Preliminary Assessment/Site Investigation Work Plan for Sites 47 and 48, and Guadalcanal Road 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
Northern Division
Naval Facilities Engineering Command
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

May 2001
FINAL
Project No. 296.0100

Preliminary Assessment/Site Investigation Work Plan for Sites 47 and 48, and Guadalcanal Road 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
Northern Division
Naval Facilities Engineering Command
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

Christopher J. Kerlish — 8 May 2001
Christopher J. Kerlish, CTO Manager — Date

Kenneth W. Kilmer — 7 May 2001
Kenneth W. Kilmer, Program Manager — Date

May 2001
FINAL
Project No. 296.0100

QUALITY REVIEW STATEMENT

Contract No. N62472-92-D-1296 EA Project No.: 29601.00.0004
Contract Task Order No. 0100
Activity: Naval Weapons Station Earle, Colts Neck, New Jersey

Description of Report/Deliverable:

Final Preliminary Assessment/Site Investigation Work Plan
for Sites 47 and 48, and Guadalcanal Road
Naval Weapons Station Earle, Colts Neck, New Jersey

EA CTO Manager: Christopher J. Kerlish

In compliance with EA's Quality Procedures for review of deliverables outlined in the Quality Management Plan, this final deliverable has been reviewed for quality by the undersigned Senior Technical Reviewer(s). The information presented in this report/deliverable has been prepared in accordance with the approved Implementation Plan for the Contract Task Order (CTO) and reflects a proper presentation of the data and/or the conclusions drawn and/or the analyses or design completed during the conduct of the work. This statement is based upon the standards identified in the CTO and/or the standard of care existing at the time of preparation.

Senior Technical Reviewer(s)

Michael S. Battle

4 May 2001

Michael S. Battle, P.G. Date
Senior Geologist

CONTENTS

Page

Page

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

EPA	(U.S.) Environmental Protection Agency
NJDEP	New Jersey Department of Environmental Protection
NWS	Naval Weapons Station
PA/SI	Preliminary Assessment/Site Investigation
SVOC	Semivolatile organic compound
VOC	Volatile organic compound

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 Northern Division to perform a Preliminary Assessment/Site Investigation (PA/SI) for Sites 47 and 48, and to perform limited ground-water monitoring at a third site near Guadalcanal Road, at Naval Weapons Station (NWS) Earle in Colts Neck, New Jersey. The objectives of these activities are as follows:

- Evaluation of the significance of slight exceedances of pesticide standards in ground water beneath Site 47, the former Pesticide Shop.
- Evaluation of potential environmental concerns at Site 48, an area historically used for disposal of inert batteries from former mines. This area has not been formally investigated in the past.
- Evaluation of the need for a formal Remedial Investigation at Sites 47 and 48.
- Determination of depth to ground water and evaluation of potential impacts to ground water in the historic drum removal area near Guadalcanal Road.

The investigation sites are shown in their respective figures (Figure 2 through Figure 4).

1.2 FIELD INVESTIGATION ACTIVITIES

1.2.1 Site 47–Former Pesticide Shop

Site 47 is the location of a former pesticide shop located in the administrative area (see 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 PA/SI in the Site 47 Pesticide Shop area is 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 will include the following:

- Collection of 6 ground-water grab samples using direct-push technology. The locations of these samples will be selected based on the analytical results presented in the Draft Removal Action Report (Foster Wheeler 2000b). Samples will be analyzed for total pesticides.

- Installation, development, and sampling of a conventional monitoring well in the event that the direct-push samples are too turbid for accurate measurement of dissolved pesticide concentrations.

1.2.2 Site 48–Mine Battery Disposal Area

The Site 48 Mine Battery Disposal Area (see Figure 3) 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 are to:

- Approximately assess the horizontal and vertical extent of batteries at the site
- Assess the presence or absence of impacts to site media (soil, ground water, surface water, and sediment) from past battery disposal activities.

