approximately 3 ft below ground surface). A permanent monitoring well was installed approximately 750 ft southwest of Mercer Road and 5 ft south of the dirt patrol road located on Site 48, just southwest of West Pond to assess possible impacts to ground water. Additionally, 2 surface water and sediment background samples were collected southwest of West Pond just above the location where the flow from West Pond enters the unnamed tributary to the Mine Brook.

4.2.1 Site 48 Soils

Analytical results for the 12 soil samples collected at Site 48 are presented in Table 2. Sampling locations are depicted in Figure 5. Concentrations were compared to NJDEP's Residential and Non-Residential Direct Contact Cleanup Criteria. As a conservative measure, total chromium concentrations were compared to the criterion for hexavalent chromium.

In general, detected constituents were consistent in concentration and distribution, and recognizable trends related to physical location or depth were not observed. Samples collected from all locations contained varying concentrations of most of the Target Analyte List metals. Six samples (4 surface soil and 2 subsurface soil) contained arsenic at concentrations in excess of the Residential Direct Contact Cleanup Criterion. Five of the 12 samples also contained cadmium at concentrations in excess of the Residential Direct Contact Cleanup Criterion, but below Non-Residential Direct Contact Cleanup Criteria.

Sample 11-TP48-17A, collected from surficial soils in a test pit completed in a low-lying area containing numerous actuators to the west of West Pond, also contained beryllium and zinc at concentrations exceeding both residential and non-residential criteria, and lead and chromium at concentrations that exceeded the residential criteria only. One additional sample (2-TP48-3B) collected from a test pit containing reinforced concrete debris located at the north edge of the

access road located to the south of West Pond, also contained chromium above the residential criterion for hexavalent chromium.

A blind duplicate sample was collected from the same location as sample 17-48-A. Analytical results generally correlated between the samples, with the same constituents detected in similar concentrations. As noted in Table 2, spiked sample recovery for several analytes (i.e., vanadium and zinc) were not within control limits. Third party validation was preformed by Alpha Environmental Consultants, Inc. on 22 April 2002. The data validation reports indicate that all results were analyzed in accordance with EPA Region 2 guidelines and finds the data acceptable. A detailed summary of the validation is provided in Appendix B.

Soil analytical data were compared with background data from the reports previously stated. Arsenic concentrations in 7 samples were above background levels collected during the Remedial Investigation (Brown & Root 1996) and Monmouth County background concentrations. Arsenic concentrations exceeded New Jersey state wide background concentrations for 2 of the 12 soil samples. However arsenic concentrations were below the New Jersey Geological Survey's baseline concentrations for glauconitic soils. Cadmium concentrations exceeded background concentrations for soil in the Remedial Investigation background study (Brown & Root 1996) in 7 of 12 soil samples, 5 of 12 soil samples exceeded background concentrations of the Monmouth County background study, 2 of 12 soil samples exceed New Jersey state wide background concentrations and 8 of 12 soil samples exceeded New Jersey Geological Survey background concentrations. Beryllium exceeded concentrations in 2 of 12 soil samples when compared to levels obtained during the Remedial Investigation (Brown & Root 1996) and Monmouth County background samples. However concentrations of beryllium did not exceed background state wide and New Jersey Geological Survey background concentrations.

Additionally, 10 background samples were collected on 21 March 2003 by EA Engineering, Science and Technology, 5 surface soil and 5 subsurface soil. Sample locations are presented in Figure 6. Results indicate concentrations of cadmium (6 of 12) and arsenic (3 of 12) above site-specific background concentrations but within New Jersey state wide background concentrations. Background ranges are presented in Table 2.

4.2.2 Site 48 Ground Water

Analytical results for the 3 ground-water samples collected at Site 48 are presented in Table 3. Sampling locations are identified on Figure 5. The 3 samples collected, and the duplicate, contained concentrations of aluminum and iron in excess of the higher of the Ground Water Quality Criteria and Practical Quantitation Level for each constituent. Arsenic was detected in the 3 samples, but not the duplicate, at concentrations above the appropriate criterion, and chromium, lead, and manganese were detected in individual sample points above applicable criteria.

As shown in Table 3, the highest concentrations of targeted analytes were reported in sample 3-WP48. This location yielded the lowest ground-water recovery of the three, and the

sample collected was observed to be turbid, in spite of purging activities. Purging at the remaining locations resulted in less turbid samples and results for arsenic and lead that were only slightly above the relevant criteria. Based on these results, the elevated turbidity level may directly correlate to the higher concentrations of targeted analytes detected in sample 3-WP48.

A blind duplicate sample was collected from the same location as sample 2-WP48. Analytical results generally correlated between the samples, with the same constituents detected in similar concentrations. Third party validation was preformed by Alpha Environmental Consultants, Inc. on 22 April 2002. The data validation reports indicate that all results were analyzed in accordance with EPA Region 2 guidelines and finds the data acceptable. A detailed summary of the validation is provided in Appendix B.

Ground-water analytical data were compared to background data collected during the Remedial Investigation performed by Brown & Root Environmental in 1996. Arsenic concentrations in 3 of 4 ground-water samples exceeded background concentrations from the Remedial Investigation (Brown & Root 1996). Aluminum, iron, and manganese concentrations did not exceed background concentrations collected during the Remedial Investigation (Brown & Root 1996). Chromium and lead exceeded background concentrations in 1 of 4 and 2 of 4 ground-water samples, respectively. Background ranges of ground-water analytical data are indicated in Table 3.

Analytical data from a ground-water sample collected from a newly installed monitoring well MW-48-01 on 10 April 2003 were compared to previous samples and site background concentrations, location of MW-48-01 sample is shown in Figure 6. Analytical results from MW-48-01 indicate concentrations of iron and manganese above NJDEP Ground Water Quality Criteria, but below site background concentrations collected during the Remedial Investigation conducted by Brown & Root in 1996.

4.2.3 Site 48 Surface Water

Analytical results for surface water samples collected from West Pond (samples 1-SW48, 2-SW48, and 3-SW48) and the tributary of Mine Brook (samples 4-SW48 and 5-SW48) are presented in Table 4. Surface water sample locations are depicted in Figure 5. Analysis of surface water samples at Site 48 indicate the presence of arsenic at concentrations in excess of the applicable New Jersey Surface Water Quality Standard in 2 of 5 surface water samples.

As noted in Table 2, spiked sample recovery for several analytes (i.e., aluminum and iron) were not within control limits. Likewise, spiked duplicate samples were not within control limits for aluminum, iron, lead, and zinc. Third party validation was preformed by Alpha Environmental Consultants, Inc. on 22 April 2002. The data validation reports indicate that all results were analyzed in accordance with EPA Region 2 guidelines and finds the data acceptable. A detailed summary of the validation is provided in Appendix B.

Surface water analytical results were compared with background data collected during Remedial Investigations conducted by Brown & Root Environmental in 1996 and 1998, and additional site

background samples collected on 21 March 2003 by EA Engineering Science and Technology. Additional background sample locations are shown in Figure 6. The results indicate that arsenic concentrations are below reported site-specific background concentrations.

4.2.4 Site 48 Sediments

Analytical results for sediment samples collected from West Pond and the tributary of Mine Brook are presented in Table 5. Sediment samples were collected from the same locations as surface water samples (Figure 5). Analytical results were compared to Freshwater Sediment Screening Guidelines. Concentrations of arsenic and chromium exceeded the criteria in the 5 samples, while beryllium and cadmium exceeded the criteria in 4 of 5 and 2 of 5 samples, respectively. Exceedances occurred in copper (4 of 5), lead (3 of 5), nickel (4 of 5), and zinc (4 of 5) samples, respectively. Concentrations of these and several other metals (aluminum, barium, calcium, cobalt, iron, magnesium, manganese, and potassium) were consistent with those detected in soils at Site 48. Vanadium was also detected in all 5 samples at concentrations below all 3 sets of regulatory criteria.

As noted in Table 2, spiked sample recovery for several analytes (i.e., aluminum and mercury) were not within control limits. Likewise, spiked duplicate samples were not within control limits for aluminum, arsenic (1-SD48 only), lead, magnesium, potassium, and zinc (1-SD48 only). Third party validation was preformed by Alpha Environmental Consultants, Inc. on 22 April 2002. The data validation reports indicate that all results were analyzed in accordance with EPA Region 2 guidelines and finds the data acceptable. A detailed summary of the validation is provided in Appendix B.

Sediment analytical results were compared with background data collected during Remedial Investigations conducted by Brown & Root Environmental in 1996 and 1998 and additional background samples collected on 21 March 2003 by EA Engineering, Science and Technology. Additional background samples are shown in Figure 6. The results indicate that chromium, copper, nickel, and zinc concentrations exceed background concentrations in 4 of 5 sediment samples. Lead concentrations exceed background concentrations in 3 of 5 sediment samples. Cadmium concentrations exceed background concentrations in 2 of 5 sediment samples and arsenic concentrations exceed background levels in 5 sediment samples when compared to the Remedial Investigations and additional site-specific background samples.

4.2.5 Site 48 Actuators

A core and battery of an actuator was collected from Site 48 and sent to the laboratory for analysis of Toxicity Characteristic Leachate Procedure (TCLP). Analytical results indicate concentrations of cadmium and lead above Resource Conservation and Recovery Act (RCRA) TCLP Hazardous Waste Regulatory Levels in the core sample. Results are presented in Table 6. Results from the battery indicate concentrations of cadmium over RCRA TCLP Hazardous Waste Regulatory Levels.

5. CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the Preliminary Assessment and Site Inspection activities performed at Site 48 and the Site Inspection activities performed at Site 47, the following conclusions and recommendations have been developed.

5.1 SITE 47 – FORMER PESTICIDE SHOP

Sample locations were selected based on knowledge of an exceedance in ground water collected during a previous sampling event by Foster Wheeler. A sample was collected in the approximate location of the exceedance and 2 more collected downgradient of that exceedance. Pesticides were not detected in ground water at concentrations that exceed New Jersey Category IIA Ground Water Quality Criteria. Endosulfan I, the constituent of concern previously identified in ground water beneath Site 47 during the removal action, was not detected in any of the 3 samples. As such, no significant impacts to ground water are present and no further action is warranted at Site 47 at this time.

5.2 SITE 48 – MINE BATTERY DISPOSAL SITE

Conclusions and recommendations for each medium of concern at Site 48 are presented below.

5.2.1 Site 48 Soil

As noted in Section 4.2.2, several target analytes, arsenic and cadmium in particular, were detected in soils at Site 48 at concentrations above NJDEP Residential and Non-Residential Direct Contact Cleanup Criteria and/or Impact to Ground Water Criteria. Beryllium and total chromium were detected above or slightly below the residential criteria across Site 48 as well. No apparent correlation between the distribution and concentration of metals at Site 48, and the observed locations of actuators, was observed, and the Navy has no record of use of these constituents at Site 48. Rather, target analyte concentrations varied widely and with no discernable trends related to location or depth, with one exception discussed below. Similar concentrations were also detected in sediment. The presence of these constituents independent of proximity to actuators suggests that historic deposition of actuators in this area have not resulted in observable impacts to media at Site 48.

Soil analytical data indicates concentrations of arsenic and beryllium above Non-Residential NJDEP Direct Contact Cleanup Standards. However, the results are within the background range for the New Jersey Geological Survey Investigation Report of Baseline Concentrations of Arsenic Beryllium and Associated Elements in Glauconitic Soils in the New Jersey Coastal Plain (NJDEP 2001), in all locations. Soils in the area of Monmouth County in which NWS Earle is located include glauconite, which often contain elevated concentrations of target analytes, including cadmium, arsenic, beryllium, and others, that are consistent with the range of concentrations detected at Site 48. This information combined with the observed nature of the distribution of these analytes in soil and sediment and lack of documented historical use of these

constituents in any raw or finished materials, suggest that their presence at Site 48 is the result of natural, or background concentrations.

A background study in accordance with N.J.A.C. 7:26E-3.10 was performed on 21 March 2003 to support previous background studies, investigations, and to verify that the concentrations of the various target analytes detected in soils at Site 48 above applicable cleanup criteria (arsenic, beryllium, cadmium, lead, and zinc) are due to natural, or background, conditions. Analysis of additional site-specific background samples collected at Site 48 when compared with soil analytical results indicate the presence of arsenic and cadmium at concentrations above site background concentrations. However, analytical results for arsenic do not exceed regional concentrations for glauconitic soils and the lack of arsenic in any raw or finished materials used during activities at Site 48 would suggest that elevated concentrations are a result of natural or background conditions.

Cadmium analytical results exceed site-specific background concentrations and NJDEP Residential Direct Contact Cleanup Criteria. However, concentrations do not exceed Non Residential Direct Contact Cleanup Criteria, since Site 48 is located on a secure Naval base and the Navy has no future plans of using it for any other purpose than non residential, and the lack of discernable trends between the presence of actuators and elevated analytical results indicate that no impact to soil has occurred.

One location at Site 48 (11-TP-48-11B) contained elevated concentrations of lead and zinc in addition to those constituents discussed above. The residential criteria for lead, and both the residential and non-residential criteria for zinc, were exceeded. However the lack of discernable trends between the presence of actuators and elevated analytical results indicate that no impact to soil has occurred.

A limited risk assessment screening was performed for Site 48 soils at the request of EPA (Appendix E). Only arsenic was determined to be a Constituent of Potential Concern based on the risk-based industrial scenario screen. As noted above, the site is not currently nor expected to be used for residential purposes in the future. Site arsenic concentrations, when analyzed for potential risks are within the EPA acceptable risk range of $10E^{-4}$ to $10E^{-6}$. Therefore there are no risk-related concerns for the site, and no remedial action is required for soils at Site 48. However, the Navy recommends removal of accessible actuators as a housekeeping measure.

5.2.2 Site 48 Ground Water

Analysis of ground-water samples collected at Site 48 indicate the presence of aluminum, arsenic, chromium, iron, lead, and manganese at concentrations that exceed the greater of the Ground Water Quality Criteria and practical quantitation limit for each constituent. Ground-water samples were collected using direct-push methods and temporary well points. Although the well points were purged and a low flow method was used for sampling, temporary well points generally result in samples that are more turbid than those collected using permanent monitoring wells. The highest concentrations of target analytes detected were observed in the

sample from well point 3-WP48, which was observed in the field to be the most turbid of the 3 samples collected.

To obtain a more accurate assessment of metals concentrations in ground water, and to assess the effect of suspended solids on concentrations of metals in ground water a permanent monitoring well (MW-48-01) in the approximate location of 3-WP48 was installed and developed on 21 March 2003, and sampled (10 April 2003) via the EPA Low-Flow (minimal drawdown) procedure. Analytical results from MW-48-01 indicate the presence of iron and manganese at concentrations above Ground Water Quality Criteria, but are below site-specific background concentrations. Based on these results, measured concentrations do not indicate an impact to ground water; therefore, no further action is warranted at this time. The Navy recommends abandonment of MW-48-01 since no impact to ground water has been identified.

5.2.3 Site 48 Sediment

Sediment samples were collected from West Pond and the tributary of Mine Brook. Analytical results were compared to NJDEP Freshwater Sediment Screening Guidelines. Concentrations of arsenic and chromium exceeded the criteria in the 5 samples, while beryllium and cadmium exceeded the criteria in 4 of 5 and 2 of 5 samples, respectively. Exceedances occurred in copper (4 of 5), lead (3 of 5), nickel (4 of 5), and zinc (4 of 5) samples, respectively. Concentrations of these and several other metals (aluminum, barium, calcium, cobalt, iron, magnesium, manganese, and potassium) were consistent with those detected in soils at Site 48, and also appear to be naturally-occurring, background concentrations. Two additional sediment samples were collected upstream of the junction of the tributary running from Site 48 and the tributary leading offsite to establish background concentrations of target analytes in sediment. Analytical results from these samples were then used in conjunction with existing analytical results to perform a Baseline Ecological Evaluation pursuant to N.J.A.C. 7:26E and NJDEP's Guidance for Sediment Quality Investigations (1998). Analytical results indicate concentrations of arsenic, chromium, beryllium, cadmium, copper, lead, nickel and zinc above site-specific background levels. Since there is a lack of historical evidence of use of arsenic in any activities past or present at Site 48, it can be concluded that elevated concentrations are the result of natural or background conditions. Although concentrations of chromium, beryllium, cadmium, copper, lead, nickel and zinc exceed sediment screening guidelines, there is no indication of migration of these constituents from West Pond, because the actuators are being removed as a matter of housekeeping, no further action is required for this media.

5.2.4 Site 48 Surface Water

Surface water samples were collected from West Pond and Mine Brook at the same locations as the sediment samples. Surface water samples were collected prior to sediment sample collection to minimize the presence of suspended solids. Analysis of surface water samples at Site 48 indicate the presence of arsenic at concentrations in excess of the applicable New Jersey Surface Water Quality Standard in 2 of 5 surface water samples. Because arsenic was not known or suspected to have been used in this area, these exceedances are also believed to be a result of naturally occurring, background arsenic in soils and sediment at NWS Earle.

Additional upstream surface water samples were collected on 21 March 2003, in conjunction with the additional sediment sampling above in the same manner as stated previously, for inclusion in a Baseline Ecological Evaluation. Analytical results indicate arsenic levels are below background concentrations collected during the Remedial Investigation, but are above additional site-specific background concentrations. This would indicate no impact to surface water; therefore, no further action is required for this media.

5.2.5 Site 48 Actuators

Analysis of the core sample of an actuator collected at Site 48 indicated the presence of cadmium and Lead at concentrations above the RCRA Hazardous Waste Regulatory Limits for TCLP. Although the core does not pass RCRA leachability, it does not appear at this time to have impacted site media. However, the Navy recommends removal of remaining actuators as a housekeeping measure.

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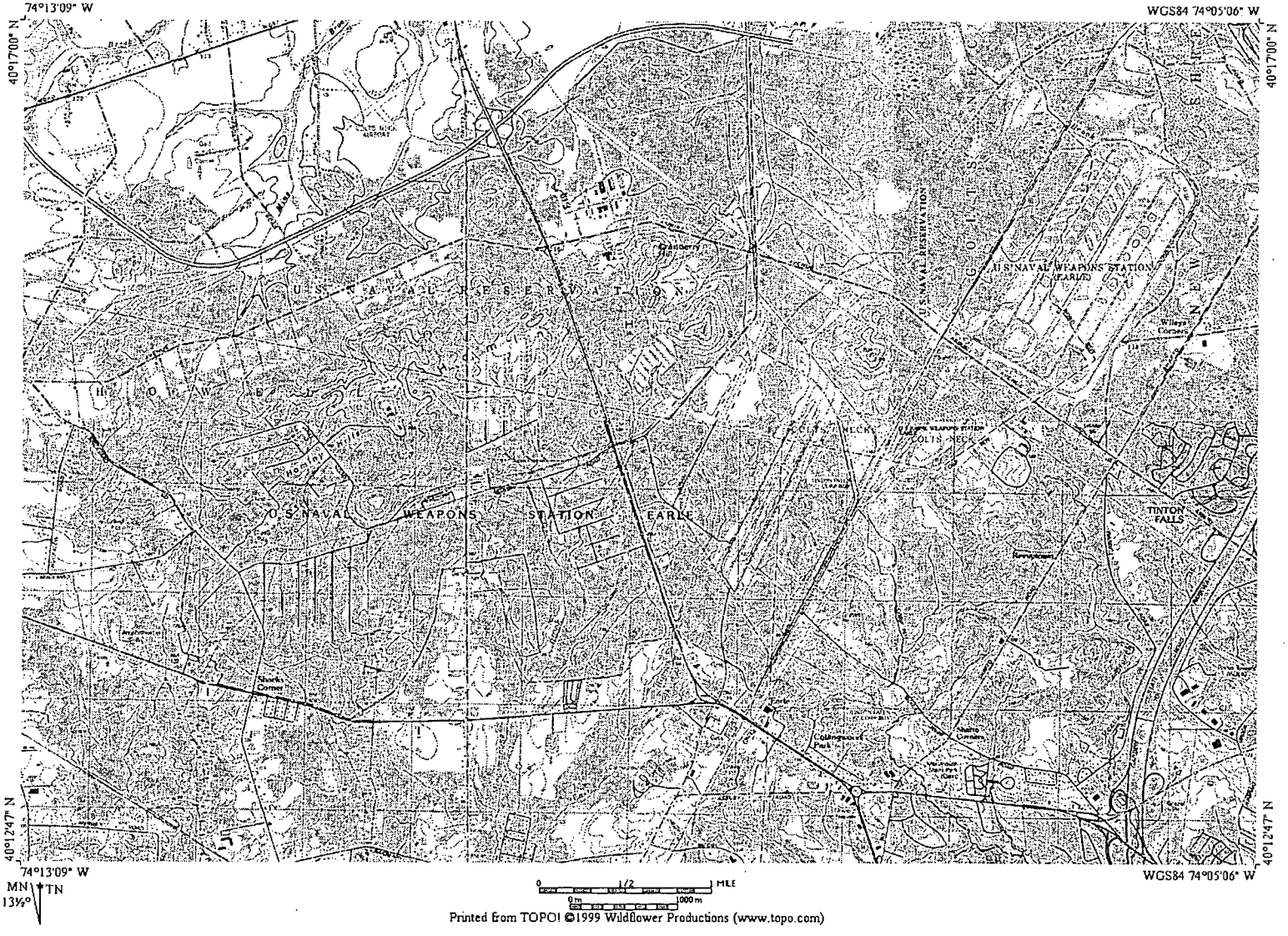
Figures



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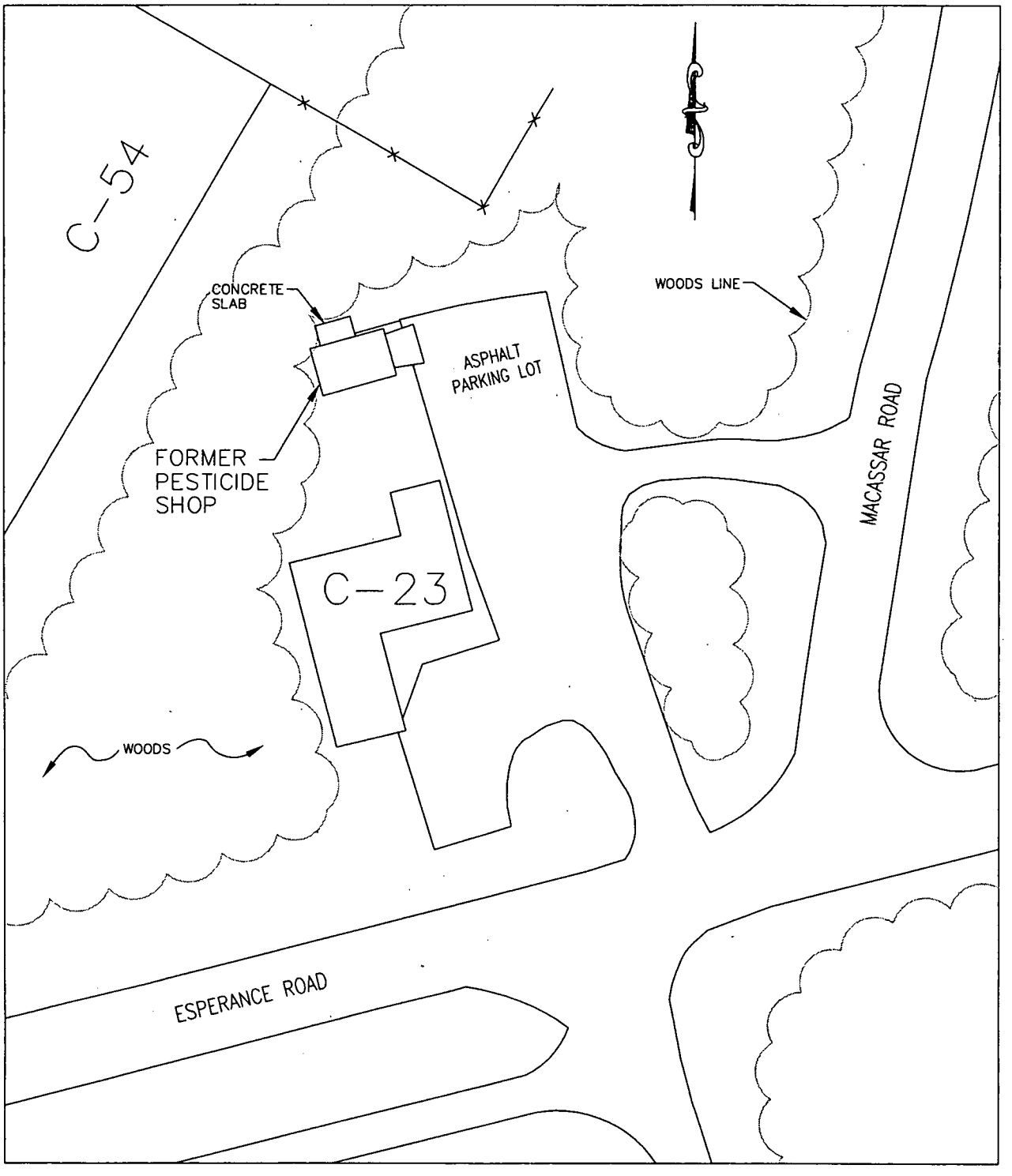
EA ENGINEERING, SCIENCE, AND TECHNOLOGY	DESIGNED BY TB	DRAWN BY TB	DATE 6 JUNE 2002	PROJECT NO. 2960100	NAVAL WEAPONS STATION EARLE SITES 47 AND 48 COLTS NECK, NEW JERSEY	SITE LOCATION MAP
	CHECKED BY TB	PROJECT MGR. CK	SCALE AS SHOWN	FIGURE 1		