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

- Performance of an unexploded ordnance survey in the terrestrial portions of Site 48 to identify potential unexploded ordnance prior to sampling activities
- Collection of soil and ground-water samples using direct-push technology
- Use of test pits to attempt to identify areas of significant battery disposal, and to assess the horizontal and vertical extents of battery disposal at the site
- Collection of up to 3 surface water and 3 sediment samples from West Pond, and 2 surface water and 2 sediment sample from the adjacent Mine Brook, to determine impacts of the battery disposal activities to surface waters in Area 48
- Analysis of all surface water, ground-water, and sediment samples for total and dissolved Target Analyte List metals and pH.

1.2.3 Drum Removal Area Near Guadalcanal Road

The Drum Removal Area near Guadalcanal Road (see Figure 4) is a site where several buried drums of a tar-like substance, as well as impacted soils, were removed in May 2000. The primary objectives of the limited ground-water sampling in the Drum Removal Area are to determine depth to ground water and to assess the potential for impacts. To satisfy these objectives, project activities at the Drum Removal Area will include the following:

- Collection of 3 ground-water grab samples via direct-push methods and analysis for Target Compound List volatile organic compounds (VOCs) and Target Compound List semivolatile organic compounds (SVOCs).

1.3 PLANNING DOCUMENTS

This PA/SI Work Plan has been developed based on the information, regulations, and guidance contained in the following documents:

- Foster Wheeler Environmental Corporation. Action Memorandum and Engineering Evaluation/Cost Analysis for the Pesticide Shop Remediation. February 2000.
- Foster Wheeler Environmental Corporation. Pre-Draft Removal Action Report, Site 47. July 2000.
- New Jersey Department of Environmental Protection (NJDEP). 1992. Field Sampling Procedures Manual.
- NJDEP. 1994a. Alternative Ground-Water Sampling Techniques Guide.
- N.J.A.C. 7:26E-3.11 Technical Requirements for Site Remediation. 1997.

1.4 WORK PLAN ORGANIZATION

This PA/SI Work Plan is organized as follows:

- Section 1 is a description of the scope of work to be performed.
- Section 2 is a description of the site background, including site location, site history, and general physical characteristics of the study area.
- Section 3 discusses management responsibilities for this project.
- Section 4 is an outline of the general sampling and field investigative procedures including sample designation and handling and sample location surveying.
- Section 5 outlines the specific sample collection procedures and techniques necessary to complete the field sampling efforts.
- Section 6 outlines the reports that will address the activities included in this work plan.

A Safety, Health, and Emergency Response Plan, that presents the possible hazards and associated protective measures to be implemented to protect the safety and health of field personnel, is provided under separate cover. A companion Quality Assurance Project Plan is also provided under separate cover.

2. SITE BACKGROUND

2.1 SITE LOCATION

NWS Earle is a facility located in Monmouth County, New Jersey, tasked with the primary responsibility of furnishing ammunition 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 containing a private road and rail line. NWS Earle was named to the U.S. Environmental Protection Agency (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. Several removal actions have been completed and four Records of Decision have been signed addressing a total of 12 sites.

2.2 SITE HISTORY

Two additional sites were identified after completion of the Remedial Investigation. The first site is a former pesticide shop located in the administrative area of NWS Earle. The Pesticide Shop was a 12 x 28 ft concrete block building used as a storage and mixing facility during the 1980s. A 10 x 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. All remaining pesticides and herbicides were removed from the building in 1991, when the Station switched to contractor-provided pest management services. Soil samples were taken near the concrete pad in 1998 when a residual pesticide odor was detected during wet weather. Elevated levels of chlordane, dichlorodiphenyltrichloroethane, and breakdown products were found in surface soil, and 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 a pesticide impact to ground water was detected. The Removal Action Report verified that New Jersey's residential standards for surface soils were achieved by the removal. However, several ground-water grab samples were observed to contain endosulfan I at concentrations above, but within an order of magnitude of, New Jersey's Ground-Water Quality Standard.

The second site identified after completion of the Remedial Investigation is a former disposal area (Site 48). 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). An 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 later identified as inert batteries from an obsolete type of mine. Based on analysis of historical aerial photos and the recollection of a long-term NWS Earle equipment operator, the area of the disposal site is

estimated to be 3-4 acres. An initial interview indicated a significant number of batteries were dumped in the area adjacent to West Pond. It is possible that a sand borrow area near the pond may have been filled with the batteries. Information regarding Site 48 is rather limited. Batteries are visible on the ground in some areas, and historical aerial photos show a cleared area (presumably a former farm) at the site. Results from surface water and sediment samples collected downstream of the site as part of a watershed sampling event prior to the discovery of the batteries did not identify significant impacts. A surface soil sample collected near some of the batteries which was analyzed using a field test kit, contained elevated concentrations of metals, including lead.

EA has also been tasked to perform a limited investigation in an area, separate from the sites identified above, in the south-central section of the NWS near Guadalcanal Road, where several drums of a tar-like substance, as well as impacted soil, were removed in May 2000.

The geology underlying NWS Earle in the area of Site 47 is predominantly layered silts, sands, and clays. The depth to water in the area is approximately 20 ft below grade. Ground water generally flows from east to west across the site. Geology and hydrogeology in the areas of Site 48 and Guadalcanal Road will be noted, to the extent possible, during field activities in this area.

3. MANAGEMENT RESPONSIBILITIES

EA's project team has been selected and organized to provide the technical expertise, field supervision, and management support needed to ensure that execution of the scope of work is successful, efficient, and safe.

3.1 CONTRACT TASK ORDER MANAGER

The Contract Task Order Manager, Mr. Christopher Kerlish, is responsible for the successful, timely, and cost-effective completion of the project activities. He is responsible for adhering to established technical and quality control protocols and procedures for the project and for reviewing and approving all documentation and reports. He provides day-to-day management of the project staff and serves as the interface between the EA project team, the Northern Division Remedial Project Manager, and NWS Earle personnel. Mr. Kerlish reports directly to Mr. Kenneth Kilmer, EA's Program Manager.

3.2 SITE MANAGER

The Site Manager, Ms. Christine Napoletano, is responsible for the management of the field investigations and preparation of reports. She is also responsible for implementation of the Work Plan and the Safety, Health, and Emergency Response Plan and adherence to the Quality Assurance Project Plan during data collection activities. She will also coordinate with EA's analytical laboratory subcontractor. Ms. Napoletano reports directly to the Contract Task Order Manager and is supported by EA's staff of engineers, environmental scientists, geoscientists, and technicians.

3.3 SENIOR TECHNICAL REVIEWERS

The Senior Technical Reviewers, Mr. Michael Battle, P.G., and Mr. Douglas McClure, P.E., will provide senior technical review for geologic/hydrogeologic issues and engineering issues, respectively. Mr. Battle and Mr. McClure are responsible for reviewing draft and final deliverables and are independent of the day-to-day project work. They have been involved with the project since the planning stages and will provide oversight and guidance throughout execution of this project. Mr. Battle and Mr. McClure report directly to EA's Base Realignment and Closure Program Manager for this project.

3.4 SAFETY AND HEALTH COORDINATOR

The Safety and Health Coordinator, Mr. Barry Weissman, is responsible for preparation of the Safety, Health, and Emergency Response Plan (EA 2000a) and oversees the activities of the project team throughout sample collection and analysis. Under direction of EA's Base Realignment and Closure Program Safety and Health Officer, Mr. Kris Hoiem, Mr. Weissman will ensure full compliance with Occupational Safety and Health Act medical and safety regulations established in the Safety, Health, and Emergency Response Plan.

4. SAMPLE MANAGEMENT AND RECORDKEEPING PROCEDURES

4.1 SAMPLE DESIGNATION SYSTEM

Each sample collected during field activities will be assigned a unique sample designation, consisting of no more than 12 characters. The first portion of the designation will be the site designation specified in the Work Plan, followed by a hyphen (e.g., a sample from Site 48 would be represented by 48-). A two-letter code will follow 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 will be included next; each sample type at each site will start with sample No. "1," with each successive sample numbered in ascending order. If the sample has a depth associated with it, the sample depth interval will follow the sample number. For example, samples collected every 2 ft from the first test pit at Site 48 would be designated 1-TP48-0-2, 1-TP48-2-4, 1-TP48-4-6.

For monitoring wells, surface water, and direct-push well points, the sample depth is not applicable and will not be indicated.