APPROXIMATE SCALE

50 0 25 50 100

(IN FEET)

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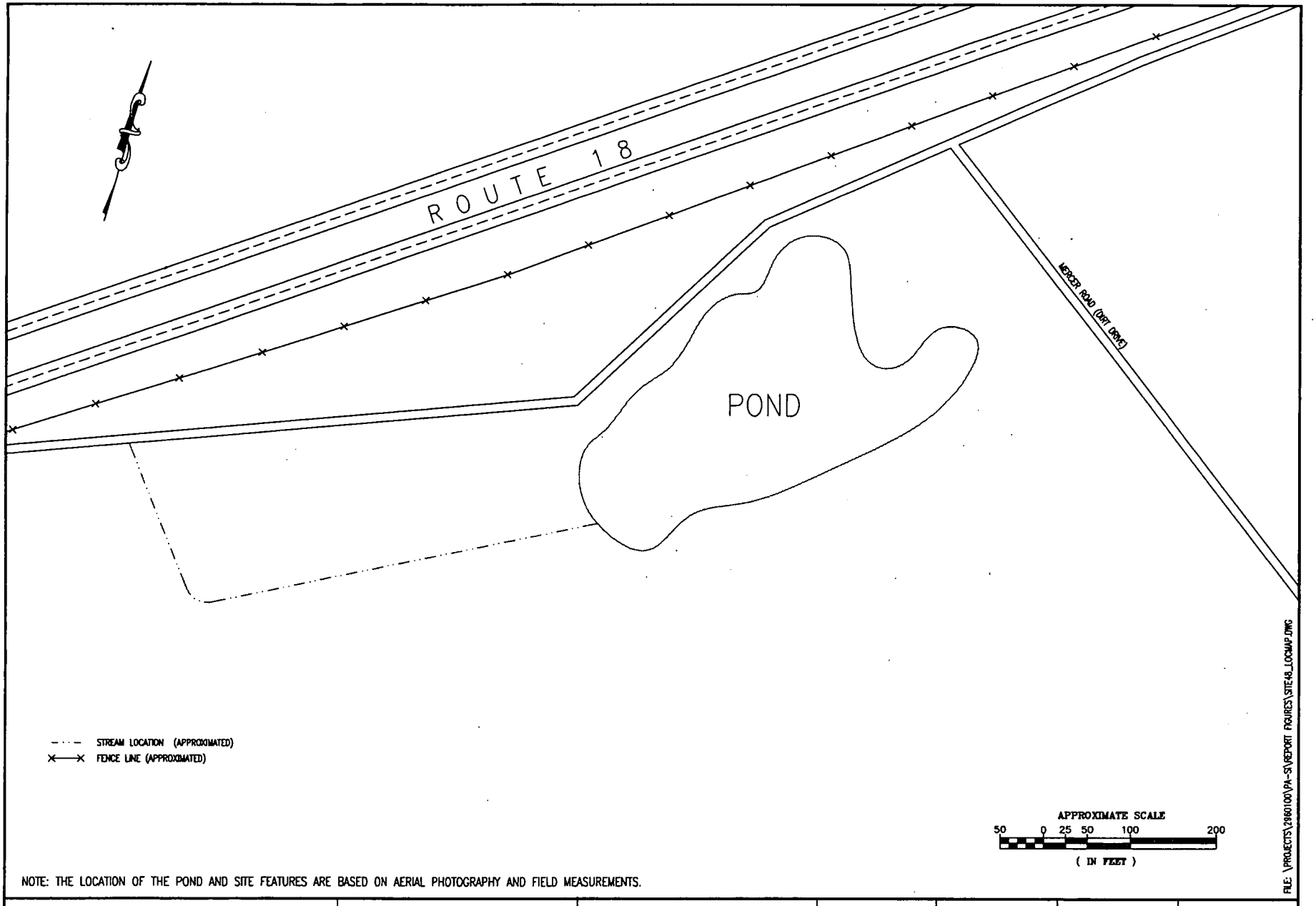
EA ENGINEERING, SCIENCE, AND TECHNOLOGY

SITE 47-NAVAL WEAPONS STATION EARLE
COLTS NECK, NEW JERSEY

SITE 47
SITE LOCATION MAP

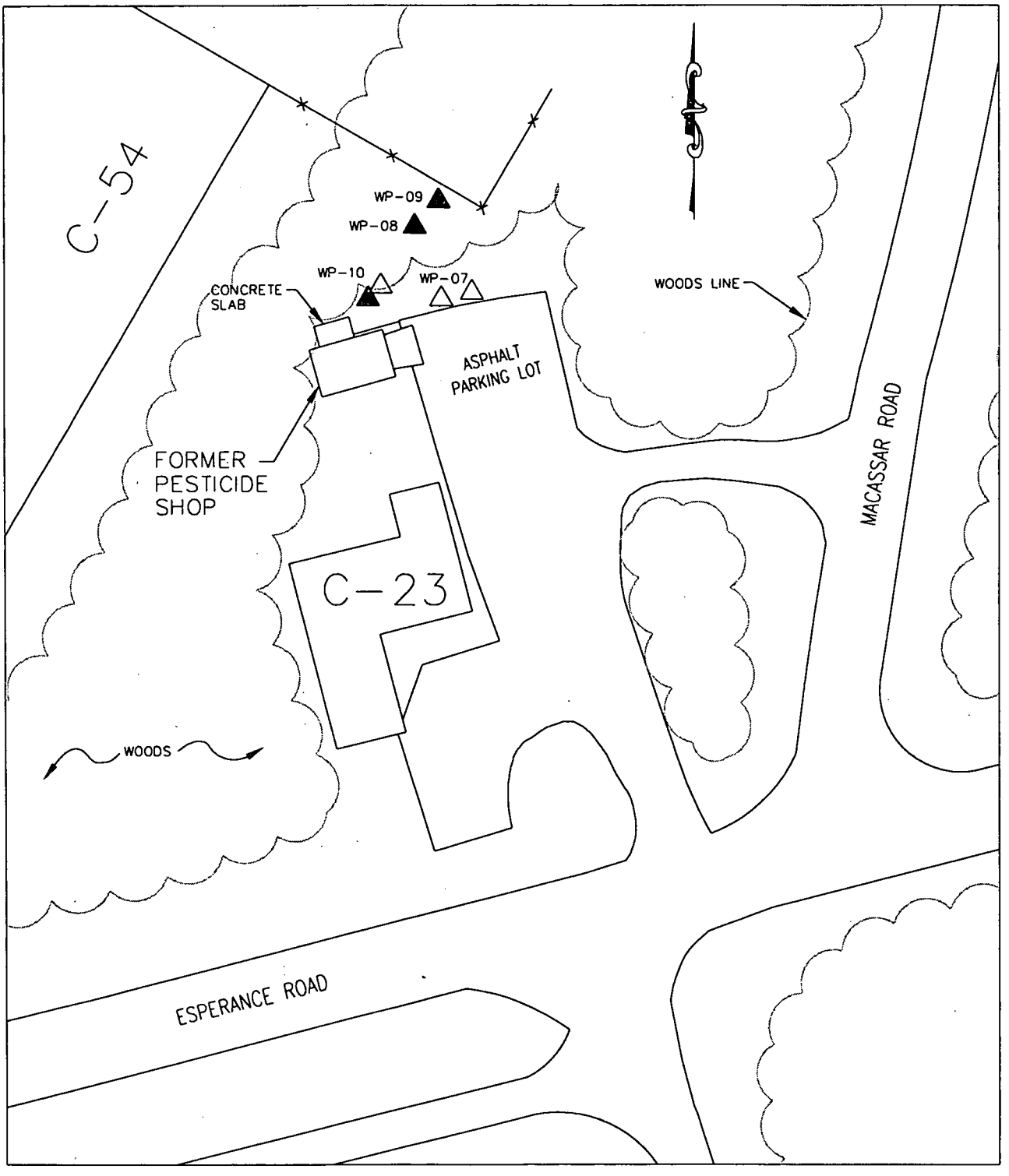
DESIGNED BY	DRAWN BY	DATE	PROJECT NO.	CHECKED BY	PROJECT MGR.	SCALE	FIGURE
TB	TB	5 JUNE 2002	29601.00	TB	CK	AS SHOWN	2



NOTE: THE LOCATION OF THE POND AND SITE FEATURES ARE BASED ON AERIAL PHOTOGRAPHY AND FIELD MEASUREMENTS.

FILE: \PROJECTS\2960100\PA-SI\REPORT FIGURES\SITE48_LOCMAP.DWG

EA ENGINEERING, SCIENCE, AND TECHNOLOGY	SITE 48-NAVAL WEAPONS STATION EARLE COLTS NECK, NEW JERSEY	SITE 48 SITE LOCATION MAP	DESIGNED BY TB	DRAWN BY TB	DATE 24 MAY 2002	PROJECT NO. 29601.00
			CHECKED BY TB	PROJECT MGR. CK	SCALE AS SHOWN	FIGURE 3



▲ GROUND-WATER GRAB SAMPLE LOCATION

△ ATTEMPTED GROUND-WATER GRAB SAMPLE LOCATION NO SAMPLE COLLECTED

APPROXIMATE SCALE

50 0 25 50 100

(IN FEET)

NOTE: GROUND-WATER GRAB SAMPLE LOCATIONS ARE APPROXIMATED, AND THEIR SPATIAL RELATIONSHIP TO SITE FEATURES ARE ALSO APPROXIMATED.

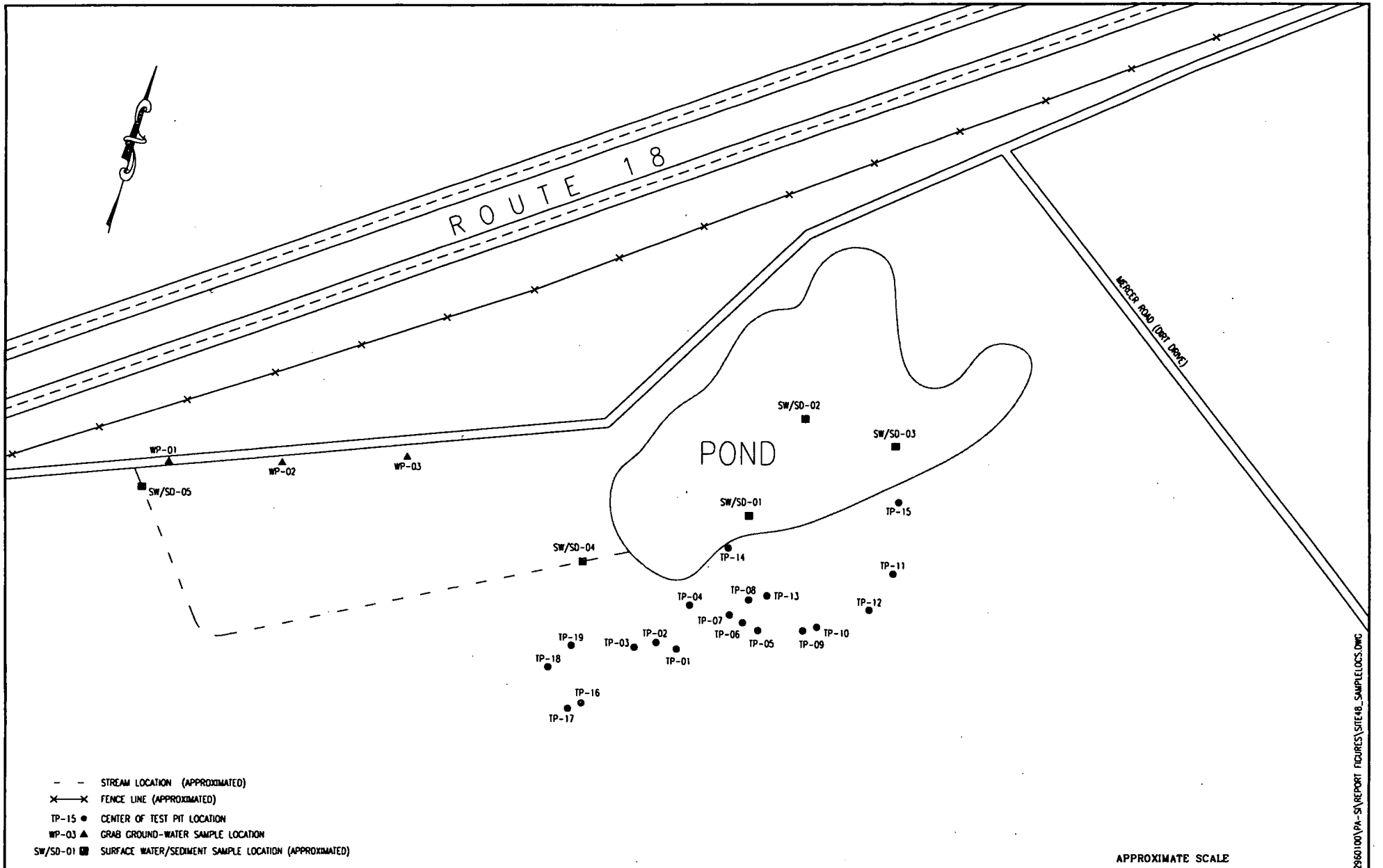
FILE: \PROJECTS\2960100\PA-SI\TEXT AND TABLES\PASI FINAL\DWG\SITE47-SAMPLELOCS.DWG

EA ENGINEERING, SCIENCE, AND TECHNOLOGY

SITE 47-NAVAL WEAPONS STATION EARLE
COLTS NECK, NEW JERSEY

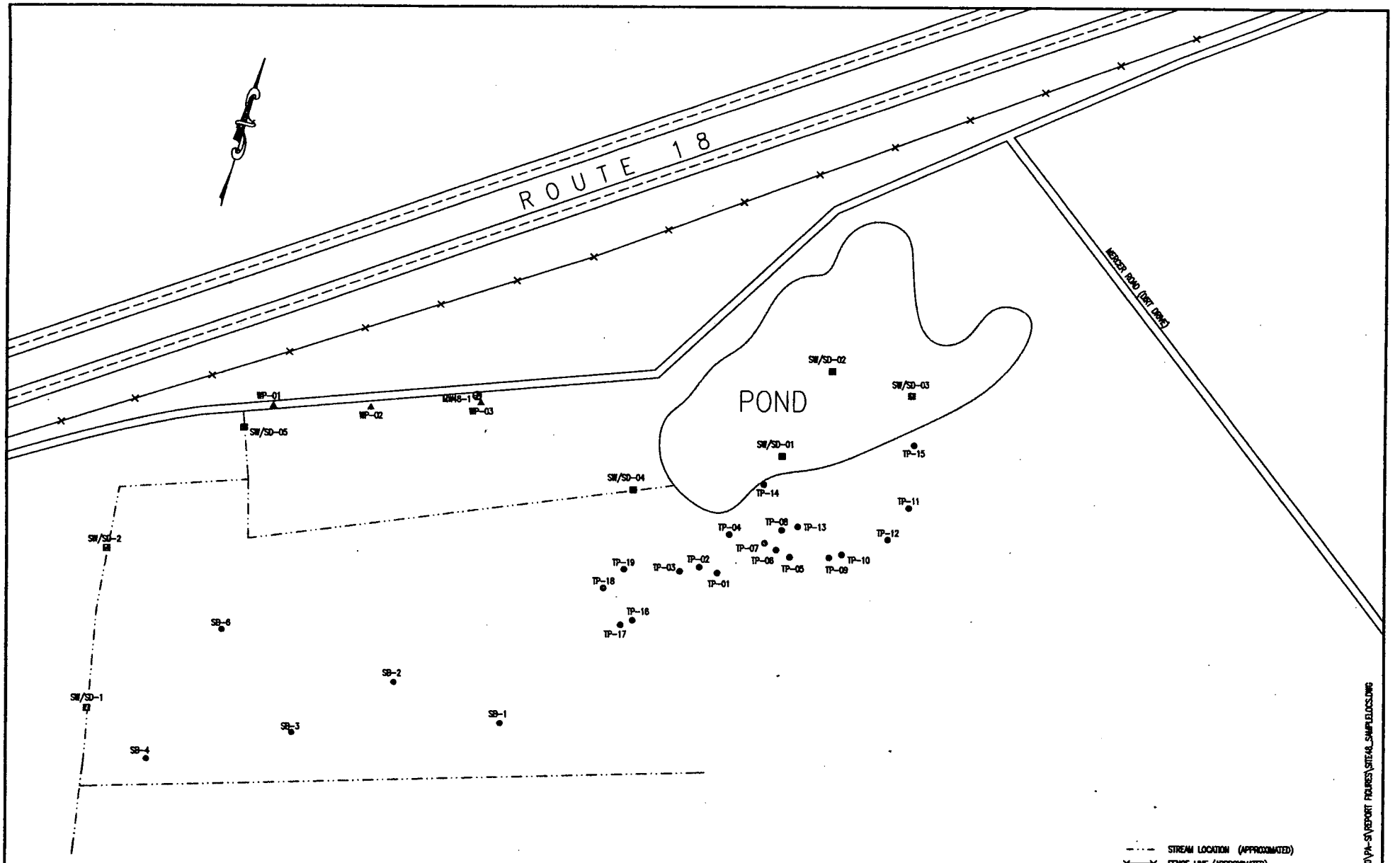
SITE 47
SAMPLE LOCATIONS

DESIGNED BY	DRAWN BY	DATE	PROJECT NO.	CHECKED BY	PROJECT MGR.	SCALE	FIGURE
TB	TB	5 JUNE 2002	29601.00	TB	CK	AS SHOWN	4



NOTE: SPATIAL DISTANCES BETWEEN TEST PITS AND GRAB GROUND-WATER SAMPLE LOCATIONS ARE BASED UPON SURVEY DATA FROM ZENITH NADIR SURVEYORS COLLECTED IN APRIL 2002. HOWEVER, THE LOCATION OF THE POND, SITE FEATURES, AND SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS ARE BASED ON FIELD MEASUREMENTS AND AERIAL PHOTOGRAPHY, AND THEIR SPATIAL RELATIONSHIP TO THE TEST PIT AND GRAB GROUND-WATER SAMPLE LOCATIONS ARE APPROXIMATED.

EA ENGINEERING, SCIENCE, AND TECHNOLOGY	SITE 48-NAVAL WEAPONS STATION EARLE COLTS NECK, NEW JERSEY	SITE 48 SAMPLE LOCATIONS	DESIGNED BY TB	DRAWN BY TB	DATE 24 MAY 2002	PROJECT NO. 29601.00
			CHECKED BY TB	PROJECT MGR. CK	SCALE AS SHOWN	FIGURE 5



NOTE: SPATIAL DISTANCES BETWEEN TEST PITS AND GRAB GROUND-WATER SAMPLE LOCATIONS ARE BASED UPON SURVEY DATA FROM ZENITH NADIR SURVEYORS COLLECTED IN APRIL 2002. SPATIAL DISTANCES BETWEEN MONITORING WELL MW48-1, SOIL BORING, AND SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS SW/SD-1 AND SW/SD-2 ARE BASED UPON SURVEY DATA FROM KS ENGINEERS COLLECTED IN MAY 2003. HOWEVER, THE LOCATION OF THE POND, SITE FEATURES, AND SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS SW/SD-01 TO 05 ARE BASED ON FIELD MEASUREMENTS AND AERIAL PHOTOGRAPHY, AND THEIR SPATIAL RELATIONSHIP TO OTHER SAMPLING LOCATIONS ARE APPROXIMATED.

APPROXIMATE SCALE
50 0 25 50 100 200
(IN FEET)

- STREAM LOCATION (APPROXIMATED)
- FENCE LINE (APPROXIMATED)
- TP-15 ● CENTER OF TEST PIT LOCATION
- SB-2 ● BACKGROUND SOIL BORING LOCATION
- WP-03 ▲ GRAB GROUND-WATER SAMPLE LOCATION
- SW/SD-1 ■ SURFACE WATER/SEDIMENT SAMPLE LOCATION (SW/SD-01 TO SW/SD-05 ARE APPROXIMATED)

FILE: \PROJECTS\29601001\PA-SI\REPORT FIGURES\SITE48_SAMPLELOCS.DWG

EA ENGINEERING, SCIENCE, AND TECHNOLOGY	SITE 48-NAVAL WEAPONS STATION EARLE COLTS NECK, NEW JERSEY	SITE 48 SAMPLE LOCATIONS	DESIGNED BY TB	DRAWN BY TB	DATE 2 JUNE 2003	PROJECT NO. 29601.00
			CHECKED BY TB	PROJECT MGR. CK	SCALE AS SHOWN	FIGURE 6

Tables

Table 1
Summary of Analytical Results for Direct-Push Ground-Water Samples Collected at Site 47,
Former Pesticide Shop, Naval Weapons Station Earle, Colts Neck, New Jersey

Compound	Criteria(a)	8-WP47		9-WP47		10-WP47		DUP3-WP47 (10-WP47)	
		Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
alpha-BHC	0.02	0.05	U	0.05	U	0.05	U	0.05	U
gamma-BHC (Lindane)	0.2	0.05	U	0.05	U	0.05	U	0.05	U
Heptachlor	0.4	0.05	U	0.05	U	0.05	U	0.05	U
Aldrin	0.04	0.05	U	0.05	U	0.05	U	0.05	U
beta-BHC	0.2	0.05	U	0.05	U	0.05	U	0.05	U
delta-BHC	--	0.05	U	0.05	U	0.05	U	0.05	U
Heptachlor epoxide	0.2	0.05	U	0.05	U	0.05	U	0.05	U
Endosulfan I	0.4	0.05	U	0.05	U	0.05	U	0.05	U
gamma-Chlordane	0.5[(b)]	0.06		0.08		0.08		0.09	
alpha-Chlordane	0.5[(b)]	0.06		0.07		0.08		0.09	
4,4'-DDD	0.1	0.05	U	0.05	U	0.05	U	0.05	U
4,4'DDT	0.1	0.05	U	0.05	U	0.05	U	0.05	U
Endrin aldehyde	--	0.05	U	0.05	U	0.05	U	0.05	U
Endosulfan Sulfate	0.4	0.05	U	0.05	U	0.05	U	0.05	U
Methoxychlor	40	0.05	U	0.05	U	0.05	U	0.05	U
Endrin ketone	--	0.05	U	0.05	U	0.05	U	0.05	U
Toxaphene	3	0.05	U	0.05	U	0.05	U	0.05	U

(a) Criteria presented is higher of Ground Water Quality and Practical Quantitation Limit, N.J.A.C. 7:9-6.
(b) Ground Water Quality Criteria listed for total chlordane; criteria not developed for alpha- and gamma- isomers.
U The analyte was analyzed for, but not detected.
All results reported in ug/l.