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

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

The sample number will follow the sample type. Sample numbers will be assigned sequentially, starting with "1" for each quality assurance/quality control sample type (e.g., 1-TP48-DUP-1, 1-TP48-FB-1). Field personnel will record the location of field samples corresponding to the quality assurance/quality control sample in the field logbook, but the location of field duplicates will not be recorded on the chain-of-custody on sample containers.

4.2 SAMPLE DOCUMENTATION

Upon completion of sample collection, logging, and preservation, the chain-of-custody forms will be completed. At that time, the samples will be secured for shipment to the laboratory. Sample tracking will start at the point of collection with logbook entries. The log entries will be recorded in waterproof ink in a bound field logbook, updated daily, and maintained at the site. Information to be recorded in the logbook will include:

- Project name and number for which sampling is being conducted (NWS Earle, 29601.00)
- Site name (Site 47, Site 48, or Guadalcanal Road)
- Field team participants and organization affiliation
- Unique, sequential sample number, in accordance with Section 4.1
- Sample depth, if applicable
- Sampling date and time
- Specific sampling location in sufficient detail to allow resampling at the same location, if required
- Method of sample collection
- Preservation techniques, if applicable
- Analyte classes of interest (e.g., metals, VOCs, SVOCs)
- Water volume removed during well development, if applicable
- Significant observations made during the sampling process
- Results of any field measurements, such as depth to water, temperature, conductivity, and pH, if applicable
- Printed name and signature of the person performing the sampling.

In addition to the sampling logbook, each sample will be labeled in waterproof ink with the following information:

- Project name and number (NWS Earle, 29601.00)
- Sample number in accordance with the format described in Section 4.1
- Sampling date and time

- Name of sampler
- Analysis requested
- Preservatives added.

Custody seals will be used to ensure that the samples are not tampered with during shipment. A sample chain-of-custody form is provided on Figure 5. One chain-of-custody form will be completed for each cooler shipped daily. The chain-of-custody form will accompany the sample throughout the shipping and analytical process. Each cooler will have a chain-of-custody form properly sealed into the cooler prior to shipment.

4.3 SAMPLE PACKAGING AND SHIPPING

Shipment of samples will be in accordance with U.S. Department of Transportation regulations described in 49 CFR 171 and 49 CFR 172, and NEIC procedures (EPA-330). This is usually guaranteed air freight, however, the laboratory offers a bottle drop-off and pickup service for samples which is convenient to this project and will be used. Samples are packaged, preserved, and cooled in accordance with EPA protocols. Bottle drop-off will occur at the beginning of each sampling day, and pickup will occur at the end of each sampling day.

1. Each sample will be labeled with the client's name, project number, location, site name, sample designation, date, time of collection, and name of sampler on a label that will not float/soak off. The label will be covered with clear plastic tape.

2. Waterproof plastic ice chests or coolers will be used.

3. Bubble packing will be placed in the bottom of the cooler.

4. Additional bubble packing, or similar packing material, will be inserted to partially cover sample bottles (more than halfway). Bags of ice will be placed around, among, and on top of sample bottles. Samples will be packed so as to maintain a temperature of 4°C.

5. The remaining volume of the cooler will be filled with bubble packing of similar packing material.

6. The chain-of-custody record will be placed in a waterproof plastic bag and taped with strapping tape to the inside of the cooler lid.

7. The drain will be taped shut.

8. The lid will be secured with tape. The cooler will be wrapped completely with strapping tape at a minimum of two locations. Labels will not be covered.

9. The custody seals will be numbered and signed and attached on front right and back left of cooler. Seals will be covered with wide, clear tape.

10. The cooler will be transferred to a Chemtech Laboratory representative at the scheduled pickup time.

11. Sample label and custody documents will be filled out in indelible ink.

Following the arrival of samples at the laboratory, the temperature and condition of those samples shipped will be noted. Once the conditions of samples are established, the sample log will be updated again, if needed.

Each site will have its own set of logs that summarize how many samples were collected, and the sample type. Each field crew will be issued this information prior to beginning sampling.

4.4 DATA QUALITY NEEDS

The analytical parameters and reporting limits that will be used for ground water and soil sample analyses are provided in Tables 1 and 2, respectively. The use of standard sampling methods and validated, EPA-approved analytical methods ensures data comparability. The specified reporting limits were established based on a review of potential chemical-specific guidance criteria for these sites.