Table 2
Summary of Analytical Results for Soil Samples Collected at Site 48, Mine Battery Disposal Area, Naval Weapons Station Earle, Colts Neck, New Jersey

	Criteria (a)		3-TP48-3A (SURFACE)		3-TP48-3B (3 feet bgs)		4-TP48-4A (SURFACE)		4-TP48-4B (2 feet bgs)		6-TP48-6A (SURFACE)		6-TP48-6B (1 foot bgs)		11-TP48-11A (SURFACE)		11-TP48-11B (1 foot bgs)		17-TP48-17A (SURFACE)		18-TP48-18A (SURFACE)		19-TP48-19A (SURFACE)		TP48-DUP-1 (17-TP48-17A)		Total Background Range
			Result		Result		Result		Result		Result		Result		Result		Result		Result		Result		Result		Result		
	R	NR	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	
Aluminum	--	--	1050		9390		6660		2990		3110		2770		680		6020		3640		6610		7130		7050		675 - 57910
Antimony	14	340	0.53	B	5.2	B	3.5	B	1.8	B	1.4	B	2	B	0.42	U	2.2	B	1.9	B	3.6	B	2.1	B	2.8	B	--
Arsenic	20	20	5.9		101		46.6		14.5		18.9		29.2		3.3		18.8		20.1		22.4		32.8		24.8		ND - 126
Barium	700	47000	11.6	B	3.8	B	9.9	B	135		42.6		60.6		8	B	46.5		69.8		60.3		24.6	B	99.8		--
Beryllium	1	1	0.09	B	0.91		0.66	B	0.64	B	0.41	B	0.3	B	0.05	B	0.91		0.69	B	1.2		0.79		1.2		ND - 14.6
Cadmium	1	100	0.08	U	1.3		1.1		0.96		0.16	B	0.15	B	0.08	U	0.52	B	8		11.8		1.4		26.2		<0.2 - 2.28
Calcium	--	--	327	B	534	B	1640		1420		318	B	95.2	B	144	B	1550		2040		2800		1000		2320		--
Chromium	240[b]	6100[c]	18.1		278		192		76.6		93.4		85.7		10.8		129		120		246		154		194		0.7 - 806
Cobalt	--	--	0.37	B	1.7	B	1.6	B	1.9	B	1.1	B	1.1	B	0.27	B	2.1	B	2.8	B	6.1	B	1.6	B	4	B	--
Copper	600	600	3.6		5		3.3	B	6		3	B	10.9		2.8	B	6.9		56.6		130		6.2		20.3		ND - 143
Iron	--	--	10100		83900		77700		68400		30600		34100		4870		48500		58800		84100		45500		68900		3745 - 274900
Lead	400	600	9.8		11.3		11.4		22.3		8.5		16.1		14.8		24.2		88.5		523		17.1		40.8		ND - 617
Magnesium	--	--	177	B	1900		1430		429	B	1020		674		93.7	B	2090		718	B	2130		2280		2210		--
Manganese	--	--	9		0.19	U	25.6		7		7.6		2.4		3.9		39.8		178		638		12.4		271		1 - 1313
Mercury	14	270	0.03		0.02		0.03		0.04		0.01		0.03		0.03		0.06		0.5		2.9		0.08		0.14		--
Nickel	250	24000	0.37	B	0.47	U	0.45	U	0.41	U	0.36	U	0.39	U	0.99	B	2.4	B	5	B	14.3		2.2	B	8.8		ND - 53.8
Potassium	--	--	237	B	4560		3040		1300		3110		1960		136	B	5660		1580		6070		4820		6380		--
Selenium	63	3100	0.33	B	0.47	B	0.33	U	0.3	U	0.27	U	0.52	B	0.28	B	0.26	U	0.34	U	0.31	U	0.63	B	0.3	U	--
Silver	110	4100	0.46	U	0.63	B	0.6	U	0.54	U	0.48	U	0.52	U	0.45	U	0.48	U	0.62	U	0.56	U	0.57	U	0.55	U	--
Sodium	--	--	56.6	U	77.1	U	73.8	U	66.6	U	59.1	U	64	U	55.2	U	58.5	U	76.4	U	553	B	69.5	U	119	B	--
Thallium	2	2	0.66	U	0.9	U	0.86	U	0.77	U	0.69	U	0.74	U	0.64	U	0.68	U	0.89	U	0.8	U	1.5		0.78	U	ND - 1.9
Vanadium	370	7100	11.5	N	112	N	79.7	N	39.8	N	37.3	N	30.1	N	10.1	N	49.2	N	57.5	N	89.6	N	62.9	N	70.1	N	--
Zinc	1500	1500	40.6	N	53	N	35.6	N	96.5	N	23.6	N	43.6	N	14.3	N	93.1	N	963	N	2980	N	131	N	1140	N	ND - 789

Note : Background data collected and reported by Brown & Root Environmental, Remedial Investigation Report for Naval Weapons Station Earle, February 1997 and Remedial Investigation Addendum Report, January 1998.

(a) The Criteria values represent the Cleanup Standards for Contaminated Sites, N.J.A.C. 7:26D determined by the NJDEP.
(b) Value shown is for hexavalent chromium; the value for trivalent chromium is 120000.
(c) Value shown is for hexavalent chromium; no criteria developed for trivalent chromium.
B The reported value was obtained from a measurement that was less than the Contract Required Detection Limit, but greater than or equal to the Instrument Detection Limit.
U The Analyte was analyzed for, but not detected.
N Spiked sample recovery not within control limits.
R Residential Direct Contact Soil Cleanup Criteria.
NR Nonresidential Direct Contact Soil Cleanup Criteria.
-- No results over criteria.
bgs Below ground surface.
All results reported in mg/kg.
Shaded results indicate exceedance of regulatory criteria for analyte.

Table 3
Summary of Analytical Results for Direct-Push and Low Flow Ground-Water samples collected at Site 48, Mine Battery Disposal Area, Naval Weapons Station Earle, Colts, Neck, New Jersey

	NJDEP Ground Water Quality Standards (a)	1-WP48		2-WP48		3-WP48		DUP1-WP48 (3-WP48)		MW-48-01		Total Background Range
		Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc	Q	
Aluminum	200	1490		931		8250		509		ND		287 - 7870
Antimony	20	8.9	U	8.9	U	8.9	U	8.9	U	ND		--
Arsenic	8	11.7		8.5	B	57.8		6.2	U	ND		5.1 - 5.8
Barium	2000	222		146	B	281		158	B	68.2	B	--
Beryllium	20	0.18	B	0.14	B	2.1	B	0.11	B	0.39	B	--
Cadmium	4	0.6	U	0.6	U	0.64	B	0.6	B	ND		--
Calcium	--	7060		4150	B	17600		4600	B	24900		--
Chromium	100	36.9		15.5		254		9.5	B	ND		ND - 43.5
Cobalt	--	0.9	U	0.9	U	10.1	B	1.1	B	ND		--
Copper	1000	8.1	B	3	B	20.8	B	3.9	B	ND		--
Iron	300	15200		3950		83500		3070		1850		153 - 95200
Lead	10	11.3		3	U	36.2		3	U	ND		ND - 3
Magnesium	--	1480	B	894	B	4100	B	876	B	2160	B	--
Manganese	50	32.4		18		219		19.7		70.3		3.2 - 3040
Mercury	2	0.2	U	0.22		0.2	U	0.2	U	ND		--
Nickel	100	2.7	B	3.1	B	35.2	B	4.5	B	4.6	B	--
Potassium	--	1210	B	1380	B	8600		1220	B	3190	B	--
Selenium	50	2.2	B	1.6	U	1.7	B	1.6	U	ND		--
Silver	2	1.7	U	1.7	U	1.7	U	1.7	U	ND		--
Sodium	50000	6930		5990		4740	B	6740		1770	B	--
Thallium	10	4.3	U	4.3	U	4.3	U	4.3	U	ND		--
Vanadium	--	24.2	B	6.9	B	151		5.1	B	ND		--
Zinc	5000	25.1		48.2		367		49.2		1.8	B	0.69 - 42.25

Note : Background data collected and reported by Brown & Root Environmental, Remedial Investigation Report for Naval Weapons Station Earle, February 1997 and Remedial Investigation Addendum Report, January 1998.

(a) Criteria presented is higher of Ground Water Quality and Practical Quantitation Limit, N.J.A.C. 7:9-6.
B The reported value was obtained from a measurement that was less than the Contract Required Detection Limit, but greater than or equal to the Instrument Detection Limit.
U The analyte was analyzed for, but not detected.
ND Not Detected at this location.
-- No results over criteria.
Shaded results indicate exceedance of regulatory criteria.
All results reported in ug/l.

Table 4
Summary of Analytical Results for Surface Water Samples Collected at Site 48,
Mine Battery Disposal Area, Naval Weapons Station Earle, Colts Neck, New Jersey

	Surface Water Quality Standards (a)	1-SW48		2-SW48		3-SW48		4-SW48		5-SW48		1-SW48-FB1		Total Background Range
		Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	
Aluminum	--	87.6	BN*E	34.7	BN*U	225	N*E	239		237	N*E	16.9	UN*E	102 - 1540
Antimony	12.2	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	--
Arsenic	0.017	5.3	B	1.7	U	1.7	U	1.7	U	3.5	B	1.7	U	ND - 9
Barium	2000	21.9	B	17.1	B	28.9	B	23.1	B	37.4	B	1.3	U	--
Beryllium	--	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.22 - 1.2
Cadmium	10	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	0.18
Calcium	--	7230		9800		10200		7180		2590	B	40.9	B	--
Chromium	160	1.3	B	0.86	B	3.6	B	4.1	B	3.5	B	1.8	B	0.72 - 2.6
Cobalt	--	0.9	U	0.9	U	0.94	B	0.9	U	1.2	B	0.9	U	--
Copper	--	1.6	B	1.5	U	2.9	B	2.5	B	2.4	B	1.5	U	1.1 - 17.8
Iron	--	4230	E*N	1800	E*N	8190	E*N	7010	E*N	2010	E*N	15.8	UE*N	160 - 23100
Lead	5	3	U*	3	U*	3	U*	3	U*	3	U*	3	U*	4.4 - 16
Magnesium	--	1730	B'	2160	B	2400	B	1760	B	1840	B	16.2	U	--
Manganese	100	29.3		13.5	B	15.6		30.2		17.8		0.2	U	14 - 203
Mercury	0.144	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	--
Nickel	516	2.2	B	1.6	B	3.7	B	3	B	2.3	B	1.6	U	2.1 - 7.9
Potassium	--	1370	B	2140	B	2020	B	1440	B	1170	B	18.4	U	--
Selenium	10	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U	--
Silver	164	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	--
Sodium	--	2800	B	3130	B	2950	B	2830	B	3950	B	357	U	--
Thallium	1.7	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	3.5 - 5.5
Vanadium	--	1.2	U	1.2	U	1.2	B	2.4	B	1.6	B	1.2	U	--
Zinc	--	32.4	*	23.7	*	41	*	33.1	*	27.2	*	20.2	*	7.6 - 29.4

Note : Background data collected and reported by Brown & Root Environmental, Remedial Investigation Report for Naval Weapons Station Earle, February 1997 and Remedial Investigation Addendum Report, January 1998.

(a) Criteria presented is higher of Ground Water Quality and Practical Quantitation Limit, N.J.A.C. 7:9-6.
B The reported value was obtained from a measurement that was less than the Contract Required Detection Limit, but greater than or equal to the Instrument Detection Limit.
U The analyte was analyzed for, but not detected.
N Spiked sample recovery not within control limits.
E The reported value is estimated due to the presence of interference.
ND Not Detected at this location.
* Duplicate Analysis not within control limits.
-- No Background Samples Collected for this Analyte
All results reported in ug/l.

Table 5
Analytical Results for Sediment samples collected at Site 48,
Mine Battery Disposal Area, Naval Weapons Station Earle, Colts Neck, New Jersey

	Freshwater Sediment Screening Guidelines	1-SD48-FB1		1-SD48		2-SD48		3-SD48		4-SD48		5-SD48		Total Background Range
		Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	
Aluminum	--	49.5	BN*E	9180		14900	*	7920	*	15900	*	2120	*	--
Antimony	--	2.1	U	6.2	U	7.2	U	9.7	U	3.5	U	1.2	U	--
Arsenic	6	1.7	U	43.6	*	58.5		77.6		60.5		24.8		2.4 - 9.9
Barium	--	2.7	B	141		121	B	141	B	139		24.4	B	--
Beryllium	--	0.1	U	1.6	B	2.2	B	1.5	B	2.9		0.32	B	--
Cadmium	0.6	0.6	U	0.42	U	1	B	1.2	B	0.41	B	0.08	U	ND - 0.46
Calcium	--	701	B	3120	B	4000	B	3980	B	4290		458	B	--
Chromium	26	3.1	B	149		221		120		228		30.2		4.3 - 56
Cobalt	--	0.9	U	7.3	B	10	B	14.6	B	5.9	B	0.31	B	--
Copper	16	5.3	B	25.6		43.6		41.4		23.8		2.4	B	1 - 13
Iron	--	297	E*N	204000		227000		139000		87400		17100		--
Lead	31	3	U*	29.3		88.2		88		53.1		12.8		4 - 34.3
Magnesium	--	153	B	2920	B*	4620	*	2220	B*	3910	*	377	B*	--
Manganese	--	8.9	B	113		141		77.2		32.6		5.3		--
Mercury	0.2	0.2	U	0.09	N	0.15	N	0.14	N	0.06	N	0.01	UN	--
Nickel	16	6.3	B	25.5	B	38.1		51.1		31		1.4	B	1.6 - 6
Potassium	--	131	B	7130	*	10900		4010	B*	8290	*	982	*	--
Selenium	--	1.6	U	1.1	U	6.6		1.7	U	0.63	U	0.21	U	--
Silver	1	1.7	U	1.2	U	1.4	U	1.9	U	0.67	U	0.23	U	--
Sodium	--	822	B	249	U	290	U	389	U	140	U	47.6	U	--
Thallium	--	4.3	U	3	U	3.5	U	4.7	U	1.7	U	0.57	U	--
Vanadium	--	1.2	U	63.2		109		65.7		109		17.1		--
Zinc	120	49.8	*	392		620		540		208		11		12.5 - 34.7

Note : Background data collected and reported by Brown & Root Environmental, Remedial Investigation Report for Naval Weapons Station Earle, February 1997 and Remedial Investigation Addendum Report, January 1998.

(a) Criteria presented is higher of Ground Water Quality and Practical Quantitation Limit, N.J.A.C. 7:9-6.
(b) Value shown is for hexavalent chromium; the value for trivalent chromium is 120000.
(c) Value shown is for hexavalent chromium; trivalent chromium is not regulated in this scenario.
B The reported value was obtained from a reading that was less than the Contract Required Detection Limit, but greater than or equal to the Instrument Detection Limit.
U The analyte was analyzed for, but not detected.
N Spiked sample recovery not within control limits.
E The reported value is estimated due to the presence of interference.
* Duplicate Analysis not within control limits.
-- No results over criteria.
ND Not Detected at this location.
All results reported in mg/kg.
Shaded results indicate exceedance of regulatory criteria.

TABLE 6 SUMMARY OF ANALYTICAL RESULTS FOR CORE AND BATTERY SAMPLES OF AN ACTUATOR, SITE 48, MINE BATTERY DISPOSAL AREA NAVAL WEAPONS STATION EARLE, COLTS NECK, NEW JERSEY

TCLP Metals	Units	RCRA TCLP Hazardous Waste Criteria	Core	Batteries
Arsenic	mg/L	5.0	ND	ND
Barium	mg/L	100.0	ND	ND
Cadmium	mg/L	1.0	3.89	0.870
Chromium	mg/L	5.0	ND	ND
Lead	mg/L	5.0	89	1.70
Mercury	mg/L	0.2	0.00083	0.158
Selenium	mg/L	1.0	ND	ND
Silver	mg/L	5.0	ND	ND

NOTE: TCLP = Toxicity Characteristic Leachate Procedure.
RCRA - Resource Conservation and Recovery Act.
ND = Non Detect.

Appendix A

Analytical Data Packages Form Is

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

1-SW48

Lab Name: CHEMTECH EDISON Contract: 68-W00-088

Lab Code: CHEMED Case No.: SAS No.: SDG No.: N4953

Matrix (soil/water): WATER Lab Sample ID: N4953-01 S

Level (low/med): LOW Date Received: 06/25/01

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	87.6	B	N*E	P
7440-36-0	Antimony	8.9	U		P
7440-38-2	Arsenic	6.2	U		P
7440-39-3	Barium	21.9	B		P
7440-41-7	Beryllium	0.10	U		P
7440-43-9	Cadmium	0.60	U		P
7440-70-2	Calcium	7230			P
7440-47-3	Chromium	1.3	B		P
7440-48-4	Cobalt	0.90	U		P
7440-50-8	Copper	1.6	B		P
7439-89-6	Iron	4230		E*N	P
7439-92-1	Lead	3.0	U	*	P
7439-95-4	Magnesium	1730	B		P
7439-96-5	Manganese	29.3			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	2.2	B		P
7440-09-7	Potassium	1370	B		P
7782-49-2	Selenium	1.6	U		P
7440-22-4	Silver	1.7	U		P
7440-23-5	Sodium	2800	B		P
7440-28-0	Thallium	4.3	U		P
7440-62-2	Vanadium	1.2	U		P
7440-66-6	Zinc	32.4		*	P

Color Before: COLORLESS Clarity Before: CLOUDY Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

2-SW-48

Lab Name: CHEMTECH EDISON Contract: 68-W00-088

Lab Code: CHEMED Case No.: SAS No.: SDG No.: N4953

Matrix (soil/water): WATER Lab Sample ID: N4953-02 S

Level (low/med): LOW Date Received: 06/25/01

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	34.7	B	N*E	P
7440-36-0	Antimony	8.9	U		P
7440-38-2	Arsenic	6.2	U		P
7440-39-3	Barium	17.1	B		P
7440-41-7	Beryllium	0.10	U		P
7440-43-9	Cadmium	0.60	U		P
7440-70-2	Calcium	9800			P
7440-47-3	Chromium	0.86	B		P
7440-48-4	Cobalt	0.90	U		P
7440-50-8	Copper	1.5	U		P
7439-89-6	Iron	1800		E*N	P
7439-92-1	Lead	3.0	U	*	P
7439-95-4	Magnesium	2160	B		P
7439-96-5	Manganese	13.5	B		P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	1.6	B		P
7440-09-7	Potassium	2140	B		P
7782-49-2	Selenium	1.6	U		P
7440-22-4	Silver	1.7	U		P
7440-23-5	Sodium	3130	B		P
7440-28-0	Thallium	4.3	U		P
7440-62-2	Vanadium	1.2	U		P
7440-66-6	Zinc	23.7		*	P

Color Before: COLORLESS Clarity Before: CLOUDY Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

3-SW-48

Lab Name: CHEMTECH EDISON Contract: 68-W00-088

Lab Code: CHEMED Case No.: SAS No.: SDG No.: N4953

Matrix (soil/water): WATER Lab Sample ID: N4953-03 S

Level (low/med): LOW Date Received: 06/25/01

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	225		N*E	P
7440-36-0	Antimony	8.9	U		P
7440-38-2	Arsenic	6.2	U		P
7440-39-3	Barium	28.9	B		P
7440-41-7	Beryllium	0.10	U		P
7440-43-9	Cadmium	0.60	U		P
7440-70-2	Calcium	10200			P
7440-47-3	Chromium	3.6	B		P
7440-48-4	Cobalt	0.94	B		P
7440-50-8	Copper	2.9	B		P
7439-89-6	Iron	8190		E*N	P
7439-92-1	Lead	3.0	U	*	P
7439-95-4	Magnesium	2400	B		P
7439-96-5	Manganese	15.6			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	3.7	B		P
7440-09-7	Potassium	2020	B		P
7782-49-2	Selenium	1.6	U		P
7440-22-4	Silver	1.7	U		P
7440-23-5	Sodium	2950	B		P
7440-28-0	Thallium	4.3	U		P
7440-62-2	Vanadium	1.2	B		P
7440-66-6	Zinc	41.0		*	P

Color Before: COLORLESS Clarity Before: CLOUDY Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

4-SW-48

Lab Name: CHEMTECH EDISON Contract: 68-W00-088

Lab Code: CHEMED Case No.: SAS No.: SDG No.: N4953

Matrix (soil/water): WATER Lab Sample ID: N4953-04 S

Level (low/med): LOW Date Received: 06/25/01

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	239		N*E	P
7440-36-0	Antimony	8.9	U		P
7440-38-2	Arsenic	6.2	U		P
7440-39-3	Barium	23.1	B		P
7440-41-7	Beryllium	0.10	U		P
7440-43-9	Cadmium	0.60	U		P
7440-70-2	Calcium	7180			P
7440-47-3	Chromium	4.1	B		P
7440-48-4	Cobalt	0.90	U		P
7440-50-8	Copper	2.5	B		P
7439-89-6	Iron	7010		E*N	P
7439-92-1	Lead	3.0	U	*	P
7439-95-4	Magnesium	1760	B		P
7439-96-5	Manganese	30.2			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	3.0	B		P
7440-09-7	Potassium	1440	B		P
7782-49-2	Selenium	1.6	U		P
7440-22-4	Silver	1.7	U		P
7440-23-5	Sodium	2830	B		P
7440-28-0	Thallium	4.3	U		P
7440-62-2	Vanadium	2.4	B		P
7440-66-6	Zinc	33.1		*	P

Color Before: COLORLESS Clarity Before: CLOUDY Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

5-SW-48

Lab Name: CHEMTECH EDISON Contract: 68-W00-088

Lab Code: CHEMED Case No.: SAS No.: SDG No.: N4953

Matrix (soil/water): WATER Lab Sample ID: N4953-05 S

Level (low/med): LOW Date Received: 06/25/01

Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	237		N*E	P
7440-36-0	Antimony	8.9	U		P
7440-38-2	Arsenic	6.2	U		P
7440-39-3	Barium	37.4	B		P
7440-41-7	Beryllium	0.10	U		P
7440-43-9	Cadmium	0.60	U		P
7440-70-2	Calcium	2590	B		P
7440-47-3	Chromium	3.5	B		P
7440-48-4	Cobalt	1.2	B		P
7440-50-8	Copper	2.4	B		P
7439-89-6	Iron	2010		E*N	P
7439-92-1	Lead	3.0	U	*	P
7439-95-4	Magnesium	1840	B		P
7439-96-5	Manganese	17.8			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	2.3	B		P
7440-09-7	Potassium	1170	B		P
7782-49-2	Selenium	1.6	U		P
7440-22-4	Silver	1.7	U		P
7440-23-5	Sodium	3950	B		P
7440-28-0	Thallium	4.3	U		P
7440-62-2	Vanadium	1.6	B		P
7440-66-6	Zinc	27.2		*	P

Color Before: COLORLESS Clarity Before: CLOUDY Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

1-SW48-FB-1

Lab Name: CHEMTECH EDISON Contract: 68-W00-088

Lab Code: CHEMED Case No.: SAS No.: SDG No.: N4953

Matrix (soil/water): WATER Lab Sample ID: N4953-06 S

Level (low/med): LOW Date Received: 06/25/01

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	16.9	U	N*E	P
7440-36-0	Antimony	8.9	U		P
7440-38-2	Arsenic	6.2	U		P
7440-39-3	Barium	1.3	U		P
7440-41-7	Beryllium	0.10	U		P
7440-43-9	Cadmium	0.60	U		P
7440-70-2	Calcium	40.9	B		P
7440-47-3	Chromium	1.8	B		P
7440-48-4	Cobalt	0.90	U		P
7440-50-8	Copper	1.5	U		P
7439-89-6	Iron	15.8	U	E*N	P
7439-92-1	Lead	3.0	U	*	P
7439-95-4	Magnesium	16.2	U		P
7439-96-5	Manganese	0.20	U		P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	1.6	U		P
7440-09-7	Potassium	18.4	U		P
7782-49-2	Selenium	1.6	U		P
7440-22-4	Silver	1.7	U		P
7440-23-5	Sodium	357	U		P
7440-28-0	Thallium	4.3	U		P
7440-62-2	Vanadium	1.2	U		P
7440-66-6	Zinc	20.2		*	P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

I-SD48-FB-1

Lab Name: CHEMTECH EDISON Contract: 68-W00-088

Lab Code: CHEMED Case No.: SAS No.: SDG No.: N4953

Matrix (soil/water): WATER Lab Sample ID: N4953-07 S

Level (low/med): LOW Date Received: 06/25/01

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	49.5	B	N*E	P
7440-36-0	Antimony	8.9	U		P
7440-38-2	Arsenic	6.2	U		P
7440-39-3	Barium	2.7	B		P
7440-41-7	Beryllium	0.10	U		P
7440-43-9	Cadmium	0.60	U		P
7440-70-2	Calcium	701	B		P
7440-47-3	Chromium	3.1	B		P
7440-48-4	Cobalt	0.90	U		P
7440-50-8	Copper	5.3	B		P
7439-89-6	Iron	297		E*N	P
7439-92-1	Lead	3.0	U	*	P
7439-95-4	Magnesium	153	B		P
7439-96-5	Manganese	8.9	B		P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	6.3	B		P
7440-09-7	Potassium	131	B		P
7782-49-2	Selenium	1.6	U		P
7440-22-4	Silver	1.7	U		P
7440-23-5	Sodium	822	B		P
7440-28-0	Thallium	4.3	U		P
7440-62-2	Vanadium	1.2	U		P
7440-66-6	Zinc	49.8		*	P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

1-SD48

Lab Name: CHEMTECH EDISON Contract: 68-W00-088

Lab Code: CHEMED Case No.: SAS No.: SDG No.: N4953

Matrix (soil/water): SOIL Lab Sample ID: N4953-08 S

Level (low/med): LOW Date Received: 06/25/01

% Solids: 14.2

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	9180			P
7440-36-0	Antimony	6.2	U		P
7440-38-2	Arsenic	43.6		*	P
7440-39-3	Barium	141			P
7440-41-7	Beryllium	1.6	B		P
7440-43-9	Cadmium	0.42	U		P
7440-70-2	Calcium	3120	B		P
7440-47-3	Chromium	149			P
7440-48-4	Cobalt	7.3	B		P
7440-50-8	Copper	25.6			P
7439-89-6	Iron	204000		*	P
7439-92-1	Lead	29.3			P
7439-95-4	Magnesium	2920	B	*	P
7439-96-5	Manganese	113			P
7439-97-6	Mercury	0.09		N	CV
7440-02-0	Nickel	25.5	B		P
7440-09-7	Potassium	7130		*	P
7782-49-2	Selenium	1.1	U		P
7440-22-4	Silver	1.2	U		P
7440-23-5	Sodium	249	U		P
7440-28-0	Thallium	3.0	U		P
7440-62-2	Vanadium	63.2			P
7440-66-6	Zinc	392			P

DR 7/15/01

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

2-SD48

Lab Name: CHEMTECH EDISON Contract: 68-W00-088

Lab Code: CHEMED Case No.: SAS No.: SDG No.: N4953

Matrix (soil/water): SOIL Lab Sample ID: N4953-09 S

Level (low/med): LOW Date Received: 06/25/01

% Solids: 12.2

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	14900		*	P
7440-36-0	Antimony	7.2	U		P
7440-38-2	Arsenic	58.5			P
7440-39-3	Barium	121	B		P
7440-41-7	Beryllium	2.2	B		P
7440-43-9	Cadmium	1.0	B		P
7440-70-2	Calcium	4000	B		P
7440-47-3	Chromium	221			P
7440-48-4	Cobalt	10	B		P
7440-50-8	Copper	43.6			P
7439-89-6	Iron	227000			P
7439-92-1	Lead	88.2			P
7439-95-4	Magnesium	4620		*	P
7439-96-5	Manganese	141			P
7439-97-6	Mercury	0.15		N	CV
7440-02-0	Nickel	38.1			P
7440-09-7	Potassium	10900		*	P
7782-49-2	Selenium	6.6			P
7440-22-4	Silver	1.4	U		P
7440-23-5	Sodium	290	U		P
7440-28-0	Thallium	3.5	U		P
7440-62-2	Vanadium	109			P
7440-66-6	Zinc	620			P

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

3-SD48

Lab Name: CHEMTECH EDISON Contract: 68-W00-088

Lab Code: CHEMED Case No.: SAS No.: SDG No.: N4953

Matrix (soil/water): SOIL Lab Sample ID: N4953-10 S

Level (low/med): LOW Date Received: 06/25/01

% Solids: 9.0

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	7920		*	P
7440-36-0	Antimony	9.7	U		P
7440-38-2	Arsenic	77.6			P
7440-39-3	Barium	141	B		P
7440-41-7	Beryllium	1.5	B		P
7440-43-9	Cadmium	1.2	B		P
7440-70-2	Calcium	3980	B		P
7440-47-3	Chromium	120			P
7440-48-4	Cobalt	14.6	B		P
7440-50-8	Copper	41.4			P
7439-89-6	Iron	139000			P
7439-92-1	Lead	83.0			P
7439-95-4	Magnesium	2250	B	*	P
7439-96-5	Manganese	77.2			P
7439-97-6	Mercury	0.14		N	CV
7440-02-0	Nickel	51.1			P
7440-09-7	Potassium	4010	B	*	P
7782-49-2	Selenium	1.7	U		P
7440-22-4	Silver	1.9	U		P
7440-23-5	Sodium	389	U		P
7440-28-0	Thallium	4.7	U		P
7440-62-2	Vanadium	65.7			P
7440-66-6	Zinc	540			P

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

4-SD48

Lab Name: CHEMTECH EDISON Contract: 68-W00-088

Lab Code: CHEMED Case No.: SAS No.: SDG No.: N4953

Matrix (soil/water): SOIL Lab Sample ID: N4953-11 S

Level (low/med): LOW Date Received: 06/25/01

% Solids: 24.7

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	15900		*	P
7440-36-0	Antimony	3.5	U		P
7440-38-2	Arsenic	60.5			P
7440-39-3	Barium	139			P
7440-41-7	Beryllium	2.9			P
7440-43-9	Cadmium	0.41	B		P
7440-70-2	Calcium	4290			P
7440-47-3	Chromium	228			P
7440-48-4	Cobalt	5.9	B		P
7440-50-8	Copper	23.8			P
7439-89-6	Iron	87400			P
7439-92-1	Lead	53.1			P
7439-95-4	Magnesium	3910		*	P
7439-96-5	Manganese	32.6			P
7439-97-6	Mercury	0.06		N	CV
7440-02-0	Nickel	31.0			P
7440-09-7	Potassium	8290		*	P
7782-49-2	Selenium	0.63	U		P
7440-22-4	Silver	0.67	U		P
7440-23-5	Sodium	140	U		P
7440-28-0	Thallium	1.7	U		P
7440-62-2	Vanadium	109			P
7440-66-6	Zinc	208			P

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

5-SD48

Lab Name: CHEMTECH EDISON Contract: 68-W00-088

Lab Code: CHEMED Case No.: SAS No.: SDG No.: N4953

Matrix (soil/water): SOIL Lab Sample ID: N4953-12 S

Level (low/med): LOW Date Received: 06/25/01

% Solids: 75.1

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	2120		*	P
7440-36-0	Antimony	1.2	U		P
7440-38-2	Arsenic	24.8			P
7440-39-3	Barium	24.4	B		P
7440-41-7	Beryllium	0.32	B		P
7440-43-9	Cadmium	0.08	U		P
7440-70-2	Calcium	458	B		P
7440-47-3	Chromium	30.2			P
7440-48-4	Cobalt	0.31	B		P
7440-50-8	Copper	2.4	B		P
7439-89-6	Iron	17100			P
7439-92-1	Lead	12.8			P
7439-95-4	Magnesium	377	B	*	P
7439-96-5	Manganese	5.3			P
7439-97-6	Mercury	0.01	U	N	CV
7440-02-0	Nickel	1.4	B		P
7440-09-7	Potassium	982		*	P
7782-49-2	Selenium	0.21	U		P
7440-22-4	Silver	0.23	U		P
7440-23-5	Sodium	47.6	U		P
7440-28-0	Thallium	0.57	U		P
7440-62-2	Vanadium	17.1			P
7440-66-6	Zinc	11.0			P

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

CHEMTECH

LABORATORY REPORT

CLIENT: EA Engineering, Science and Technology, Inc.

ATTN.: C. Napoletano

NWS Earle

LAB RECEIVING #: N4953

Analysis Meth.: 150.1

Matrix: Water
Unit: ph Units

Analyzed: 6/26/01
Analyst: sejal

	Lab Sample ID:		N4953-01	N4953-02	N4953-03	N4953-04	
	Client Sample ID:	Method Blank	1-SW48	2-SW-48	3-SW-48	4-SW-48	**Detection Limit**
OMPOUNDS:	**D.F.:**		1	1	1	1	
pH			6.44	6.67	6.87	6.25	

	Lab Sample ID:		N4953-05	N4953-06	
	Client Sample ID:	Method Blank	5-SW-48	1-SW48-FB-1	**Detection Limit**
COMPOUNDS:	**D.F.:**		1	1	
			6.07	6.2	

☐ 110 Route 4
Englewood, New Jersey 07631
Phone: 201.568.7400 Fax: 201.567.3231

☑ 205 Campus Plaza 1
Edison, NJ 08837
Phone: 732.225.4111 Fax: 732.225.4110

NYSDOH Certification No. 10624

NYSDOH Certification No. 11376
NJDEP Certification No. 12013

CHEMTECH

LABORATORY REPORT

CLIENT: EA Engineering, Science and Technology, Inc.

ATTN.: C. Napoletano

NWS Earle

LAB RECEIVING #: N4953

Analysis Meth.: 160.3

Matrix: Solid
Unit: %

Analyzed: 6/27/01
Analyst: PRAMIT

	Lab Sample ID:		N4953-08	N4953-09	N4953-10	N4953-11	
	Client Sample ID:	Method Blank	1-SD48	2-SD48	3-SD48	4-SD48	**Detection Limit**
COMPOUNDS:	**D.F.:**		1	1	1	1	
Percent Solids			14.2	12.2	9.00	24.7	

	Lab Sample ID:		N4953-12	
	Client Sample ID:	Method Blank	5-SD48	**Detection Limit**
COMPOUNDS:	**D.F.:**		1	
Percent Solids			75.1	

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NYSDOH Certification No. 11376
NJDEP Certification No. 12013

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

1-WP48

Lab Name: CHEMTECH EDISON Contract: 68-W00-088

Lab Code: CHEMED Case No.: SAS No.: SDG No.: N4920

Matrix (soil/water): WATER Lab Sample ID: N4920-01 S

Level (low/med): LOW Date Received: 06/22/01

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	1490		N*E	P
7440-36-0	Antimony	8.9	U		P
7440-38-2	Arsenic	11.7			P
7440-39-3	Barium	222			P
7440-41-7	Beryllium	0.18	B		P
7440-43-9	Cadmium	0.60	U		P
7440-70-2	Calcium	7060			P
7440-47-3	Chromium	36.9			P
7440-48-4	Cobalt	0.90	U		P
7440-50-8	Copper	8.1	B		P
7439-89-6	Iron	15200		N*E	P
7439-92-1	Lead	11.3		*	P
7439-95-4	Magnesium	1480	B		P
7439-96-5	Manganese	32.4			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	2.7	B		P
7440-09-7	Potassium	1210	B		P
7782-49-2	Selenium	2.2	B		P
7440-22-4	Silver	1.7	U		P
7440-23-5	Sodium	6930			P
7440-28-0	Thallium	4.3	U		P
7440-62-2	Vanadium	24.2	B		P
7440-66-6	Zinc	25.1		*	P

Color Before: COLORLESS Clarity Before: CLOUDY Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

2-WP48

Lab Name: CHEMTECH EDISON Contract: 68-W00-088

Lab Code: CHEMED Case No.: SAS No.: SDG No.: N4920

Matrix (soil/water): WATER Lab Sample ID: N4920-02 S

Level (low/med): LOW Date Received: 06/22/01

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	931		N*E	P
7440-36-0	Antimony	8.9	U		P
7440-38-2	Arsenic	8.5	B		P
7440-39-3	Barium	146	B		P
7440-41-7	Beryllium	0.14	B		P
7440-43-9	Cadmium	0.60	U		P
7440-70-2	Calcium	4150	B		P
7440-47-3	Chromium	15.5			P
7440-48-4	Cobalt	0.90	U		P
7440-50-8	Copper	3.0	B		P
7439-89-6	Iron	3950		N*E	P
7439-92-1	Lead	3.0	U	*	P
7439-95-4	Magnesium	894	B		P
7439-96-5	Manganese	18.0			P
7439-97-6	Mercury	0.22			CV
7440-02-0	Nickel	3.1	B		P
7440-09-7	Potassium	1380	B		P
7782-49-2	Selenium	1.6	U		P
7440-22-4	Silver	1.7	U		P
7440-23-5	Sodium	5990			P
7440-28-0	Thallium	4.3	U		P
7440-62-2	Vanadium	6.9	B		P
7440-66-6	Zinc	48.2		*	P

Color Before: COLORLESS Clarity Before: CLOUDY Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

3-WP48

Lab Name: CHEMTECH EDISON Contract: 68-W00-088

Lab Code: CHEMED Case No.: SAS No.: SDG No.: N4920

Matrix (soil/water): WATER Lab Sample ID: N4920-03 S

Level (low/med): LOW Date Received: 06/22/01

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	8250		N*E	P
7440-36-0	Antimony	8.9	U		P
7440-38-2	Arsenic	57.8			P
7440-39-3	Barium	281			P
7440-41-7	Beryllium	2.1	B		P
7440-43-9	Cadmium	0.64	B		P
7440-70-2	Calcium	17600			P
7440-47-3	Chromium	254			P
7440-48-4	Cobalt	10.1	B		P
7440-50-8	Copper	20.8	B		P
7439-89-6	Iron	83500		N*E	P
7439-92-1	Lead	36.2		*	P
7439-95-4	Magnesium	4100	B		P
7439-96-5	Manganese	219			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	35.2	B		P
7440-09-7	Potassium	8600			P
7782-49-2	Selenium	1.7	B		P
7440-22-4	Silver	1.7	U		P
7440-23-5	Sodium	4740	B		P
7440-28-0	Thallium	4.3	U		P
7440-62-2	Vanadium	151			P
7440-66-6	Zinc	367		*	P

Color Before: GREY Clarity Before: CLOUDY Texture:

Color After: YELLOW Clarity After: CLEAR Artifacts:

Comments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

DUP1-WP48

Lab Name: CHEMTECH EDISON Contract: 68-W00-088

Lab Code: CHEMED Case No.: SAS No.: SDG No.: N4920

Matrix (soil/water): WATER Lab Sample ID: N4920-04 S

Level (low/med): LOW Date Received: 06/22/01

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	509		N*E	P
7440-36-0	Antimony	8.9	U		P
7440-38-2	Arsenic	6.2	U		P
7440-39-3	Barium	158	B		P
7440-41-7	Beryllium	0.11	B		P
7440-43-9	Cadmium	0.60	U		P
7440-70-2	Calcium	4600	B		P
7440-47-3	Chromium	9.5	B		P
7440-48-4	Cobalt	1.1	B		P
7440-50-8	Copper	3.9	B		P
7439-89-6	Iron	3070		N*E	P
7439-92-1	Lead	3.0	U	*	P
7439-95-4	Magnesium	876	B		P
7439-96-5	Manganese	19.7			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	4.5	B		P
7440-09-7	Potassium	1220	B		P
7782-49-2	Selenium	1.6	U		P
7440-22-4	Silver	1.7	U		P
7440-23-5	Sodium	6740			P
7440-28-0	Thallium	4.3	U		P
7440-62-2	Vanadium	5.1	B		P
7440-66-6	Zinc	49.2		*	P

Color Before: COLORLESS Clarity Before: CLOUDY Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.
TIRPBLANK

Lab Name: CHEMTECH Contract: EA ENGINEERING SCIEN

Project No.: N4920 Site: NWS EARL Location: LB14750 Group: 5970-VOA

Matrix: (soil/water) WATER Lab Sample ID: O16

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VG062723.D

Level: (low/med) Date Received: 6/22/01

% Moisture: not dec. 100 Date Analyzed: 6/28/01

GC Column: RTX624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
75-71-8	Dichlorodifluoromethane	3.3	U
74-87-3	Chloromethane	2.8	U
75-01-4	Vinyl Chloride	1.8	U
74-83-9	Bromomethane	1.9	U
75-00-3	Chloroethane	2.3	U
75-69-4	Trichlorofluoromethane	1	U
75-35-4	1,1-Dichloroethene	1.6	U
67-64-1	Acetone	5.8	U
75-15-0	Carbon Disulfide	1	U
75-09-2	Methylene Chloride	1.1	U
156-60-5	trans-1,2-Dichloroethene	1.7	U
108-05-4	Vinyl Acetate	6.1	U
75-34-3	1,1-Dichloroethane	1	U
78-93-3	2-Butanone	5.6	U
594-20-7	2,2-Dichloropropane	1.1	U
156-59-2	cis-1,2-Dichloroethene	1.8	U
74-97-5	Bromochloromethane	1.6	U
67-66-3	Chloroform	1	U
71-55-6	1,1,1-Trichloroethane	1.5	U
563-58-6	1,1-Dichloropropene	1.3	U
56-23-5	Carbon Tetrachloride	1	U
71-43-2	Benzene	1	U
107-06-2	1,2-Dichloroethane	2.5	U
79-01-6	Trichloroethene	2.8	U
78-87-5	1,2-Dichloropropane	3.6	U
74-95-3	Dibromomethane	1	U
75-27-4	Bromodichloromethane	1	U
108-10-1	4-Methyl-2-Pentanone	3	U
108-88-3	Toluene	1.2	U
10061-02-6	t-1,3-Dichloropropene	1.7	U
10061-01-5	cis-1,3-Dichloropropene	1	U
79-00-5	1,1,2-Trichloroethane	1.1	U
142-28-9	1,3-Dichloropropane	1	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.
TIRPBLANK

Lab Name: CHEMTECH Contract: EA ENGINEERING SCIEN

Project No.: N4920 Site: NWS EARL Location: LB14750 Group: 5970-VOA

Matrix: (soil/water) WATER Lab Sample ID: O16

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VG062723.D

Level: (low/med) Date Received: 6/22/01

% Moisture: not dec. 100 Date Analyzed: 6/28/01

GC Column: RTX624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
110-75-8	2-Chloroethyl vinyl ether	9.6	U
591-78-6	2-Hexanone	12	U
124-48-1	Dibromochloromethane	1	U
106-93-4	1,2-Dibromoethane	1	U
127-18-4	Tetrachloroethene	1.6	U
108-90-7	Chlorobenzene	1	U
630-20-6	1,1,1,2-Tetrachloroethane	1.5	U
100-41-4	Ethyl Benzene	1.5	U
136777-61-2	m/p-Xylenes	1.5	U
95-47-6	o-Xylene	1.7	U
100-42-5	Styrene	1	U
75-25-2	Bromoform	1	U
98-82-8	Isopropylbenzene	1	U
79-34-5	1,1,2,2-Tetrachloroethane	2.2	U
96-18-4	1,2,3-Trichloropropane	2.2	U
108-86-1	Bromobenzene	1	U
103-65-1	n-propylbenzene	1	U
95-49-8	2-Chlorotoluene	1	U
108-67-8	1,3,5-Trimethylbenzene	1	U
106-43-4	4-Chlorotoluene	1	U
98-06-6	tert-Butylbenzene	1	U
95-63-6	1,2,4-Trimethylbenzene	1	U
135-98-8	sec-Butylbenzene	1	U
99-87-6	p-Isopropyltoluene	1	U
541-73-1	1,3-Dichlorobenzene	1	U
106-46-7	1,4-Dichlorobenzene	1	U
104-51-8	n-Butylbenzene	1	U
95-50-1	1,2-Dichlorobenzene	1	U
96-12-8	1,2-Dibromo-3-Chloropropane	2.1	U
120-82-1	1,2,4-Trichlorobenzene	1	U
87-68-3	Hexachlorobutadiene	1	U
91-20-3	Naphthalene	1	U
1634-04-4	Methyl tert-butyl Ether	1	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.
TIRPBLANK

Lab Name: CHEMTECH Contract: EA ENGINEERING SCIEN

Project No.: N4920 Site: NWS EARL Location: LB14750 Group: 5970-VOA

Matrix: (soil/water) WATER Lab Sample ID: O16

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: VG062723.D

Level: (low/med) Date Received: 6/22/01

% Moisture: not dec. 100 Date Analyzed: 6/28/01

GC Column: RTX624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
87-61-6	1,2,3-Trichlorobenzene	1.6	U

CHEMTECH

LABORATORY REPORT

CLIENT: EA Engineering, Science and Technology, Inc.

LAB RECEIVING #: N4920

ATTN.: C. Napoletano

NWS Earle

Analysis Meth.: 150.1

Matrix: Water
Unit: ph Units

Analyzed: 6/25/01
Analyst: sejal

	Lab Sample ID:		N4920-01	N4920-02	N4920-03	N4920-04	**Detection Limit**
	Client Sample ID:	Method Blank	1-WP48	2-WP48	3-WP48	DUP1-WP48	
COMPOUNDS:	**D.F.:**		1	1	1	1	
pH			4.2	4.5	4.3	4.8	

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NJDEP Certification No. 12013

CHEMTECH, 284 Sheffield Street, Mountainside, NJ 07092. Tel.(908) 789-8900, Fax(908) 789-8922.

Tabulated Analytical Report
PESTICIDES

Project Name: NWS EARLE
Client: EA ENGINEERING, SCIEN
Client ID: 8-WP47
Lab ID: N4920-10
Filename: 3PS9828.D
Lab Project No: N4920

MATRIX: WATER
Date extracted: 6/28/2001
Ext. Batch: PB 062801-06
Date Analyzed: 7/6/2001
Dilution: 1
QC Batch: LB 14760
Analyst: A.A.

CAS #	COMPOUNDS	RESULTS (ug/L) PRIMARY	RESULTS (ug/L) CONFIRMATION	Q	MDL MDL (ug/L)
319-84-6	alpha-BHC	U	U		0.05
58-89-9	gamma-BHC (Lindane)	U	U		0.05
76-44-8	Heptachlor	U	U		0.05
309-00-2	Aldrin	U	U		0.05
319-85-7	beta-BHC	U	U		0.05
319-86-8	delta-BHC	U	U		0.05
1024-57-3	Heptachlor epoxide	U	U		0.05
959-98-8	Endosulfan I	U	U		0.05
5103-71-9	gamma-Chlordane	.07	.06		0.05
5103-74-2	alpha-Chlordane	.03	.06		0.05
72-55-9	4,4'-DDE	U	U		0.05
60-57-1	Dieldrin	U	U		0.05
72-20-8	Endrin	U	U		0.05
33213-65-9	Endosulfan II	U	U		0.05
72-54-8	4,4'-DDD	U	U		0.05
50-29-3	4,4'-DDT	U	U		0.05
7421-93-4	Endrin aldehyde	U	U		0.05
1031-07-8	Endosulfan Sulfate	U	U		0.05
72-43-5	Methoxychlor	U	U		0.05
53494-70-5	Endrin ketone	U	U		0.05
8001-35-2	Toxaphene	U	U		0.05

MDL = METHOD DETECTION LIMIT
U =UNDETECTED BELOW THE MDL
B = PRESENT IN THE ASSOCIATED BLANK
E = EXCEEDED CALIBRATION RANGE, DILUTION TO FOLLOW
D = DILUTION

Initial vol.: 1000.00
Final vol.: 10

Tabulated Analytical Report
PESTICIDES

Project Name: NWS EARLE
Client: EA ENGINEERING, SCIEN
Client ID: 9-WP47
Lab ID: N4920-11
Filename: 3PS9829.D
Lab Project No: N4920

MATRIX: WATER
Date extracted: 6/28/2001
Ext. Batch: PB 062801-06
Date Analyzed: 7/6/2001
Dilution: 1
QC Batch: LB 14760
Analyst: A.A.

CAS #	COMPOUNDS	RESULTS (ug/L) PRIMARY	RESULTS (ug/L) CONFIRMATION	Q	MDL MDL (ug/L)
319-84-6	alpha-BHC	U	U		0.05
58-89-9	gamma-BHC (Lindane)	U	U		0.05
76-44-8	Heptachlor	U	U		0.05
309-00-2	Aldrin	U	U		0.05
319-85-7	beta-BHC	U	U		0.05
319-86-8	delta-BHC	U	U		0.05
1024-57-3	Heptachlor epoxide	U	U		0.05
959-98-8	Endosulfan I	U	U		0.05
5103-71-9	gamma-Chlordane	.09	.08		0.05
5103-74-2	alpha-Chlordane	.03	.07		0.05
72-55-9	4,4'-DDE	U	U		0.05
60-57-1	Dieldrin	U	U		0.05
72-20-8	Endrin	U	U		0.05
33213-65-9	Endosulfan II	U	U		0.05
72-54-8	4,4'-DDD	U	U		0.05
50-29-3	4,4'-DDT	U	U		0.05
7421-93-4	Endrin aldehyde	U	U		0.05
1031-07-8	Endosulfan Sulfate	U	U		0.05
72-43-5	Methoxychlor	U	U		0.05
53494-70-5	Endrin ketone	U	U		0.05
8001-35-2	Toxaphene	U	U		0.05

MDL = METHOD DETECTION LIMIT
U =UNDETECTED BELOW THE MDL
B = PRESENT IN THE ASSOCIATED BLANK
E = EXCEEDED CALIBRATION RANGE, DILUTION TO FOLLOW
D = DILUTION

Initial vol.: 1000.00
Final vol.: 10

CHEMTECH, 284 Sheffield Street, Mountainside, NJ 07092. Tel.(908) 789-8900, Fax(908) 789-8922.

Tabulated Analytical Report
PESTICIDES

Project Name: NWS EARLE
Client: EA ENGINEERING, SCIEN
Client ID: 10-WP47
Lab ID: N4920-12
Filename: 3PS9830.D
Lab Project No: N4920

MATRIX: WATER
Date extracted: 6/28/2001
Ext. Batch: PB 062801-06
Date Analyzed: 7/6/2001
Dilution: 1
QC Batch: LB 14760
Analyst: A.A.

CAS #	COMPOUNDS	RESULTS (ug/L) PRIMARY	RESULTS (ug/L) CONFIRMATION	Q	MDL MDL (ug/L)
319-84-6	alpha-BHC	U	U		0.05
58-89-9	gamma-BHC (Lindane)	U	U		0.05
76-44-8	Heptachlor	U	U		0.05
309-00-2	Aldrin	U	U		0.05
319-85-7	beta-BHC	U	U		0.05
319-86-8	delta-BHC	U	U		0.05
1024-57-3	Heptachlor epoxide	U	U		0.05
959-98-8	Endosulfan I	U	U		0.05
5103-71-9	gamma-Chlordane	.10	.08		0.05
5103-74-2	alpha-Chlordane	.06	.08		0.05
72-55-9	4,4'-DDE	U	U		0.05
60-57-1	Dieldrin	U	U		0.05
72-20-8	Endrin	U	U		0.05
33213-65-9	Endosulfan II	U	U		0.05
72-54-8	4,4'-DDD	U	U		0.05
50-29-3	4,4'-DDT	U	U		0.05
7421-93-4	Endrin aldehyde	U	U		0.05
1031-07-8	Endosulfan Sulfate	U	U		0.05
72-43-5	Methoxychlor	U	U		0.05
53494-70-5	Endrin ketone	U	U		0.05
8001-35-2	Toxaphene	U	U		0.05

MDL = METHOD DETECTION LIMIT
U =UNDETECTED BELOW THE MDL
B = PRESENT IN THE ASSOCIATED BLANK
E = EXCEEDED CALIBRATION RANGE, DILUTION TO FOLLOW
D = DILUTION

Initial vol.: 1000.00
Final vol.: 10

CHEMTECH, 284 Sheffield Street, Mountainside, NJ 07092. Tel.(908) 789-8900, Fax(908) 789-8922.

Tabulated Analytical Report
PESTICIDES

Project Name: NWS EARLE
Client: EA ENGINEERING, SCIEN
Client ID: DUP3-WP47
Lab ID: N4920-15
Filename: 3PS9831.D
Lab Project No: N4920

MATRIX: WATER
Date extracted: 6/28/2001
Ext. Batch: PB 062801-06
Date Analyzed: 7/6/2001
Dilution: 1
QC Batch: LB 14760
Analyst: A.A.

CAS #	COMPOUNDS	RESULTS (ug/L) PRIMARY	RESULTS (ug/L) CONFIRMATION	Q	MDL MDL (ug/L)
319-84-6	alpha-BHC	U	U		0.05
58-89-9	gamma-BHC (Lindane)	U	U		0.05
76-44-8	Heptachlor	U	U		0.05
309-00-2	Aldrin	U	U		0.05
319-85-7	beta-BHC	U	U		0.05
319-86-8	delta-BHC	U	U		0.05
1024-57-3	Heptachlor epoxide	U	U		0.05
959-98-8	Endosulfan I	U	U		0.05
5103-71-9	gamma-Chlordane	.09	.09		0.05
5103-74-2	alpha-Chlordane	.07	.09		0.05
72-55-9	4,4'-DDE	U	U		0.05
60-57-1	Dieldrin	U	U		0.05
72-20-8	Endrin	U	U		0.05
33213-65-9	Endosulfan II	U	U		0.05
72-54-8	4,4'-DDD	U	U		0.05
50-29-3	4,4'-DDT	U	U		0.05
7421-93-4	Endrin aldehyde	U	U		0.05
1031-07-8	Endosulfan Sulfate	U	U		0.05
72-43-5	Methoxychlor	U	U		0.05
53494-70-5	Endrin ketone	U	U		0.05
8001-35-2	Toxaphene	U	U		0.05

MDL = METHOD DETECTION LIMIT
U =UNDETECTED BELOW THE MDL
B = PRESENT IN THE ASSOCIATED BLANK
E = EXCEEDED CALIBRATION RANGE, DILUTION TO FOLLOW
D = DILUTION

Initial vol.: 1000.00
Final vol.: 10

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

3-TP48-3A(SURFACE)

Lab Name: CHEMTECH EDISON

Contract: 68-W00-088

Lab Code: CHEMED Case No.: SAS No.: SDG No.: N4876

Matrix (soil/water): SOIL Lab Sample ID: N4876-01 S

Level (low/med): LOW Date Received: 06/20/01

% Solids: 84.9

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	1050			P
7440-36-0	Antimony	0.53	B		P
7440-38-2	Arsenic	5.9			P
7440-39-3	Barium	11.6	B		P
7440-41-7	Beryllium	0.09	B		P
7440-43-9	Cadmium	0.08	U		P
7440-70-2	Calcium	327	B		P
7440-47-3	Chromium	18.1			P
7440-48-4	Cobalt	0.37	B		P
7440-50-8	Copper	3.6			P
7439-89-6	Iron	10100			P
7439-92-1	Lead	9.8			P
7439-95-4	Magnesium	177	B		P
7439-96-5	Manganese	9.0			P
7439-97-6	Mercury	0.03			CV
7440-02-0	Nickel	0.37	B		P
7440-09-7	Potassium	237	B		P
7782-49-2	Selenium	0.33	B		P
7440-22-4	Silver	0.46	U		P
7440-23-5	Sodium	56.6	U		P
7440-28-0	Thallium	0.66	U		P
7440-62-2	Vanadium	11.5		N	P
7440-66-6	Zinc	40.6		N	P

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

3-TP48-3B(SURFACE)

Lab Name: CHEMTECH EDISON

Contract: 68-W00-088

Lab Code: CHEMED Case No.: SAS No.: SDG No.: N4876

Matrix (soil/water): SOIL Lab Sample ID: N4876-02 S

Level (low/med): LOW Date Received: 06/20/01

% Solids: 62.3

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	9390			P
7440-36-0	Antimony	5.2	B		P
7440-38-2	Arsenic	101			P
7440-39-3	Barium	3.8	B		P
7440-41-7	Beryllium	0.91			P
7440-43-9	Cadmium	1.3			P
7440-70-2	Calcium	534	B		P
7440-47-3	Chromium	278			P
7440-48-4	Cobalt	1.7	B		P
7440-50-8	Copper	5.0			P
7439-89-6	Iron	83900			P
7439-92-1	Lead	11.3			P
7439-95-4	Magnesium	1900			P
7439-96-5	Manganese	0.19	U		P
7439-97-6	Mercury	0.02			CV
7440-02-0	Nickel	0.47	U		P
7440-09-7	Potassium	4560			P
7782-49-2	Selenium	0.47	B		P
7440-22-4	Silver	0.63	U		P
7440-23-5	Sodium	77.1	U		P
7440-28-0	Thallium	0.90	U		P
7440-62-2	Vanadium	112		N	P
7440-66-6	Zinc	53.0		N	P

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

4-TP48-4A(SURFACE)

Lab Name: CHEMTECH EDISON

Contract: 68-W00-088

Lab Code: CHEMED Case No.: SAS No.: SDG No.: N4876

Matrix (soil/water): SOIL Lab Sample ID: N4876-03 S

Level (low/med): LOW Date Received: 06/20/01

% Solids: 65.8

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	6660			P
7440-36-0	Antimony	3.5	B		P
7440-38-2	Arsenic	46.6			P
7440-39-3	Barium	9.9	B		P
7440-41-7	Beryllium	0.66	B		P
7440-43-9	Cadmium	1.1			P
7440-70-2	Calcium	1640			P
7440-47-3	Chromium	192			P
7440-48-4	Cobalt	1.6	B		P
7440-50-8	Copper	3.3	B		P
7439-89-6	Iron	77700			P
7439-92-1	Lead	11.4			P
7439-95-4	Magnesium	1430			P
7439-96-5	Manganese	25.6			P
7439-97-6	Mercury	0.03			CV
7440-02-0	Nickel	0.45	U		P
7440-09-7	Potassium	3040			P
7782-49-2	Selenium	0.33	U		P
7440-22-4	Silver	0.60	U		P
7440-23-5	Sodium	73.8	U		P
7440-28-0	Thallium	0.86	U		P
7440-62-2	Vanadium	79.7		N	P
7440-66-6	Zinc	35.6		N	P

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

4-TP48-4B(SURFACE)

Lab Name: CHEMTECH EDISON

Contract: 68-W00-088

Lab Code: CHEMED Case No.: SAS No.: SDG No.: N4876

Matrix (soil/water): SOIL Lab Sample ID: N4876-04 S

Level (low/med): LOW Date Received: 06/20/01

% Solids: 72.2

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	2990			P
7440-36-0	Antimony	1.8	B		P
7440-38-2	Arsenic	14.5			P
7440-39-3	Barium	135			P
7440-41-7	Beryllium	0.64	B		P
7440-43-9	Cadmium	0.96			P
7440-70-2	Calcium	1420			P
7440-47-3	Chromium	76.6			P
7440-48-4	Cobalt	1.9	B		P
7440-50-8	Copper	6.0			P
7439-89-6	Iron	68400			P
7439-92-1	Lead	22.3			P
7439-95-4	Magnesium	429	B		P
7439-96-5	Manganese	7.0			P
7439-97-6	Mercury	0.04			CV
7440-02-0	Nickel	0.41	U		P
7440-09-7	Potassium	1300			P
7782-49-2	Selenium	0.30	U		P
7440-22-4	Silver	0.54	U		P
7440-23-5	Sodium	66.6	U		P
7440-28-0	Thallium	0.77	U		P
7440-62-2	Vanadium	39.8		N	P
7440-66-6	Zinc	96.5		N	P

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

6-TP48-6A(SURFACE)

Lab Name: CHEMTECH EDISON

Contract: 68-W00-088

Lab Code: CHEMED Case No.: SAS No.: SDG No.: N4876

Matrix (soil/water): SOIL Lab Sample ID: N4876-05 S

Level (low/med): LOW Date Received: 06/20/01

% Solids: 82.1

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	3110			P
7440-36-0	Antimony	1.4	B		P
7440-38-2	Arsenic	18.9			P
7440-39-3	Barium	42.6			P
7440-41-7	Beryllium	0.41	B		P
7440-43-9	Cadmium	0.16	B		P
7440-70-2	Calcium	318	B		P
7440-47-3	Chromium	93.4			P
7440-48-4	Cobalt	1.1	B		P
7440-50-8	Copper	3.0	B		P
7439-89-6	Iron	30600			P
7439-92-1	Lead	8.5			P
7439-95-4	Magnesium	1020			P
7439-96-5	Manganese	7.6			P
7439-97-6	Mercury	0.01			CV
7440-02-0	Nickel	0.36	U		P
7440-09-7	Potassium	3110			P
7782-49-2	Selenium	0.27	U		P
7440-22-4	Silver	0.48	U		P
7440-23-5	Sodium	59.1	U		P
7440-28-0	Thallium	0.69	U		P
7440-62-2	Vanadium	37.3		N	P
7440-66-6	Zinc	23.6		N	P

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

6-TP48-6B(SURFACE)

Lab Name: CHEMTECH EDISON

Contract: 68-W00-088

Lab Code: CHEMED Case No.: SAS No.: SDG No.: N4876

Matrix (soil/water): SOIL Lab Sample ID: N4876-06 S

Level (low/med): LOW Date Received: 06/20/01

% Solids: 74.4

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	2770			P
7440-36-0	Antimony	2.0	B		P
7440-38-2	Arsenic	29.2			P
7440-39-3	Barium	60.6			P
7440-41-7	Beryllium	0.30	B		P
7440-43-9	Cadmium	0.15	B		P
7440-70-2	Calcium	95.2	B		P
7440-47-3	Chromium	85.7			P
7440-48-4	Cobalt	1.1	B		P
7440-50-8	Copper	10.9			P
7439-89-6	Iron	34100			P
7439-92-1	Lead	16.1			P
7439-95-4	Magnesium	674			P
7439-96-5	Manganese	2.4			P
7439-97-6	Mercury	0.03			CV
7440-02-0	Nickel	0.39	U		P
7440-09-7	Potassium	1960			P
7782-49-2	Selenium	0.52	B		P
7440-22-4	Silver	0.52	U		P
7440-23-5	Sodium	64.0	U		P
7440-28-0	Thallium	0.74	U		P
7440-62-2	Vanadium	30.1		N	P
7440-66-6	Zinc	43.6		N	P

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

11-TP48-11A(SURFACE)

Lab Name: CHEMTECH EDISON

Contract: 68-W00-088

Lab Code: CHEMED Case No.: SAS No.: SDG No.: N4876

Matrix (soil/water): SOIL Lab Sample ID: N4876-07 S

Level (low/med): LOW Date Received: 06/20/01

% Solids: 87.0

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	680			P
7440-36-0	Antimony	0.42	U		P
7440-38-2	Arsenic	3.3			P
7440-39-3	Barium	8.0	B		P
7440-41-7	Beryllium	0.05	B		P
7440-43-9	Cadmium	0.08	U		P
7440-70-2	Calcium	144	B		P
7440-47-3	Chromium	10.8			P
7440-48-4	Cobalt	0.27	B		P
7440-50-8	Copper	2.8	B		P
7439-89-6	Iron	4870			P
7439-92-1	Lead	14.8			P
7439-95-4	Magnesium	93.7	B		P
7439-96-5	Manganese	3.9			P
7439-97-6	Mercury	0.03			CV
7440-02-0	Nickel	0.99	B		P
7440-09-7	Potassium	136	B		P
7782-49-2	Selenium	0.28	B		P
7440-22-4	Silver	0.45	U		P
7440-23-5	Sodium	55.2	U		P
7440-28-0	Thallium	0.64	U		P
7440-62-2	Vanadium	10.1		N	P
7440-66-6	Zinc	14.3		N	P

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

11-TP48-11B(SURFACE)

Lab Name: CHEMTECH EDISON

Contract: 68-W00-088

Lab Code: CHEMED Case No.: SAS No.: SDG No.: N4876

Matrix (soil/water): SOIL Lab Sample ID: N4876-08 S

Level (low/med): LOW Date Received: 06/20/01

% Solids: 82.1

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	6020			P
7440-36-0	Antimony	2.2	B		P
7440-38-2	Arsenic	18.8			P
7440-39-3	Barium	46.5			P
7440-41-7	Beryllium	0.91			P
7440-43-9	Cadmium	0.52	B		P
7440-70-2	Calcium	1550			P
7440-47-3	Chromium	129			P
7440-48-4	Cobalt	2.1	B		P
7440-50-8	Copper	6.9			P
7439-89-6	Iron	48500			P
7439-92-1	Lead	24.2			P
7439-95-4	Magnesium	2090			P
7439-96-5	Manganese	39.8			P
7439-97-6	Mercury	0.06			CV
7440-02-0	Nickel	2.4	B		P
7440-09-7	Potassium	5660			P
7782-49-2	Selenium	0.26	U		P
7440-22-4	Silver	0.48	U		P
7440-23-5	Sodium	58.5	U		P
7440-28-0	Thallium	0.68	U		P
7440-62-2	Vanadium	49.2		N	P
7440-66-6	Zinc	93.1		N	P

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

17-TP48-17A(SURFACE)

Lab Name: CHEMTECH EDISON

Contract: 68-W00-088

Lab Code: CHEMED Case No.: SAS No.: SDG No.: N4876

Matrix (soil/water): SOIL Lab Sample ID: N4876-09 S

Level (low/med): LOW Date Received: 06/20/01

% Solids: 63.5

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	3640			P
7440-36-0	Antimony	1.9	B		P
7440-38-2	Arsenic	20.1			P
7440-39-3	Barium	69.8			P
7440-41-7	Beryllium	0.69	B		P
7440-43-9	Cadmium	8.0			P
7440-70-2	Calcium	2040			P
7440-47-3	Chromium	120			P
7440-48-4	Cobalt	2.8	B		P
7440-50-8	Copper	56.6			P
7439-89-6	Iron	58800			P
7439-92-1	Lead	88.5			P
7439-95-4	Magnesium	718	B		P
7439-96-5	Manganese	178			P
7439-97-6	Mercury	0.50			CV
7440-02-0	Nickel	5.0	B		P
7440-09-7	Potassium	1580			P
7782-49-2	Selenium	0.34	U		P
7440-22-4	Silver	0.62	U		P
7440-23-5	Sodium	76.4	U		P
7440-28-0	Thallium	0.89	U		P
7440-62-2	Vanadium	57.5		N	P
7440-66-6	Zinc	963		N	P

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

18-TP48-18A(SURFACE)

Lab Name: CHEMTECH EDISON

Contract: 68-W00-088

Lab Code: CHEMED Case No.: SAS No.: SDG No.: N4876

Matrix (soil/water): SOIL Lab Sample ID: N4876-10 S

Level (low/med): LOW Date Received: 06/20/01

% Solids: 70.8

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	6610			P
7440-36-0	Antimony	3.6	B		P
7440-38-2	Arsenic	22.4			P
7440-39-3	Barium	60.3			P
7440-41-7	Beryllium	1.2			P
7440-43-9	Cadmium	11.8			P
7440-70-2	Calcium	2800			P
7440-47-3	Chromium	246			P
7440-48-4	Cobalt	6.1	B		P
7440-50-8	Copper	130			P
7439-89-6	Iron	84100			P
7439-92-1	Lead	523			P
7439-95-4	Magnesium	2130			P
7439-96-5	Manganese	638			P
7439-97-6	Mercury	2.9			CV
7440-02-0	Nickel	14.3			P
7440-09-7	Potassium	6070			P
7782-49-2	Selenium	0.31	U		P
7440-22-4	Silver	0.56	U		P
7440-23-5	Sodium	553	B		P
7440-28-0	Thallium	0.80	U		P
7440-62-2	Vanadium	89.6		N	P
7440-66-6	Zinc	2980		N	P

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

19-TP48-19A(SURFACE)

Lab Name: CHEMTECH EDISON

Contract: 68-W00-088

Lab Code: CHEMED Case No.: SAS No.: SDG No.: N4876

Matrix (soil/water): SOIL Lab Sample ID: N4876-11 S

Level (low/med): LOW Date Received: 06/20/01

% Solids: 68.5

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	7130			P
7440-36-0	Antimony	2.1	B		P
7440-38-2	Arsenic	32.8			P
7440-39-3	Barium	24.6	B		P
7440-41-7	Beryllium	0.79			P
7440-43-9	Cadmium	1.4			P
7440-70-2	Calcium	1000			P
7440-47-3	Chromium	154			P
7440-48-4	Cobalt	1.6	B		P
7440-50-8	Copper	6.2			P
7439-89-6	Iron	45500			P
7439-92-1	Lead	17.1			P
7439-95-4	Magnesium	2280			P
7439-96-5	Manganese	12.4			P
7439-97-6	Mercury	0.08			CV
7440-02-0	Nickel	2.2	B		P
7440-09-7	Potassium	4820			P
7782-49-2	Selenium	0.63	B		P
7440-22-4	Silver	0.57	U		P
7440-23-5	Sodium	69.5	U		P
7440-28-0	Thallium	1.5			P
7440-62-2	Vanadium	62.9		N	P
7440-66-6	Zinc	131		N	P

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

TP48-DUP-1

Lab Name: CHEMTECH EDISON Contract: 68-W00-088

Lab Code: CHEMED Case No.: SAS No.: SDG No.: N4876

Matrix (soil/water): SOIL Lab Sample ID: N4876-12 S

Level (low/med): LOW Date Received: 06/20/01

% Solids: 69.9

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	7050			P
7440-36-0	Antimony	2.8	B		P
7440-38-2	Arsenic	24.8			P
7440-39-3	Barium	99.8			P
7440-41-7	Beryllium	1.2			P
7440-43-9	Cadmium	26.2			P
7440-70-2	Calcium	2320			P
7440-47-3	Chromium	194			P
7440-48-4	Cobalt	4.0	B		P
7440-50-8	Copper	20.3			P
7439-89-6	Iron	68900			P
7439-92-1	Lead	40.8			P
7439-95-4	Magnesium	2210			P
7439-96-5	Manganese	271			P
7439-97-6	Mercury	0.14			CV
7440-02-0	Nickel	8.8			P
7440-09-7	Potassium	6380			P
7782-49-2	Selenium	0.30	U		P
7440-22-4	Silver	0.55	U		P
7440-23-5	Sodium	119	B		P
7440-28-0	Thallium	0.78	U		P
7440-62-2	Vanadium	70.1		N	P
7440-66-6	Zinc	1140		N	P

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

CHEMTECH

LABORATORY REPORT

CLIENT: EA Engineering, Science and Technology, Inc.

LAB RECEIVING #: N4876

ATTN.: C. Napoletano

NWS Earle Site 19

Analysis Meth.: 160.3

Matrix: Solid **Analyzed:** 6/25/01

Unit: % **Analyst:** danuta

	Lab Sample ID:		N4876-01	N4876-02	N4876-03	N4876-04	**Detection Limit**
	Client Sample ID:	Method Blank	3-TP48-3A(SURF	3-TP48-3B(SURF	4-TP48-4A(SURF	4-TP48-4B(SURF	
OMPOUNDS:	**D.F.:**		1	1	1	1	
ercent Solids			84.9	62.3	65.8	72.2	

	Lab Sample ID:		N4876-05	N4876-06	N4876-07	N4876-08	**Detection Limit**
	Client Sample ID:	Method Blank	6-TP48-6A(SURF	6-TP48-6B(SURF	11-TP48-11A(SU	11-TP48-11B(SU	
OMPOUNDS:	**D.F.:**		1	1	1	1	
ercent Solids			82.1	74.4	87.0	82.1	

	Lab Sample ID:		N4876-09	N4876-10	N4876-11	N4876-12	**Detection Limit**
	Client Sample ID:	Method Blank	17-TP48-17A(SU	18-TP48-18A(SU	19-TP48-19A(SU	TP48-DUP-1	
COMPOUNDS:	**D.F.:**		1	1	1	1	
rcent Solids			63.5	70.8	68.5	69.9	

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Englewood, New Jersey 07631
Phone: 201.568.7400 Fax: 201.567.3231

☑ 205 Campus Plaza 1
Edison, NJ 08837
Phone: 732.225.4111 Fax: 732.225.4110

NYSDOH Certification No. 10624

NYSDOH Certification No. 11376
NJDEP Certification No. 12013

CHEMTECH

LABORATORY REPORT

CLIENT: EA Engineering, Science and Technology, Inc.

LAB RECEIVING #: N4876

ATTN.: C. Napoletano

NWS Earle Site 19

Analysis Meth.: 9045

Matrix: Solid **Analyzed:** 6/22/01

Unit: ph Units **Analyst:** anil

COMPOUNDS:	Lab Sample ID:		N4876-01	N4876-02	N4876-03	N4876-04	Detection Limit
	Client Sample ID:	Method Blank	3-TP48-3A(SURF	3-TP48-3B(SURF	4-TP48-4A(SURF	4-TP48-4B(SURF	
	D.F.:		1	1	1	1	
pH			5.81	4.35	5	4.76	

COMPOUNDS:	Lab Sample ID:		N4876-05	N4876-06	N4876-07	N4876-08	Detection Limit
	Client Sample ID:	Method Blank	6-TP48-6A(SURF	6-TP48-6B(SURF	11-TP48-11A(SU	11-TP48-11B(SU	
	D.F.:		1	1	1	1	
pH			4.17	3.5	4.89	5.31	

COMPOUNDS:	Lab Sample ID:		N4876-09	N4876-10	N4876-11	N4876-12	Detection Limit
	Client Sample ID:	Method Blank	17-TP48-17A(SU	18-TP48-18A(SU	19-TP48-19A(SU	TP48-DUP-1	
	D.F.:		1	1	1	1	
pH			5.23	5.76	5.67	5.32	

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NYSDOH Certification No. 10624

NYSDOH Certification No. 11376
NJDEP Certification No. 12013

STL-Pittsburgh

Metals Data Reporting Form

Sample Results

Lab Sample ID: FKKV1 **Client ID:** SB-1A

Matrix: Soil **Units:** mg/kg **Prep Date:** 3/31/03 **Prep Batch:** 3089142

Weight: 1.00 **Volume:** 100 **Percent Moisture:** 29.529

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Arsenic	189.04	0.23	1.4	2.7		1	ICPST	4/1/03	14:15
Cadmium	226.50	0.043	0.71	0.043	U	1	ICPST	4/1/03	14:15

SHP 5/22/03

Comments: Lot #: C3C220125 Sample #: 1

Version 4.97.1

U Result is less than the IDL

B Result is between IDL and RL

Form I Equivalent

STL-Pittsburgh

Metals Data Reporting Form

Sample Results

Lab Sample ID: FKKV2 **Client ID:** SB-1B

Matrix: Soil **Units:** mg/kg **Prep Date:** 3/31/03 **Prep Batch:** 3089142

Weight: 1.00 **Volume:** 100 **Percent Moisture:** 24.329

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Arsenic	189.04	0.21	1.3	5.7		1	ICPST	4/1/03	14:20
Cadmium	226.50	0.040	0.66	0.040	U	1	ICPST	4/1/03	14:20

4/1/03

Comments: Lot #: C3C220125 Sample #: 2

Version 4.97.1

U Result is less than the IDL

B Result is between IDL and RL

Form I Equivalent

STL-Pittsburgh

Metals Data Reporting Form

Sample Results

Lab Sample ID: FKKV3 **Client ID:** FB-1

Matrix: Water **Units:** ug/L **Prep Date:** 3/31/03 **Prep Batch:** 3089141

Weight: NA **Volume:** 50 **Percent Moisture:** NA

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Arsenic	189.04	1.6	10.0	1.6	U	1	ICPST	4/1/03	19:16
Cadmium	226.50	0.30	5.0	0.30	U	1	ICPST	4/2/03	11:08

JP 5/22/03

Comments: Lot #: C3C220125 Sample #: 3

Version 4.97.1

U Result is less than the IDL

B Result is between IDL and RL

Form I Equivalent

STL-Pittsburgh

Metals Data Reporting Form

Sample Results

Lab Sample ID: FKKV4 **Client ID:** DUP-1

Matrix: Soil **Units:** mg/kg **Prep Date:** 3/31/03 **Prep Batch:** 3089142

Weight: 1.00 **Volume:** 100 **Percent Moisture:** 21.843

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Arsenic	189.04	0.21	1.3	2.3		1	ICPST	4/1/03	14:26
Cadmium	226.50	0.038	0.64	0.27	B	1	ICPST	4/1/03	14:26

SMP 5/22/03

Comments: Lot #: C3C220125 Sample #: 4

Version 4.97.1

U Result is less than the IDL

B Result is between IDL and RL

Form I Equivalent

STL-Pittsburgh

Metals Data Reporting Form

Sample Results

Lab Sample ID: FKKV5 **Client ID:** SB-2A

Matrix: Soil **Units:** mg/kg **Prep Date:** 3/31/03 **Prep Batch:** 3089142

Weight: 1.00 **Volume:** 100 **Percent Moisture:** 24.964

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Arsenic	189.04	0.21	1.3	5.7		1	ICPST	4/1/03	14:31
Cadmium	226.50	0.040	0.67	0.040	U	1	ICPST	4/1/03	14:31

SMT 5/22/03

Comments: Lot #: C3C220125 Sample #: 5

Version 4.97.1

U Result is less than the IDL.
B Result is between IDL and RL.

Form I Equivalent

STL-Pittsburgh

Metals Data Reporting Form

Sample Results

Lab Sample ID: FKKV6 **Client ID:** SB-2B

Matrix: Soil **Units:** mg/kg **Prep Date:** 3/31/03 **Prep Batch:** 3089142

Weight: 1.00 **Volume:** 100 **Percent Moisture:** 28.882

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Arsenic	189.04	0.23	1.4	29.0		1	ICPST	4/1/03	14:37
Cadmium	226.50	0.042	0.70	0.042	U	1	ICPST	4/1/03	14:37

Comments: Lot #: C3C220125 Sample #: 6

Version 4.97.1

U Result is less than the IDL

B Result is between IDL and RL

Form I Equivalent

STL-Pittsburgh

Metals Data Reporting Form

Sample Results

Lab Sample ID: FKKV7 **Client ID:** SB-3A

Matrix: Soil **Units:** mg/kg **Prep Date:** 3/31/03 **Prep Batch:** 3089142

Weight: 1.00 **Volume:** 100 **Percent Moisture:** 22.539

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Arsenic	189.04	0.21	1.3	2.2		1	ICPST	4/1/03	17:49
Cadmium	226.50	0.039	0.65	0.097	B	1	ICPST	4/1/03	17:49

Comments: Lot #: C3C220125 Sample #: 7

Version 4.97.1

U Result is less than the IDL

B Result is between IDL and RL

Form I Equivalent

STL-Pittsburgh

Metals Data Reporting Form

Sample Results

Lab Sample ID: FKKV9 **Client ID:** SB-4A

Matrix: Soil **Units:** mg/kg **Prep Date:** 3/31/03 **Prep Batch:** 3089142

Weight: 1.00 **Volume:** 100 **Percent Moisture:** 26.782

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Arsenic	189.04	0.22	1.4	13.5		1	ICPST	4/1/03	18:00
Cadmium	226.50	0.041	0.68	0.21	B	1	ICPST	4/1/03	18:00

YH 4/22/03

Comments: Lot #: C3C220125 Sample #: 9

Version 4.97.1

U Result is less than the IDL

B Result is between IDL and RL

Form I Equivalent

STL-Pittsburgh

Metals Data Reporting Form

Sample Results

Lab Sample ID: FKKWA **Client ID:** SB-4B

Matrix: Soil **Units:** mg/kg **Prep Date:** 3/31/03 **Prep Batch:** 3089142

Weight: 1.00 **Volume:** 100 **Percent Moisture:** 24.194

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Arsenic	189.04	0.21	1.3	2.7		1	ICPST	4/1/03	18:06
Cadmium	226.50	0.040	0.66	0.040	U	1	ICPST	4/1/03	18:06

Comments: Lot #: C3C220125 Sample #: 10

Version 4.97.1

U Result is less than the IDL

B Result is between IDL and RL

Form I Equivalent

STL-Pittsburgh

Metals Data Reporting Form

Sample Results

Lab Sample ID: FKKWC **Client ID:** SW-1

Matrix: Water **Units:** ug/L **Prep Date:** 3/31/03 **Prep Batch:** 3089141

Weight: NA **Volume:** 50 **Percent Moisture:** NA

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Arsenic	189.04	1.6	10.0	1.6	U	1	ICPST	4/1/03	19:22
Cadmium	226.50	0.30	5.0	0.30	U	1	ICPST	4/2/03	11:14

Comments: Lot #: C3C220125 Sample #: 11

Version 4.97.1

U Result is less than the IDL

B Result is between IDL and RL

Form I Equivalent

STL-Pittsburgh

Metals Data Reporting Form

Sample Results

Lab Sample ID: FKKWD **Client ID:** SD-1

Matrix: Soil **Units:** mg/kg **Prep Date:** 3/31/03 **Prep Batch:** 3089142

Weight: 1.00 **Volume:** 100 **Percent Moisture:** 59.091

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Aluminum	308.22	2.7	48.9	3580		1	ICPST	4/1/03	18:11
Antimony	220.35	0.37	2.4	0.61	B	1	ICPST	4/1/03	18:11
Arsenic	189.04	0.39	2.4	14.3		1	ICPST	4/1/03	18:11
Barium	493.41	0.039	48.9	32.6	B	1	ICPST	4/1/03	18:11
Beryllium	313.04	0.064	1.2	0.69	B	1	ICPST	4/1/03	18:11
Cadmium	226.50	0.073	1.2	0.36	B	1	ICPST	4/1/03	18:11
Calcium	317.93	4.1	1220	262	B	1	ICPST	4/1/03	18:11
Chromium	267.72	0.34	1.2	49.8	N	1	ICPST	4/1/03	18:11 J+
Cobalt	228.62	0.18	12.2	0.33	B	1	ICPST	4/1/03	18:11
Copper	324.75	0.14	6.1	2.1	B	1	ICPST	4/1/03	18:11
Iron	271.44	4.1	24.4	18200		1	ICPST	4/1/03	18:11
Lead	220.35	0.39	0.73	15.2		1	ICPST	4/1/03	18:11
Magnesium	279.08	3.2	1220	551	B	1	ICPST	4/1/03	18:11
Manganese	257.61	0.032	3.7	3.1	B	1	ICPST	4/1/03	18:11
Nickel	231.60	0.27	9.8	2.4	B	1	ICPST	4/1/03	18:11
Potassium	766.49	2.3	1220	1710		1	ICPST	4/2/03	10:08
Selenium	220.35	0.56	1.2	1.2	B	1	ICPST	4/1/03	18:11
Silver	328.07	0.081	1.2	0.081	U	1	ICPST	4/1/03	18:11
Sodium	330.23	18.7	1220	106	B	1	ICPST	4/1/03	18:11
Thallium	190.86	0.93	2.4	0.93	U	1	ICPST	4/2/03	10:08
Vanadium	292.40	0.22	12.2	28.6		1	ICPST	4/1/03	18:11
Zinc	213.86	0.20	4.9	13.3		1	ICPST	4/1/03	18:11

SAP
5/21/03

Comments: Lot #: C3C220125 Sample #: 12

Version 4.97.1

U Result is less than the IDL
B Result is between IDL and RL

Form I Equivalent

STL-Pittsburgh

Metals Data Reporting Form

Sample Results

Lab Sample ID: FKKWE **Client ID:** SW-2

Matrix: Water **Units:** ug/L **Prep Date:** 3/31/03 **Prep Batch:** 3089141

Weight: NA **Volume:** 50 **Percent Moisture:** NA

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Arsenic	189.04	1.6	10.0	2.0	B	1	ICPST	4/1/03	19:54

Comments: Lot #: C3C220125 Sample #: 13

Version 4.97.1

U Result is less than the IDL.
B Result is between IDL and RL.

Form I Equivalent

STL-Pittsburgh

Metals Data Reporting Form

Sample Results

Lab Sample ID: FKKWG **Client ID:** SD-2

Matrix: Soil **Units:** mg/kg **Prep Date:** 3/31/03 **Prep Batch:** 3089142

Weight: 1.00 **Volume:** 100 **Percent Moisture:** 24.074

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Aluminum	308.22	1.5	26.3	1180		1	ICPST	4/1/03	18:49
Antimony	220.35	0.20	1.3	0.34	B	1	ICPST	4/1/03	18:49
Arsenic	189.04	0.21	1.3	11.7		1	ICPST	4/1/03	18:49
Barium	493.41	0.021	26.3	19.0	B	1	ICPST	4/1/03	18:49
Beryllium	313.04	0.034	0.66	0.28	B	1	ICPST	4/2/03	10:30
Cadmium	226.50	0.040	0.66	0.040	U	1	ICPST	4/2/03	10:30
Calcium	317.93	2.2	659	60.5	B	1	ICPST	4/2/03	10:30
Chromium	267.72	0.18	0.66	17.1	N	1	ICPST	4/2/03	10:30
Cobalt	228.62	0.096	6.6	0.16	B	1	ICPST	4/2/03	10:30
Copper	324.75	0.075	3.3	0.48	B	1	ICPST	4/1/03	18:49
Iron	271.44	2.2	13.2	12100		1	ICPST	4/2/03	10:30
Lead	220.35	0.21	0.40	9.7		1	ICPST	4/2/03	10:30
Magnesium	279.08	1.7	659	166	B	1	ICPST	4/1/03	18:49
Manganese	257.61	0.017	2.0	0.77	B	1	ICPST	4/2/03	10:30
Nickel	231.60	0.15	5.3	0.57	B	1	ICPST	4/2/03	10:30
Potassium	766.49	1.3	659	507	B	1	ICPST	4/2/03	10:30
Selenium	220.35	0.30	0.66	0.30	U	1	ICPST	4/1/03	18:49
Silver	328.07	0.044	0.66	0.062	B	1	ICPST	4/1/03	18:49
Sodium	330.23	10.1	659	39.5	B	1	ICPST	4/1/03	18:49
Thallium	190.86	0.50	1.3	0.50	U	1	ICPST	4/2/03	10:30
Vanadium	292.40	0.12	6.6	11.3		1	ICPST	4/2/03	10:30
Zinc	213.86	0.11	2.6	5.1		1	ICPST	4/1/03	18:49

SMJ 5/22/03

Comments: Lot #: C3C220125 Sample #: 14

Version 4.97.1

U Result is less than the IDL.
B Result is between IDL and RL.

Form I Equivalent

STL-Pittsburgh

Metals Data Reporting Form

Sample Results

Lab Sample ID: FKKWH **Client ID:** SD-5A

Matrix: Soil **Units:** mg/kg **Prep Date:** 3/31/03 **Prep Batch:** 3089142

Weight: 1.00 **Volume:** 100 **Percent Moisture:** 29.242

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Arsenic	189.04	0.23	1.4	16.4		1	ICPST	4/1/03	18:55
Cadmium	226.50	0.042	0.71	0.042	U	1	ICPST	4/2/03	10:35

Comments: Lot #: C3C220125 Sample #: 15

Version 4.97.1

U Result is less than the IDL

B Result is between IDL and RL

Form I Equivalent

STL-Pittsburgh

Metals Data Reporting Form

Sample Results

Lab Sample ID: FKKWJ **Client ID:** SD-5B

Matrix: Soil **Units:** mg/kg **Prep Date:** 3/31/03 **Prep Batch:** 3089142

Weight: 1.00 **Volume:** 100 **Percent Moisture:** 21.971

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Arsenic	189.04	0.21	1.3	1.5		1	ICPST	4/1/03	19:00
Cadmium	226.50	0.038	0.64	0.038	U	1	ICPST	4/2/03	10:52

Comments: Lot #: C3C220125 Sample #: 16

Version 4.97.1

U Result is less than the IDL

B Result is between IDL and RL

Form I Equivalent

STL-Pittsburgh

Metals Data Reporting Form

Sample Results

Lab Sample ID: FKKWD **Client ID:** SD-1

Matrix: Soil **Units:** mg/kg **Prep Date:** 4/4/03 **Prep Batch:** 3093238

Weight: 0.60 **Volume:** 100 **Percent Moisture:** 59.091

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Mercury	253.7	0.027	0.082	0.027	U	1	CVAA	4/4/03	12:11

Comments: Lot #: C3C220125 Sample #: 12

Version 4.97.1

U Result is less than the IDL
B Result is between IDL and RL

Form I Equivalent

STL-Pittsburgh

Metals Data Reporting Form

Sample Results

Lab Sample ID: FKKWG **Client ID:** SD-2

Matrix: Soil **Units:** mg/kg **Prep Date:** 4/4/03 **Prep Batch:** 3093238

Weight: 0.60 **Volume:** 100 **Percent Moisture:** 24.074

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Mercury	253.7	0.014	0.044	0.030	B	1	CVAA	4/4/03	12:16

5/2/03

Comments: Lot #: C3C220125 Sample #: 14

Version 4.97.1

U Result is less than the IDL

B Result is between IDL and RL

Form I Equivalent

STL-Pittsburgh

Metals Data Reporting Form

Sample Results

Lab Sample ID: FLTP1 Client ID: SB-3B

Matrix: Soil Units: mg/kg Prep Date: 4/17/03 Prep Batch: 3107147

Weight: 1.00 Volume: 100 Percent Moisture: 23.057

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Arsenic	189.04	0.22	1.3	4.0		1	ICPST	4/26/03	17:06
Cadmium	226.50	0.056	0.65	0.056	U	1	ICPST	4/26/03	17:06

5/2/03

Comments: Lot #: C3D120111 Sample #: 1

Version 4.97.1

U Result is less than the IDL

B Result is between IDL and RL

Form I Equivalent

STL-Pittsburgh

Metals Data Reporting Form

Sample Results

Lab Sample ID: FLTP4 Client ID: FB-1

Matrix: Water Units: ug/L Prep Date: 4/17/03 Prep Batch: 3107151

Weight: NA Volume: 50 Percent Moisture: NA

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Aluminum	308.22	29.5	200	29.5	U	1	ICPST	4/26/03	17:51
Antimony	206.84	2.4	10.0	2.4	U	1	ICPST	4/26/03	17:51
Arsenic	189.04	1.7	10.0	1.7	U	1	ICPST	4/26/03	17:51
Barium	**493.41**	**0.20**	**200**	**0.62**	**B**	**1**	**ICPST**	**4/26/03**	**17:51**
Beryllium	**313.04**	**0.18**	**4.0**	**0.37**	**B**	**1**	**ICPST**	**4/26/03**	**17:51**
Cadmium	226.50	0.43	5.0	0.43	U	1	ICPST	4/26/03	17:51
Calcium	**317.93**	**30.7**	**5000**	**52.9**	**B**	**1**	**ICPST**	**4/26/03**	**17:51**
Chromium	267.72	0.57	5.0	0.57	U	1	ICPST	4/26/03	17:51
Cobalt	228.62	0.67	50.0	0.67	U	1	ICPST	4/26/03	17:51
Copper	324.75	0.96	25.0	0.96	U	1	ICPST	4/26/03	17:51
Iron	271.44	25.9	100	25.9	U	1	ICPST	4/26/03	17:51
Lead	220.35	1.9	3.0	1.9	U	1	ICPST	4/26/03	17:51
Magnesium	279.08	32.6	5000	32.6	U	1	ICPST	4/26/03	17:51
Manganese	257.61	0.26	15.0	0.26	U	1	ICPST	4/26/03	17:51
Nickel	231.60	0.81	40.0	0.81	U	1	ICPST	4/26/03	17:51
Potassium	**766.49**	**12.3**	**5000**	**37.3**	**B**	**1**	**ICPST**	**4/26/03**	**17:51**
Selenium	220.35	2.2	5.0	2.2	U	1	ICPST	4/26/03	17:51
Silver	328.07	0.47	5.0	0.47	U	1	ICPST	4/26/03	17:51
Sodium	330.23	124	5000	124	U	1	ICPST	4/26/03	17:51
Thallium	**190.86**	**1.9**	**10.0**	**3.3**	**B**	**1**	**ICPST**	**4/26/03**	**17:51**
Vanadium	292.40	0.66	50.0	0.66	U	1	ICPST	4/26/03	17:51
Zinc	**206.2**	**0.48**	**20.0**	**4.1**	**B**	**1**	**ICPST**	**4/26/03**	**17:51**

5/22/03

Comments: Lot #: C3D120111 Sample #: 2

Version 4.97.1

U Result is less than the IDL

B Result is between IDL and RL

Form I Equivalent

STL-Pittsburgh

Metals Data Reporting Form

Sample Results

Lab Sample ID: FLTP4 Client ID: FB-1

Matrix: Water Units: ug/L Prep Date: 4/23/03 Prep Batch: 3113094

Weight: NA Volume: 100 Percent Moisture: NA

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Mercury	253.7	0.065	0.20	0.065	U	1	CVAA	4/23/03	9:38

Comments: Lot #: C3D120111 Sample #: 2

Version 4.97.1

U Result is less than the IDL

B Result is between IDL and RL

Form I Equivalent

STL-Pittsburgh

Metals Data Reporting Form

Sample Results

Lab Sample ID: FLTP5 **Client ID:** MW48-1

Matrix: Water **Units:** ug/L **Prep Date:** 4/23/03 **Prep Batch:** 3113094

Weight: NA **Volume:** 100 **Percent Moisture:** NA

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Mercury	253.7	0.065	0.20	0.065	U	1	CVAA	4/23/03	9:40

SAP 5/12/03

Comments: Lot #: C3D120111 Sample #: 3

Version 4.97.1

U Result is less than the IDL

B Result is between IDL and RL

Form I Equivalent

STL-Pittsburgh

Metals Data Reporting Form

Sample Results

Lab Sample ID: FLTP6F **Client ID:** MW48-1F

Matrix: Water **Units:** ug/L **Prep Date:** 4/23/03 **Prep Batch:** 3113094

Weight: NA **Volume:** 100 **Percent Moisture:** NA

Element	WL/ Mass	IDL	Report Limit	Conc	Q	DF	Instr	Anal Date	Anal Time
Mercury	253.7	0.065	0.20	0.065	U	1	CVAA	4/23/03	9:45

Comments: Lot #: C3D120111 Sample #: 4 DISSOLVED METALS ANALYSIS

Version 4.97.1

U Result is less than the IDL

B Result is between IDL and RL

Form I Equivalent

Appendix B

Data Validation Reports

ALPHA
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Data Validation
Environmental Chemistry
Lab and Field Audits
Sampling Plans

April 22, 2002

Ms. Jennifer Nafus
EA Engineering, Science, and Technology, Inc.
485 Route 1 South, Building C, Suite 260
Iselin, New Jersey 08830

Re: Data Validation Report
Naval Weapons-Earle
June 2001 Sampling Event

Dear Ms. Nafus:

The data validation summaries for the Naval Weapons-Earle, June 2001 sampling event, are attached to this letter. The data for Chemtech project numbers N4876LP, N4920LP, and N4953LP, were acceptable. No data were rejected (R) in these data packs.

If you have any questions concerning the work performed, please contact me at (518) 348-6995. Thank you for the opportunity to assist EA Engineering, Science, and Technology, Inc.

Sincerely,
Alpha Environmental Consultants, Inc.

Donald Anné

Donald Anné
Senior Chemist

DCA:dca
attachments

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Data Validation Acronyms

AA	Atomic absorption, flame technique
BHC	Hexachlorocyclohexane
BFB	Bromofluorobenzene
CCB	Continuing calibration blank
CCC	Calibration check compound
CCV	Continuing calibration verification
CN	Cyanide
CRDL	Contract required detection limit
CRQL	Contract required quantitation limit
CVAA	Atomic adsorption, cold vapor technique
DCAA	2,4-Dichlophenylacetic acid
DCB	Decachlorobiphenyl
DFTPP	Decafluorotriphenyl phosphine
ECD	Electron capture detector
FAA	Atomic absorption, furnace technique
FID	Flame ionization detector
FNP	1-Fluoronaphthalene
GC	Gas chromatography
GC/MS	Gas chromatography/mass spectrometry
GPC	Gel permeation chromatography
ICB	Initial calibration blank
ICP	Inductively coupled plasma-atomic emission spectrometer
ICV	Initial calibration verification
IDL	Instrument detection limit
IS	Internal standard
LCS	Laboratory control sample
LCS/LCSD	Laboratory control sample/laboratory control sample duplicate
MSA	Method of standard additions
MS/MSD	Matrix spike/matrix spike duplicate
PID	Photo ionization detector
PCB	Polychlorinated biphenyl
PCDD	Polychlorinated dibenzodioxins
PCDF	Polychlorinated dibenzofurans
QA	Quality assurance
QC	Quality control
RF	Response factor
RPD	Relative percent difference
RRF	Relative response factor
RRF(number)	Relative response factor at concentration of the number following
RT	Retention time
RRT	Relative retention time
SDG	Sample delivery group
SPCC	System performance check compound
TCX	Tetrachloro-m-xylene
%D	Percent difference
%R	Percent recovery
%RSD	Percent relative standard deviation

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QA/QC Review of TAL Metals Data for Chemtech Project No. N4876LP Sampled June 18 and 19, 2001

Prepared by: Donald Anné
April 22, 2002

Holding Times: Samples were analyzed within EPA Region II holding times.

Initial and Continuing Calibration Verification: All percent recoveries for TAL metals were within control limits (90-110% for all metals, except 80-120% for Hg).

CRDL Standard for AA and ICP: The percent recoveries for applicable TAL metals were within Region II QC limits (80-120%).

Blanks: Initial and continuing calibration, and preparation blanks reported TAL metals as below the CRDLs, as required.

ICP Interference Check Sample: The percent recoveries for applicable TAL metals were within control limits (80-120%).

Spike Sample Recovery: The percent recoveries for vanadium (61.2% and 62.0%) and zinc (74.4%) were outside control limits (75-125%) for MS/MSD sample IS06SS010001. Results for vanadium and zinc should be considered estimates (J).

Duplicates: The relative percent differences for TAL metals were below the allowable maximum (35%) for duplicate samples IS06SS010001D and 19-TP48-19A(SURFACE)D, and MS/MSD samples IS06SS010001 and 19-TP48-19A(SURFACE).

Laboratory Control Sample: Recoveries for TAL metals were within control limits for the soil LCS.

Standard Addition Results: No sample results were quantitated by MSA in this SDG.

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ICP Serial Dilution: The %Ds for applicable TAL metals were below the allowable maximum (10%) for serial dilution sample IS06SS010001L, as required.

Instrument Detection Limits: The IDLs for TAL metals were at or below the CRDLs, as required.

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QA/QC Review of Pesticide Data for Chemtech Project No. N4920LP Sampled June 20 and 21, 2001

Prepared by: Donald Anné
April 22, 2002

Holding Times: Samples were extracted and analyzed within EPA Region II holding times.

Initial Calibration: The %RSDs for target pesticides were below the allowable maximum (20%), as required.

Continuing Calibration: The %Ds for target pesticides were below the allowable maximum (15%), as required.

Blanks: The method blank reported target pesticides as not detected.

Surrogate Recovery: The surrogate recoveries for samples were within QC limits.

Matrix Spike/Matrix Spike Duplicate: The relative percent differences were below the allowable maximums and the percent recoveries were within control limits for MS/MSD sample N4920-12.

Laboratory Control Sample: The percent recoveries for LCS PBS1-062801-06 were within QC limits.

Compound ID: Checked compounds were within GC quantitation limits. Detected compounds were confirmed on a second, dissimilar column.

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QA/QC Review of TAL Metals Data
for Chemtech Project No. N4920LP
Sampled June 20 and 21, 2001

Prepared by: Donald Anné
April 22, 2002

Holding Times: Samples were analyzed within EPA Region II holding times.

Initial and Continuing Calibration Verification: All percent recoveries for TAL metals were within control limits (90-110% for all metals, except 80-120% for Hg).

CRDL Standard for AA and ICP: The percent recoveries for mercury (135%) and selenium (78.2%) were outside Region II QC limits (80-120%). Positive results for mercury that are less than 2 times the CRDL (0.4 ug/L) should be considered estimates (J). Results for selenium that are less than 4 times the CRDL (40 ug/L) should be considered estimates (J).

Blanks: Initial and continuing calibration, and preparation blanks reported TAL metals as below the CRDLs, as required.

ICP Interference Check Sample: The percent recoveries for applicable TAL metals were within control limits (80-120%).

Spike Sample Recovery: The percent recoveries for aluminum (171.7% and 143.4%) and iron (413.1% and 251%) were outside control limits (75-125%) for MS/MSD sample 2-WP48. Positive results for aluminum and iron should be considered estimates (J).

Duplicates: The relative percent differences for aluminum (31.9%), iron (37.7%), lead (200%), and zinc (38.7%) were above the allowable maximum (20%) for duplicate sample 4-WP48D. The relative percent difference for iron (22.3%) was above the allowable maximum (20%) for MS/MSD sample 4-WP48. Positive results for aluminum, iron, lead, and zinc should be considered estimates (J).

Laboratory Control Sample: The percent recoveries for TAL metals were within control limits (80-120%) for the aqueous LCS.

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Standard Addition Results: No sample results were quantitated by MSA in this SDG.

ICP Serial Dilution: The %Ds for aluminum (27.5%) and iron (10.5%) were above the allowable maximum (10%) for serial dilution sample 2-WP48L. Results for aluminum and iron should be considered estimates (J).

Instrument Detection Limits: The IDLs for TAL metals were at or below the CRDLs, as required.

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Environmental Chemistry
Lab and Field Audits
Sampling Plans

QA/QC Review of TAL Metals Data
for Chemtech Project No. N4953LP
Sampled June 25, 2001

Prepared by: Donald Anné
April 22, 2002

Holding Times: Samples were analyzed within EPA Region II holding times.

Initial and Continuing Calibration Verification: All percent recoveries for TAL metals were within control limits (90-110% for all metals, except 80-120% for Hg).

CRDL Standard for AA and ICP: The percent recoveries for arsenic (121.1%) and mercury (135.0%) were outside Region II QC limits (80-120%). Positive results for mercury that are less than 2 times the CRDL (0.4 ug/L) should be considered estimates (J) in aqueous samples. Positive results for arsenic that are less than 4 times the CRDL (40 ug/L) should be considered estimates (J) in aqueous samples.

The percent recoveries for mercury (70.0%) and selenium (78.2%) were outside Region II QC limits (80-120%). Positive results for mercury that are less than 2 times the CRDL (0.4 ug/L) should be considered estimates (J) in soil samples. Positive results for selenium that are less than 4 times the CRDL (40 ug/L) should be considered estimates (J) in soil samples.

Blanks: Initial and continuing calibration, and preparation blanks reported TAL metals as below the CRDLs, as required. The water field blank 1-SW48-FB-1 contained zinc (20.2 ug/L). The soil field blank 1-SD48-FB-1 contained iron (297 ug/L) and zinc (49.8 ug/L). Results for these metals that are less than five times the associated field balnk level should be considered not detected (U) in samples.

ICP Interference Check Sample: The percent recoveries for applicable TAL metals were within control limits (80-120%).

Spike Sample Recovery: The percent recoveries for aluminum (171.7% and 143.4%) and iron (413.1% and 251%) were outside control limits (75-125%) for water MS/MSD sample 2-WP48. Positive results for aluminum and iron should be considered estimates (J) in water samples.

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The percent recovery for mercury (64.9%) was outside control limits (75-125%) for soil MS/MSD sample S-33(5.5-6.0). Results for mercury should be considered estimates (J) in soil samples.

Duplicates: The relative percent differences for aluminum (31.9%), iron (37.7%), lead (200%), and zinc (38.7%) were above the allowable maximum (20%) for water duplicate sample 4-WP48D. The relative percent difference for iron (22.3%) was above the allowable maximum (20%) for water MS/MSD sample 4-WP48. Positive results for aluminum, iron, lead, and zinc should be considered estimates (J) in water samples.

The relative percent difference for potassium (63.5%) was above the allowable maximum (35%) for soil MS/MSD sample EB-3A, BORINGEB-3. Positive results for potassium should be considered estimates (J) in soil samples.

Laboratory Control Sample: The recoveries and percent recoveries for TAL metals were within control limits (80-120%) for soil and aqueous LCSs.

Standard Addition Results: No sample results were quantitated by MSA in this SDG.

ICP Serial Dilution: The %Ds for applicable TAL metals were below the allowable maximum (10%) for serial dilution sample EB-3A, BORINGEB-3L, as required.

The %Ds for aluminum (27.5%) and iron (10.5%) were above the allowable maximum (10%) for serial dilution sample 2-WP48L. Results for aluminum and iron should be considered estimates (J).

Instrument Detection Limits: The IDLs for TAL metals were at or below the CRDLs, as required.

MEMORANDUM

TO: Jennifer Nafus

FROM: Sherri Pullar

SUBJECT: Data Usability Summary Report - Inorganic
Severn Trent Laboratories (STL)
STL Lot Numbers: C3D120111 and C3C2201250

DATE: May 21, 2003

The purpose of this memorandum is to present the data validation report for the samples collected at the Naval Weapons Station, Earle during the March/April sampling event. Ten soil samples were analyzed for cadmium (6010B) and arsenic (6010B); one ground-water sample was analyzed for TAL metals ((6010B/7470A); two sediment samples were analyzed for cadmium (6010B) and arsenic (6010B); two sediment samples were analyzed for TAL metals (6010B/7470A); one field blank was analyzed for arsenic and cadmium; one field blank was analyzed for total metals; and two surface water samples were analyzed for arsenic (6010B) using USEPA CLP protocols. The field sample IDs are:

SB-1A	SB-1B	SB-3A	SD-1	SD-5B	FB-1 (4/10/03)	SW-1
FB-1 (3/31/03)	SB-2A	SB-4A	SD-2	MW-48-1	SB-3B	SW-2
SB-1A DUP	SB-2B	SB-4B	SD-5A	MW-48-1F		

Data were reviewed by Sherri Pullar and validated using a combination of method-specific criteria and *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (July 2002). Table 1 includes the parameters evaluated. Data associated with parameters that did not comply with quality control specifications and directly impacted project data have been qualified in accordance with USEPA specifications.

Table 1. Laboratory Performance Criteria

Qualified		Parameter
Yes	No	
	X	Holding Times
	X	Initial and Continuing Calibration
	X	Instrument Performance Results
	X	Blank Analysis
X		Matrix Spike Analysis
	X	Laboratory Control Samples
	X	Precision Evaluation
	X	Field Duplicates
	X	ICP Serial Dilution
	NA	Internal Standards
	X	Calculation Verification

The quality of data collected in support of this sampling activity is considered acceptable.

Attachments

NAVAL WEAPONS STATION, EARLE VALIDATION REPORT
CADMIUM, ARSENIC AND TAL METALS REVIEW
STL LOT NUMBERS: C3C220125 AND CED120111

I. HOLDING TIMES AND PRESERVATION

Holding time criteria: Cool 4±2°C (Aqueous: pH<2 HNO3); 28 days for mercury and 180 days for other metals. The dates and times were compared between the sample collection and laboratory analysis.

- All criteria were met. No qualifiers were applied.

II. INITIAL AND CONTINUING CALIBRATION

Bench and run summary sheets were reviewed to determine whether calibration was performed at the beginning of sample analysis and at a frequency of 10% or every two hours using the following criteria. Mercury analyses were performed on 04/04/03 and 04/23/03 with a correlation coefficient of 0.99989 and 0.99988, respectively. All criteria were met.

Hg : 1 - blank
6 - standards

Percent recoveries for initial and continuing calibration were reviewed and determined to be in compliance with control limits: mercury (80-120%) and metals (90-110%).

- All criteria were met. No qualifiers were applied.

III-Instrument Performance Check

The analysis of the instrument performance check solution for ICP must be performed at the beginning of each 12-hour period during which samples are analyzed.

- The instrument performance check met the criteria. No qualification was applied.

IV. BLANK ANALYSIS

Blanks are assessed to determine the existence and magnitude of contamination problems. Any sample having a concentration less than the 5x Max concentration listed (as wet weight) and greater than the IDL would be qualified "U."

- All blanks (including field blanks) were non-detect or <CDQL and criteria were met. No qualifiers were applied.

V. MATRIX SPIKE SAMPLE ANALYSIS

Spike recoveries must be within 75-125%; with the exception of samples that have concentrations exceeding the spike concentration by a factor of four or more. When matrix spike recovery limits are not met, a post-digestion spike must be performed at twice the sample concentration or twice the CRDL, whichever is greater. This does not apply to silver or mercury.

- SW-1, SB-3B, MW48-1, SD-1, and MW48-1F were used as laboratory matrix spike samples. All criteria were met with the exception of chromium (129.7 percent) in Sample SD-1. The result for chromium in Sample SD-1 was qualified estimated bias high (J+).

VI. LABORATORY CONTROL SAMPLES

All LCS results must fall within the control limits specified.

- All criteria were met. No qualifier was applied.

VII. DUPLICATE SAMPLE ANALYSIS

A control limit of ±2CRDL for aqueous values less than 10 times the CRDL.
A control limit of 20% RPD is used for aqueous sample values >10 times the CRDL.

- The laboratory performed sample matrix duplicates on SW-1, SB-3B, MW48-1, SD-1, and MW48-1F. All criteria were met. No qualifiers were applied.

VIII. FIELD DUPLICATE

Field duplicate samples were taken and analyzed as an indication of overall precision. These analyses measure both field and lab precision; therefore, the results may have more variability than lab duplicates which measure only lab performance.

A control limit of ±2CRDL for aqueous values less than 10 times the CRDL.
A control limit of 30% RPD is used for aqueous sample values >10 times the CRDL.

- The field crew duplicated sample SB-1A. All criteria were met. No qualifiers were applied.

IX. ICP SERIAL DILUTION

An ICP serial dilution is performed to determine whether significant physical or chemical interferences exist due to sample matrix at high concentrations. An analysis of a 5-fold dilution should agree within 10% difference of the original result when the concentration in sample is a factor of 50 above IDL.

- The serial dilutions were analyzed for samples SW-1, SD-1, SB-3B, MW48-1, and MW48-1F. All criteria were met. No qualifier was applied.

X. Internal Standards (IS)

Internal standards performance criteria ensure that ICPMS sensitivity and response are stable during every analytical run. Specific criteria includes: area counts (-50% to +100%) of the associated calibration standard.

- Not applicable.

XI. CALCULATION VERIFICATION

The following calculations were performed for verification. All calculation verifications were within the 10% difference criteria.

- All criteria were met. No qualifier was applied.

For Metals:

MS/MSD %R=SSR/SR+SA*100

Sample: MW48-1 Aluminum
%R = 1970/0+2000*100=98.5%
Reported Value = 98.6%
%Difference = 0.1%

Sample: SB-3B Cadmium
%R=5.7/0+6.4983*100=87.7%
Reported Value = 87.4%
%Difference = 0.3%

Sample: SD-1 Thallium
%R = 454/0+488.89*100 = 92.9%
Reported Value = 92.9%
%Difference = 0.0%

Duplicate RPD

RPD=[D-S]/(D+S/2)

Sample: SW-1 Cadmium
RPD = [49.2-50]/(49.2+50/2)*100=1.6%
Reported Value = 1.5%
%Difference = 0.1%

Sample: SD-2 Zinc
RPD = [127-126]/(127+126/2)*100=0.8%
Reported Value = 0.9%
%Difference = 0.1%

Sample: SB-3B Arsenic
RPD = [241-240]/(241+240/2)*100=0.4%
Reported Value = 0.5%
%Difference = 0.1%

Appendix C

Photographic Log

Photo of Test Pit #1

Test Pit #2

Test Pit #2

Test Pit #3

Test Pit #3

Photo of battery cells – TP-4

Battery cells at TP-4

Battery with cells at TP-4

Metal rebar found at TP-5

TP-6

TP-7

Excavation of TP-8

Scraps of rusted metal from drum at TP-8

Excavation of TP-9

Excavation of TP-11

Rusted metal scraps from drum at TP-11

TP-12

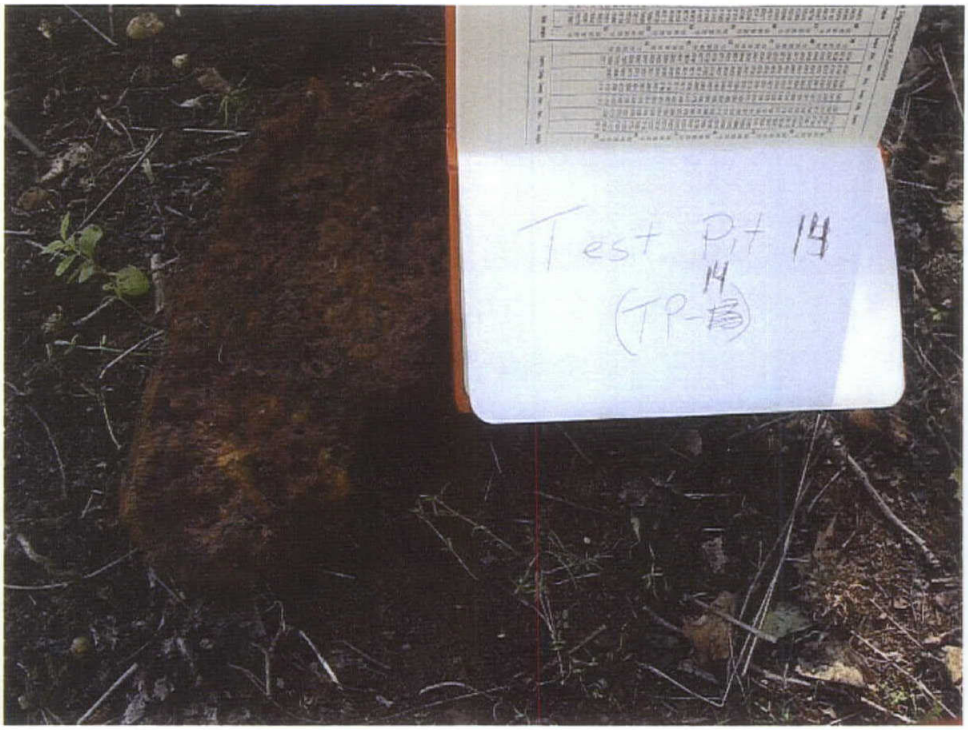
Mine battery at TP-12

Test Pit #13

Scrap metal from TP-13

TP-14

Slag material found 1.5-2' bgs at TP-14. Reddish-brown/black , very fine sand and silt with numerous 1/8" air pockets; iron staining throughout



Close-up picture of slag material at TP-14

Two large pieces of slag material removed from TP-14 – approximately 18"x8"x12"

TP-16

TP-17

Battery Cell discovered at TP-17

Ground water seeping into TP-17

Visible battery in TP-18

More visible batteries in TP-18

Dozens of batteries uncovered in the surfacial soil at TP-19

Batteries in TP-19

Ground water in TP-19 at approximately 2ft bgs

Appendix D

Background Summary

Appendix D Summary of Analytical Results
for Additional Background Soil Samples Collected at Site 48
Mine Battery Disposal Area, Naval Weapons Station Earle, Colts Neck, NJ

	NJDEP Cleanup Criteria (a)		SB-1A (0-6 inches bgs)		SB-1B (2.5-3 ftbgs)		SB-2A (0-6 inches bgs)		SB-2B (2.5-3 ftbgs)		SB-3A (0-6 inches bgs)		SB-3B (2.5-3 ftbgs)		SB-4A (0-6 inches bgs)		SB-4B (2.5-3 ftbgs)		SB-5A (0-6 inches bgs)		SB-5B (2.5-3 ftbgs)		Total Background Range
			Result		Result		Result		Result		Result		Result		Result		Result		Result		Result		
	R	NR	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	
Arsenic	20	20	2.7		5.7		5.7		29		2.2		4		13.5		2.7		16.4		1.5		1.5-29
Cadmium	1	100	0.043	U	0.04	U	0.04	U	0.042	U	0.097	B	0.65	U	0.21	B	0.04	U	0.042	U	0.038	U	ND-0.21

(a) The Criteria values represent the Cleanup Standards for Contaminated Sites, N.J.A.C. 7:26D determined by the NJDEP.
B The reported value was obtained from a measurement that was less than the Contract Required Detection Limit, but greater than or equal to the Instrument Detection Limit
U The Analyte was analyzed for, but not detected
N Spiked sample recovery not within control limits
R Residential Direct Contact Soil Cleanup Criteria
NR Nonresidential Direct Contact Soil Cleanup Criteria
bgs Below ground surface
All results reported in mg/kg
Shaded results indicate exceedance of regulatory criteria for analyte

Appendix D Summary of Analytical Results for Additional Background
Surface Water and Sediment Samples Collected at Site 48
Mine Battery Disposal Area, Naval Weapons Station Earle, Colts Neck, NJ

	NJDEP Surface Water Quality Standards (a)	SW-1 Result		SW-2 Result		Total Background Range for Surface Water	NJDEP Freshwater Sediment Screening Guidelines	SD-1 Result		SD-2 Result		Total Background Range
		Conc.	Q	Conc.	Q			Conc.	Q	Conc.	Q	
Aluminum	--	NA		NA		--	--	3580		1180		1180-3580
Antimony	12.2	NA		NA		--	--	0.61	B	0.34	B	0.34-0.61
Arsenic	0.017	1.6	U	2	B	ND-2	6	14.3		11.7		11.7-14.3
Barium	2000	NA		NA		--	--	32.6	B	19	B	19-32.6
Beryllium	--	NA		NA		--	--	0.69	B	0.28	B	0.28-0.69
Cadmium	10	0.3	U	NA		--	0.6	0.36	B	0.04	U	ND-0.36
Calcium	--	NA		NA		--	--	262	B	60.5	B	60.5-262
Chromium	160	NA		NA		--	26	49.8	N	17.1	N	17.1-49.8
Cobalt	--	NA		NA		--	--	0.33	B	0.16	B	0.16-0.33
Copper	--	NA		NA		--	16	2.1	B	0.48	B	0.48-2.1
Iron	--	NA		NA		--	--	18200		12100		12100-18200
Lead	5	NA		NA		--	31	15.2		9.7		9.7-15.2
Magnesium	--	NA		NA		--	--	551	B	166	B	166-551
Manganese	100	NA		NA		--	--	3.1	B	0.77	B	0.77-3.1
Mercury	0.144	NA		NA		--	0.2	0.027	U	0.03	B	ND-0.03
Nickel	516	NA		NA		--	16	2.4	B	0.57	B	0.57-2.4
Potassium	--	NA		NA		--	--	1710		507	B	507-1710
Selenium	10	NA		NA		--	--	1.2	B	0.3	U	ND-1.2
Silver	164	NA		NA		--	1	0.081	U	0.062	B	0.062-0.081
Sodium	--	NA		NA		--	--	106	B	39.5	B	39.5-106
Thallium	1.7	NA		NA		--	--	0.93	U	0.5	U	0.5-0.93
Vanadium	--	NA		NA		--	--	28.6		11.3		11.3-28.6
Zinc	--	NA		NA		--	120	13.3		5.1		5.1-13.3

B The reported value was obtained from a measurement that was less than the Contract Required Detection Limit, but greater than or equal to the Instrument Detection Limit
U The Analyte was analyzed for, but not detected
N Spiked sample recovery not within control limits
NA Not Analyzed at this location
ND Not Detected
-- No results
SW results reported in ug/L
SD results reported in mg/kg
Shaded results indicate exceedance of regulatory criteria for analyte

Appendix D Summary of Analytical Results from Surface Soil Background Samples
Collected During the Remedial Investigation at Naval Weapons Station Earle, Colts Neck, NJ

	Units	Number of Samples Collected	Reported Background Concentration						
			Site 3	Site 12	Site 16	Site 17	Site 20	Site L	Total Background Range
Aluminum	mg/kg	4	1710 - 5310	3530 - 7825	1710 - 5310	1710 - 5310	1710 - 5310	1710 - 5310	1710 - 7825
Arsenic	mg/kg	4	1.35 - 14.4	5.1 - 10.7	1.35 - 14.4	1.35 - 14.4	1.35 - 14.4	1.35 - 14.4	1.35 - 14.4
Beryllium	mg/kg	4	N/S	0.28	0.28	0.28	0.28	0.28	0.28
Cadmium	mg/kg	4	0.3975	0.3975	0.57	0.57	0.57	0.57	0.3975 - 0.57
Chromium	mg/kg	4	N/S	7.8 - 59.5	7.8 - 59.5	7.8 - 59.5	7.8 - 59.5	7.8 - 59.5	7.8 - 59.5
Copper	mg/kg	4	0.97 - 8.4	0.97 - 8.4	0.97 - 8.4	0.97 - 8.4	0.97 - 8.4	0.97 - 8.4	0.97 - 8.4
Iron	mg/kg	4	3745 - 62500	3745 - 62500	3745 - 62500	3745 - 62500	3745 - 62500	3745 - 62500	3745 - 62500
Lead	mg/kg	4	1.8 - 39.4	1.8 - 39.4	1.8 - 39.4	1.8 - 39.4	1.8 - 39.4	1.8 - 39.4	1.8 - 39.4
Manganese	mg/kg	4	3.45 - 214	3.45 - 214	3.45 - 214	3.45 - 214	3.45 - 214	3.45 - 214	3.45 - 214
Nickel	mg/kg	4	1.8 - 7.2	1.8 - 7.2	1.8 - 7.2	1.8 - 7.2	1.8 - 7.2	1.8 - 7.2	1.8 - 7.2
Thallium	mg/kg	4	N/S	0.5025 - 1.9	N/S	N/S	0.7 - 1.9	N/S	0.5025 - 1.9
Zinc	mg/kg	4	0.665 - 27.6	0.665 - 27.6	1.1 - 27.6	1.1 - 27.6	1.1 - 27.6	1.1 - 27.6	0.665 - 27.6

Note : Background data collected and reported by Brown & Root Environmental, Remedial Investigation Report for Naval Weapons Station Earle, February 1997 and Remedial Investigation Addendum Report, January 1998.

N/S - Not sampled at this location

ND - Not Detected at this location

Appendix D Summary of Analytical Results from Sediment Background Samples
Collected During the Remedial Investigation at Naval Weapons Station Earle, Colts Neck, NJ

	Units	Number of Samples Collected	Reported Background Concentration											
			Site 3	Site 6	Site 12	Site 13	Site 16	Site 17	Site 19	Site 20	Site 22	Site 23	Watershed	Total Background Range
Aluminum	mg/kg	7	839 - 3940	839 - 3940	839 - 3940	839 - 3940	839 - 3940	839 - 3940	839 - 3940	839 - 3940	839 - 3940	839 - 3940	839 - 3940	839 - 3940
Arsenic	mg/kg	7	2.4 - 9.9	2.4 - 9.9	2.4 - 9.9	2.4 - 9.9	2.4 - 9.9	2.40 - 9.90	2.4 - 6.2	2.4 - 6.2	2.4 - 6.2	2.4 - 6.2	2.4 - 6.2	2.4 - 9.9
Beryllium	mg/kg	7	0.34 - 0.57	0.34 - 0.57	0.34 - 0.57	0.34 - 0.57	0.34 - 0.57	0.34 - 0.57	0.57	0.57	0.57	N/S	0.57	0.34 - 0.57
Cadmium	mg/kg	7	0.44 - 0.46	0.44 - 0.46	N/S	0.44 - 0.46	0.44 - 0.46	0.44 - 0.46	N/S	ND	ND	ND	ND	ND - 0.46
Chromium	mg/kg	7	4.3 - 56	4.3 - 56	4.3 - 56	4.3 - 56	4.3 - 56	4.30 - 56	4.3 - 56	4.3 - 56	4.3 - 56	4.3 - 56	4.3 - 56	4.3 - 56
Copper	mg/kg	7	1 - 13	1 - 13	1 - 13	1 - 13	1 - 13	1 - 13	1.5 - 13	1.5 - 13	1.5 - 13	1.5 - 13	1.5 - 13	1 - 13
Iron	mg/kg	7	228 - 21400	228 - 21400	228 - 21400	228 - 21400	228 - 21400	228 - 21400	228 - 7650	228 - 7650	228 - 7650	228 - 7650	228 - 7650	228 - 21400
Lead	mg/kg	7	4 - 34.3	4 - 34.3	4 - 34.3	4 - 34.3	4 - 34.3	4.00 - 34.30	4.6 - 34.3	4.6 - 34.3	4.6 - 34.3	4.6 - 34.3	4.6 - 34.3	4 - 34.3
Manganese	mg/kg	7	3.9 - 63.1	3.9 - 63.1	3.9 - 63.1	3.9 - 63.1	3.9 - 63.1	3.90 - 63.10	4.6 - 9.2	4.6 - 9.2	13.8	4.6 - 9.2	4.6 - 9.2	3.9 - 63.1
Nickel	mg/kg	7	1.6 - 6	1.6 - 6	1.6 - 6	1.6 - 6	1.6 - 6	1.60 - 6	N/S	2.1 - 6	2.1 - 6	2.1 - 6	2.1 - 6	1.6 - 6
Thallium	mg/kg	7	N/S	ND	N/S	N/S	ND	ND	N/S	N/S	N/S	N/S	ND	ND
Zinc	mg/kg	7	12.5 - 34.7	12.5 - 34.7	12.5 - 34.7	12.5 - 34.7	12.5 - 34.7	12.50 - 34.70	14.2 - 26.9	14.2 - 26.9	14.2 - 26.9	14.2 - 26.9	14.2 - 26.9	12.5 - 34.7

Note : Background data collected and reported by Brown & Root Environmental, Remedial Investigation Report for Naval Weapons Station Earle, February 1997 and Remedial Investigation Addendum Report, January 1998.
N/S - Not sampled at this location
ND - Not Detected at this location

Appendix D Summary of Analytical Results from Ground Water Background Samples Collected During the Remedial Investigation at Naval Weapons Station Earle, Colts Neck, NJ

	Units	Number of Samples Collected	Reported Background Concentration											
			Site 3	Site 4	Site 5	Site 6	Site 13	Site 16	Site 17	Site 19	Site 23	Site 26	Site 29	Total Background Range
Aluminum	ug/L	4	287 - 7870	287 - 7870	287 - 7870	1320 - 2090	287 - 7870	287 - 7870	1320 - 2090	287 - 7870	287 - 7870	287 - 7870	287 - 7870	287 - 7870
Arsenic	ug/L	4	5.8	N/S	5.8 - 5.8	5.1	5.8	5.8	5.1	5.8	5.8	N/S	5.8	5.1 - 5.8
Beryllium	ug/L	4	N/S	0.21 - 1.6	0.21 - 1.6	0.23 - 4.5	0.21 - 1.6	0.21 - 1.6	0.23 - 4.5	0.21 - 1.6	0.21 - 1.6	N/S	N/S	0.21 - 4.5
Cadmium	ug/L	4	0.6 - 1.9	0.6 - 1.9	0.6 - 1.9	0.43 - 7	0.6 - 1.9	0.6 - 1.9	0.43 - 7	0.6 - 1.9	0.6 - 1.9	0.6 - 1.9	0.6 - 1.9	0.43 - 7
Chromium	ug/L	4	ND	ND	ND	ND	1.3 - 43.5	1.3 - 43.5	ND	ND	ND	1.3 - 43.5	ND	ND - 43.5
Copper	ug/L	4	0.79 - 13.5	0.79 - 13.5	0.79 - 13.5	N/S	0.79 - 13.5	0.79 - 13.2	ND	0.79 - 13.5	0.79 - 13.5	0.79 - 13.5	N/S	0.79 - 13.5
Iron	ug/L	4	153 - 7690	153 - 7690	153 - 7690	1400 - 95200	153 - 7690	153 - 7690	1400 - 95200	153 - 7690	153 - 7690	153 - 7690	153 - 7690	153 - 95200
Lead	ug/L	4	2.1 - 3	2.1 - 3	2.1 - 3	N/S	2.1 - 3	2.1 - 3	ND	2.1 - 3	2.1 - 3	2.1 - 3	2.1 - 3	ND - 3
Manganese	ug/L	4	3.3 - 65	3.3 - 65	3.3 - 65	720 - 3040	3.3 - 65	3.3 - 65	720 - 3040	3.3 - 65	3.3 - 65	3.3 - 65	3.3 - 65	3.2 - 3040
Nickel	ug/L	4	0.81 - 25.5	0.81 - 25.5	0.81 - 25.5	3.7 - 43.2	0.81 - 25.5	0.81 - 25.5	3.7 - 43.2	0.81 - 25.5	0.81 - 25.5	0.81 - 25.5	0.81 - 25.5	0.81 - 43.2
Thallium	ug/L	4	4 - 5.1	N/S	4 - 5.1	N/S		4 - 5.1	N/S	4 - 5.1	4 - 5.1	N/S	N/S	4 - 5.1
Zinc	ug/L	4	3.7 - 348	3.7 - 348	N/S	18.9 - 30.9	0.69 - 42.25	3.7 - 348	18.9 - 30.9	3.7 - 348	3.7 - 348	3.7 - 348	3.7 - 348	0.69 - 42.25

Note : Background data collected and reported by Brown & Root Environmental, Remedial Investigation Report for Naval Weapons Station Earle, February 1997 and Remedial Investigation Addendum Report, January 1998.

N/S - Not sampled at this location

ND - Not Detected at this location

Appendix D Summary of Surface Water Analytical Results from Background Samples
Collected During the Remedial Investigation at Naval Weapons Station Earle, Colts Neck, NJ

	Units	Number of Samples Collected	Reported Background Concentration						
			Site 6	Site 13	Site 17	Site 19	Site 23	Watershed	Total Background Range
Aluminum	ug/L	7	102 - 1540	102 - 1540	102 - 1540	265 - 409	265 - 409	265 - 409	102 - 1540
Arsenic	ug/L	7	9	N/S	9	N/S	N/S	ND	ND - 9
Beryllium	ug/L	7	0.22 - 1.2	0.22 - 1.2	N/S	0.22 - 0.33	N/S	0.22 - 0.33	0.22 - 1.2
Cadmium	ug/L	7	0.18	0.18	0.22 - 1.2	N/S	0.18	0.18	0.18
Chromium	ug/L	7	0.72 - 2.6	0.72 - 2.6	462 - 177000	N/S	0.72 - 2.6	0.72 - 2.6	0.72 - 2.6
Copper	ug/L	7	1.1 - 17.8	1.1 - 17.8	0.81 - 2	1.1 - 9.8	1.1 - 9.8	1.1 - 9.8	1.1 - 17.8
Iron	ug/L	7	160 - 23100	160 - 23100	1.1 - 17.8	160 - 702	160 - 702	160 - 702	160 - 23100
Lead	ug/L	7	4.4 - 16	4.4 - 16	160 - 23100	4.4	4.4	4.4	4.4 - 16
Manganese	ug/L	7	14 - 203	14 - 203	369 - 559000	14 - 55.5	14 - 55.5	14 - 55.5	14 - 203
Nickel	ug/L	7	2.1 - 7.9	2.1 - 7.9	0.023 - 0.028	2.1 - 7.1	N/S	2.1 - 7.1	2.1 - 7.9
Thallium	ug/L	7	3.5 - 5.5	N/S	3.5 - 9.2	N/S	N/S	3.5 - 5.5	3.5 - 5.5
Zinc	ug/L	7	7.6 - 29.4	N/S	3.5 - 5.5	7.6 - 29.4	7.6 - 29.4	7.6 - 29.4	7.6 - 29.4

Note : Background data collected and reported by Brown & Root Environmental, Remedial Investigation Report for Naval Weapons Station Earle, February 1997 and Remedial Investigation Addendum Report, January 1998.

N/S - Not sampled at this location

ND - Not Detected at this location

Appendix D Summary of State Wide and Site Specific Background Concentrations of Associated Elements in Soil

	Units	Reported Soil Background Concentration					
		New Jersey Geological Survey Investigation Report (a)	NJ Background Concentrations (b) State Wide	NJ Background Concentrations (b) Monmouth County	Remedial Investigation Report / Remedial Investigation Addendum Report (c)	Additional Site Specific Background Samples.	Total Background Range
Aluminum	mg/kg	35730 - 57910	N/S	N/S	675 - 5310	N/S	675 - 57910
Arsenic	mg/kg	18 - 126	0.02 - 48.9	2.85 - 17.1	1.35 - 14.4	2.2-29	ND - 126
Beryllium	mg/kg	7.9 - 14.6	ND - 10.3	0.09 - 1.07	0.12 - 0.28	N/S	ND - 14.6
Cadmium	mg/kg	<0.2 - 0.7	ND - 2.28	0.03 - 0.135	0.57	ND-0.21	<0.2 - 2.28
Chromium	mg/kg	226 - 806	0.7 - 72.7	10.4 - 20.7	4.7 - 59.5	N/S	0.7 - 806
Copper	mg/kg	2.9 - 13.4	ND - 143	5.25 - 7.27	0.97 - 8.6	N/S	ND - 143
Iron	mg/kg	173360 - 274900	N/S	N/S	3745 - 62500	N/S	3745 - 274900
Lead	mg/kg	5 - 97	ND - 617	15.1 - 44.3	1.4 - 39.4	N/S	ND - 617
Manganese	mg/kg	<80 - 7750	1 - 1313	27 - 120	2.6 - 214	N/S	1 - 1313
Nickel	mg/kg	15 - 35	ND - 53.8	3.2 - 8.3	1.8 - 7.2	N/S	ND - 53.8
Thallium	mg/kg	<0.1 - 0.3	ND - 0.28	ND	0.7 - 1.9	N/S	ND - 1.9
Zinc	mg/kg	92.8 - 294	ND - 789	25.5 - 44.6	0.665 - 50.7	N/S	ND - 789

(a) New Jersey Geological Survey Investigation Report, Baseline Concentrations of Arsenic, Beryllium, and Associated Elements in Glauconite and Glauconitic Soils in the New Jersey Costal Plain, 2001.

(b) Background concentrations from New Jersey Department of Environmental Protection and Energy, Site Remediation Program and Division of Science and Research, A Summary of Selected Soil Constituents and Contaminants at Background Locations in New Jersey, September 1993.

(c) Background data collected and reported by Brown & Root Environmental, Remedial Investigation Report for Naval Weapons Station Earle, February 1997 and Remedial Investigation Addendum Report, January 1998.

N/S Not sampled

ND Not Detected at this location

Appendix D Summary of Analytical Results from Surface Soil Background Samples
Collected During the Remedial Investigation at Naval Weapons Station Earle, Colts Neck, NJ

	Units	Number of Samples Collected	Reported Background Concentration										
			Site 12	Site 16	Site 19	Site 20	Site 22	Site 23	Site 24	Site 25	Site 26	Site 27	Total Background Range
Aluminum	mg/kg	4	675 - 5310	675 - 5310	675 - 5310	675 - 5310	675 - 5310	675 - 5310	675 - 5310	675 - 5310	675 - 5310	675 - 5310	675 - 5310
Arsenic	mg/kg	4	1.35 - 14.4	1.35 - 14.4	1.35 - 14.4	1.35 - 14.4	1.35 - 14.4	1.35 - 14.4	1.35 - 14.4	1.35 - 14.4	1.35 - 14.4	1.35 - 14.4	1.35 - 14.4
Beryllium	mg/kg	4	0.12 - 0.28	0.12 - 0.28	0.12 - 0.28	N/S	0.12 - 0.28	0.12 - 0.28	0.12 - 0.28	0.12 - 0.28	0.12 - 0.28	0.12 - 0.28	0.12 - 0.28
Cadmium	mg/kg	4	N/S	0.57	0.57	N/S	N/S	0.57	0.57	N/S	0.57	0.57	0.57
Chromium	mg/kg	4	4.7 - 59.5	4.7 - 59.5	4.7 - 59.5	4.7 - 59.5	4.7 - 59.5	4.7 - 59.5	4.7 - 59.5	4.7 - 59.5	4.7 - 59.5	4.7 - 59.5	4.7 - 59.5
Copper	mg/kg	4	0.97 - 8.6	0.97 - 8.6	0.97 - 8.6	0.97 - 8.6	0.97 - 8.6	0.97 - 8.6	0.97 - 8.6	0.97 - 8.6	0.97 - 8.6	0.97 - 8.6	0.97 - 8.6
Iron	mg/kg	4	3745 - 62500	3745 - 62500	3745 - 62500	3745 - 62500	3745 - 62500	3745 - 62500	3745 - 62500	3745 - 62500	3745 - 62500	3745 - 62500	3745 - 62500
Lead	mg/kg	4	1.4 - 39.4	1.4 - 39.4	1.4 - 39.4	1.4 - 39.4	1.4 - 39.4	1.4 - 39.4	1.4 - 39.4	1.4 - 39.4	1.4 - 39.4	1.4 - 39.4	1.4 - 39.4
Manganese	mg/kg	4	2.6 - 214	2.6 - 214	2.6 - 214	2.6 - 214	2.6 - 214	2.6 - 214	2.6 - 214	2.6 - 214	2.6 - 214	2.6 - 214	2.6 - 214
Nickel	mg/kg	4	1.8 - 7.2	1.8 - 7.2	1.8 - 7.2	1.8 - 7.2	1.8 - 7.2	1.8 - 7.2	1.8 - 7.2	1.8 - 7.2	1.8 - 7.2	1.8 - 7.2	1.8 - 7.2
Thallium	mg/kg	4	N/S	0.7 - 1.9	0.7 - 1.9	N/S	N/S	0.7 - 1.9	N/S	N/S	0.7 - 1.9	N/S	0.7 - 1.9
Zinc	mg/kg	4	0.665 - 50.7	1.1 - 50.7	1.1 - 50.7	1.1 - 50.7	1.1 - 50.7	1.1 - 50.7	1.1 - 50.7	1.1 - 50.7	1.1 - 50.7	1.1 - 50.7	0.665 - 50.7

Note : Background data collected and reported by Brown & Root Environmental, Remedial Investigation Report for Naval Weapons Station Earle, February 1997 and Remedial Investigation Addendum Report, January 1998.

N/S - Not sampled at this location

ND - Not Detected at this location

Appendix E

Risk Assessment Screening and Background Statistical Analyses

MEMORANDUM

Date: 14 January 2004

To: Michele DiGeambeardino

From: Virginia Snead
Christopher Kerlish

Re: Risk Assessment Screening and Background Statistical Analyses

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As discussed in the Preliminary Assessment/Site Investigation (PA/SI) prepared by EA in 2003, arsenic and cadmium are present in soil samples at Site 48, Naval Weapons Station Earle, at concentrations above the New Jersey Department of Environmental Protection's (NJDEP's) Residential Direct Contact Soil Cleanup Criteria. It should be noted that, although mine actuators historically disposed at Site 48 have been documented to contain cadmium (please refer to TCLP analysis results, provided as Appendix B), no arsenic is present in the actuators or is known or suspected to have been used at Site 48 by the Navy. Following review of the PA/SI, EPA Region II requested that the Navy perform a limited human health risk-based screening and risk ratio assessment for chemicals of potential concern (COPCs) for surface soil. Data used in the risk-based screening is provided in Table 1.

Human Health Risk-Based Screening

A human health risk-based screening analysis was performed using the site surface soil data presented in Table 1. The risk-based screening was performed using the most recent U.S. EPA Region IX Preliminary Remediation Goals (PRGs) for industrial (USEPA 2003a). Site 48 is located within the ordnance area of Naval Weapons Station Earle; as such, use is classified as industrial. Access to this area is strictly limited and use of and access to Site 48 are not anticipated to change in the foreseeable future. A hazard quotient of 0.1 and a carcinogenic risk target of 10^{-6} were used. The maximum detected concentration for each analyte was compared to the chemical-specific PRG; those analytes with site concentrations exceeding the PRG were considered COPCs.

Based on the comparison to industrial soil PRGs (Table 2), only arsenic was selected as a COPC.

Risk Ratio Assessment for Arsenic

The acceptable U.S. EPA risk range for carcinogens is 10E-4 to 10E-6. Arsenic was selected as a COPC based on the comparison of the maximum detected arsenic concentration to a risk-based carcinogenic value corresponding to a risk of 10E-6. Using a risk ratio approach, arsenic is analyzed as both a carcinogen and non-carcinogen. The risk ratio approach is presented in Table 3. The risk ratio demonstrates that potential industrial arsenic risks are within the acceptable carcinogenic risk range of 10E-4 to 10E-6 and below the target hazard quotient of 1.0. Therefore arsenic concentrations are not of concern for industrial use of the site.

Conclusions

In summary, only arsenic was determined to be a COPC based on the risk-based industrial scenario screen. The site is industrial in nature and is expected to remain industrial in the future. Site arsenic concentrations, when analyzed for potential risks are within the U.S. EPA acceptable risk range of 10E-4 to 10E-6. Therefore there are no risk-related concerns for the site.

References

EA Engineering, Science, and Technology, Inc. 2003. *Preliminary Assessment/Site Investigation Report for Sites 47 and 48, Naval Weapons Station Earle.* June.

U.S. Environmental Protection Agency (EPA). 2001. *Risk Assessment Guidance for Superfund Volume 1 – Human Health Evaluation Manual (Part D), Standardized Planning, Reporting and Review of Superfund Risk Assessments Final Guidance.* Office of Emergency and Remedial Response, Washington, D.C.

EPA Region IX. 2003a. *Preliminary Remediation Goals (PRGs)* on-line table maintained on the Internet at http://www.epa.gov/region09/waste/sfund/prg/index.htm.

Gilbert, R.O. 1987. *Statistical Methods for Environmental Pollution Monitoring.*

TABLE 1
DATA INCLUDED IN THE RISK ASSESSMENT SCREENING
NWS EARLE, COLTS NECK, NJ

DATA SET	SAMPLE NAME
SITE DATA	11-TP48-11A
SITE DATA	11-TP48-11B
SITE DATA	17-TP48-17A
SITE DATA	17-TP48-17A
SITE DATA	18-TP48-18A
SITE DATA	18-TP48-18A
SITE DATA	19-TP48-19A
SITE DATA	19-TP48-19A
SITE DATA	3-TP48-3A
SITE DATA	3-TP48-3B
SITE DATA	4-TP48-4A
SITE DATA	4-TP48-4B
SITE DATA	6-TP48-6A
SITE DATA	6-TP48-6B
SITE DATA	TP-48-DUP-1
SITE DATA	TP-48-DUP-1

TABLE 2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
NWS EARLE, COLTS NECK, NJ
SURFACE SOIL - INDUSTRIAL

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Earle

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentraion	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (5) Contaminant Deletion or Selection
							Inorganics										
7429-90-5	ALUMINUM	680		9390		MG/KG	3-TP48-3B	11/11	5.1 - 7.2	9390	NA	1.00E+04	N	NA	NA	No	BSL
7440-36-0	ANTIMONY	0.53	B	5.2	B	MG/KG	3-TP48-3B	10/11	0.42 - 0.58	5.2	NA	4.09E+01	N	NA	NA	No	BSL
7440-38-2	**ARSENIC**	**3.3**		**101**		**MG/KG**	**3-TP48-3B**	**11/11**	**0.29 - 0.41**	**101**	**NA**	**1.59E+00**	**C**	**NA**	**NA**	**Yes**	**ASL**
7440-39-3	BARIUM	3.8	B	135		MG/KG	4-TP48-4B	11/11	0.94 - 1.3	135	NA	6.66E+03	N	NA	NA	No	BSL
7440-41-7	BERYLLIUM	0.05	B	1.2		MG/KG	18-TP48-18A	11/11	0.011 - 0.016	1.2	NA	1.94E+03	C	NA	NA	No	BSL
7440-43-9	CADMIUM	0.15	B	17.1	/	MG/KG	17-TP48-17A	9/11	0.079 - 0.11	17.1	NA	4.51E+01	N	NA	NA	No	BSL
7440-70-2	CALCIUM	95.2	B	2800		MG/KG	18-TP48-18A	11/11	1.2 - 1.7	2800	NA	NA		NA	NA	No	NUT
7440-47-3	CHROMIUM	10.8		278		MG/KG	3-TP48-3B	11/11	0.15 - 0.2	278	NA	4.48E+02	C	NA	NA	No	BSL
7440-48-4	COBALT	0.27	B	6.1	B	MG/KG	18-TP48-18A	11/11	0.2 - 0.28	6.1	NA	1.92E+03	C	NA	NA	No	BSL
7440-50-8	COPPER	2.8	B	130		MG/KG	18-TP48-18A	11/11	0.25 - 0.35	130	NA	4.09E+03	N	NA	NA	No	BSL
7439-89-6	IRON	4870		84100		MG/KG	18-TP48-18A	11/11	1.5 - 2.1	84100	NA	1.00E+05		NA	NA	No	NUT
7439-92-1	LEAD	8.5		523		MG/KG	18-TP48-18A	11/11	0.17 - 0.24	523	NA	7.50E+02	N	NA	NA	No	BSL
7439-95-4	MAGNESIUM	93.7	B	2280		MG/KG	19-TP48-19A	11/11	8.6 - 12	2280	NA	NA		NA	NA	No	NUT
7439-96-5	MANGANESE	2.4		638		MG/KG	18-TP48-18A	10/11	0.14 - 0.19	638	NA	1.95E+03	N	NA	NA	No	BSL
7439-97-6	MERCURY	0.01		2.9		MG/KG	18-TP48-18A	11/11	0.01 - 0.016	2.9	NA	6.16E+00	N	NA	NA	No	BSL
7440-02-0	NICKEL	0.37	B	14.3		MG/KG	18-TP48-18A	6/11	0.34 - 0.47	14.3	NA	2.04E+03	N	NA	NA	No	BSL
7440-09-7	POTASSIUM	136	B	6070		MG/KG	18-TP48-18A	11/11	2.51 - 3.51	6070	NA	NA		NA	NA	No	NUT
7782-49-2	SELENIUM	0.28	B	0.63	B	MG/KG	19-TP48-19A	5/11	0.25 - 0.35	0.63	NA	5.11E+02	N	NA	NA	No	BSL
7440-23-5	SODIUM	119	B	553	B	MG/KG	18-TP48-18A	2/11	55.2 - 77.1	553	NA	NA		NA	NA	No	NUT
7440-28-0	THALLIUM	1.5		1.5		MG/KG	19-TP48-19A	1/11	0.64 - 0.9	1.5	NA	6.75E+00	N	NA	NA	No	BSL
7440-62-2	VANADIUM	10.1	N	112	N	MG/KG	3-TP48-3B	11/11	0.36 - 0.51	112	NA	7.15E+02	N	NA	NA	No	BSL
7440-66-6	ZINC	14.3	N	2980	N	MG/KG	18-TP48-18A	11/11	0.96 - 1.3	2980	NA	1.00E+04	N	NA	NA	No	BSL

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used as screening value.
(3) Background Values
(4) Screening Toxicity Value - Taken from USEPA Region IX Preliminary Remediation Goals (PRGs) Table, USEPA, February 2003. For non-carcinogens, value shown is equal to 1/10 the Industrial PRG. For carcinogens the value shown is equal to the Industrial PRG.
(5) Rationale Codes — Selection Reason: Above Screening Toxicity Level (ASL); Deletion Reason: Essential Nutrient (NUT); Below Screening Toxicity Level (BSL)

Surrogates: Methyl mercury for Mercury.

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
C = Carcinogenic
COPC = Chemical of Potential Concern
N = Non-Carcinogenic
NA = Not Applicable
ND = No Data

Qualifiers:
B = Estimated value.
N = Sample recovery not within control limits.

TABLE 3
RISK RATIO CALCULATIONS
NWS EARLE, COLTS NECK, NJ
SURFACE SOIL - INDUSTRIAL

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Earle

Chemical	Minimum (1) Concentration	Maximum (1) Concentration	Average Concentration(2)	Units	Screening (3) Toxicity Value		Risk-Ratio(4)	Exceedence?
Inorganic COPC								
ARSENIC	3.3	101	28.7	MG/KG	1.59	C	6.35E-05	No, Within Risk Range
ARSENIC	3.3	101	28.7	MG/KG	26	N	0.39	No, Less than 1

(1) Minimum/maximum detected concentration.

(2) Average concentration calculated using all validated table samples listed in Table 1. One-half detection limit was used for non-detects.

(3) Screening Toxicity Value - Taken from USEPA Region IX Preliminary Remediation Goals (PRGs) Table, USEPA, February 2003. For non-carcinogens, value shown is equal to 1/10 the Industrial PRG and corresponds to a hazard quotient of 0.1. For carcinogens the value shown is equal to the Industrial PRG and corresponds to a risk of 10E-6.

(4) Risk-ratio is calculated by first dividing the maximum detected concentration by the screening toxicity value. For carcinogens, this is then multiplied by 10e-6 to achieve the carcinogenic risk ratio. For non-carcinogens, it is divided by 10 to achieve a non-carcinogenic risk ratio.

C = Carcinogenic

N = Non-Carcinogenic

APPENDIX A
ProUCL output for Cadmium (State Background Data)

Summary Statistics for	CADMIUM
Number of Samples	80
Minimum	0.005
Maximum	5.16
Mean	0.3718375
Median	0.146
Standard Deviation	0.717208662
Variance	0.514388264
Coefficient of Variation	1.928822837
Skewness	4.529843118

95 % UCL (Assuming Normal Data)

Student's-t	0.505297366

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	0.547125279
Modified-t	0.512065789

95 % Non-parametric UCL

CLT	0.503732335
Jackknife	0.505297366
Standard Bootstrap	0.499112001
Bootstrap-t	0.595123119
Chebyshev (Mean, Std)	0.721361766

Summary Statistics for	ln(CADMIUM)
Minimum	-5.298317367
Maximum	1.640936579
Mean	-2.099751522
Standard Deviation	1.609259139
Variance	2.589714976
Lilliefors Test Statisitic	0.09353618
Lilliefors 5% Critical Value	0.099057811

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution

MLE Mean	0.447135305
MLE Standard Deviation	1.569818943
MLE Coefficient of Variation	3.510836487
MLE Skewness	53.80698465
MLE Median	0.12248686
MLE 80% Quantile	0.477148484
MLE 90% Quantile	0.968648451
MLE 95% Quantile	1.728890306
MLE 99% Quantile	5.172650542
MVU Estimate of Median	0.12051989
MVU Estimate of Mean	0.431503438
MVU Estimate of Std. Dev.	1.309283084
MVU Estimate of SE of Mean	0.109472333

UCL Assuming Lognormal Distribution

95% H-UCL	0.75420526
95% Chebyshev (MVUE) UCL	0.908682276
99% Chebyshev (MVUE) UCL	1.520739402

Recommended UCL to use:
H-UCL

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