The quality of data obtained in the field for chemical analysis is 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 is required at each site, for each matrix (e.g., Site 48 will require 2 duplicate samples, 1 solid and 1 aqueous). If more than 20 samples are taken at a given site, 2 duplicates will be needed, as no sample delivery group will exceed 20 samples. Obtaining duplicates from a soil medium requires homogenization of the sample before filling the sample container.

One rinse blank will be obtained at each site, for each matrix sampled. A trip blank is required for VOC analysis at the Guadalcanal Road site, and will be provided by the analytical laboratory.

Data obtained for Sites 47 and 48 will be validated by EA or a validation subcontractor as discussed in the QAPjP (EA 2000b). Data obtained for the Guadalcanal Road will be provided to the Navy without validation by EA or its subcontractor.

4.5 SAMPLE CONTAINERS AND HANDLING

Samples collected in the field will be placed into the appropriate laboratory-provided bottles based on the parameters to be analyzed. Approximately 5 g of solid (soil) sample is required for Target Analyte List metals analysis, and the container can be either polyethylene or glass. At least 600 mL is required for Target Analyte List metals analysis of water, and the sample should be preserved with nitric acid to a pH less than 2. A 40-mL glass container with a teflon-lined

septum in the cap will be used to collect aqueous VOC samples. Aqueous VOC samples will be preserved with hydrochloric acid to a pH of less than 2. A 1-L amber glass container with a teflon-lined cap will be used to collect aqueous SVOC and pesticide samples; no preservative is required for SVOCs and pesticides.

Collected samples will be transferred to pre-preserved laboratory-supplied bottles, sealed, labeled, and immediately placed into temporary storage coolers packed with ice to maintain a temperature of less than 4°C. Samples contained in glass bottles will be wrapped in bubble pack to protect them during shipment. A chain-of-custody form, detailing the analyses to be performed, will be completed and included within the cooler. Sample labeling and chain-of-custody procedures will follow the format identified in Section 8 of the Quality Assurance Project Plan, which details sample handling and shipping procedures. Samples will be picked up by the analytical laboratory at the end of each sampling day and transported directly to the laboratory.

4.6 FIELD DOCUMENTATION/LOGBOOKS

It will be the responsibility of the field team leader to secure all documents produced in the field (e.g., field personnel's daily logbooks, lithologic and sampling logs, and communications record forms) at the end of each work day. The site logbook is the primary means to support evidentiary information.

The possession of field-produced documents will be recorded. However, only the field team leader or designee may remove field data from the site for reduction and evaluation.

A summary of field activities will be properly recorded in a bound logbook with consecutively numbered pages that cannot be removed, in accordance with American Society for Testing and Materials D 1988-88. Logbooks will be assigned to field personnel but will be stored in a secure area when not in use. A unique number will identify each logbook.

Logbooks will include the following information:

- Name of the person to whom the logbook is assigned
- Logbook number
- Project name
- Project start date
- Names and responsibilities of onsite project personnel including subcontractor personnel
- Arrival/departure of visitors to the site

- Arrival/departure of equipment
- Sample activities and sample log sheet references
- Description of activities
- Sample pickup information, including chain-of-custody numbers
- Safety and health issues, including ambient monitoring results, and instrument calibration information
- Description of photographs including date, time, photographer, roll and picture number, location, and direction of the photograph.

Entries will be made in indelible black ink, and no erasures will be made. If an incorrect entry is made, the correction will be made by drawing a single line through the incorrect information. The person making the correction will then initial and date the change.

Samples will be collected following the outlined procedures. The equipment used to collect the sample will be noted in the logbook along with the time of sampling, sampler's name, sample description, depth at which sample was collected, and the volume and number of containers filled. Quality control sample information will also be recorded.

Each field instrument requiring calibration will have a separate equipment calibration log that documents that the manufacturer's instructions and that standard operating procedures were followed for calibration of the equipment. This information should include the frequency and type of standard or calibration device. This record documents the accuracy, precision, or sensitivity of the measurement. If necessary, it will be used to determine if corrections should be applied to the readings. A separate form will be established and maintained for each field instrument. These forms will be stored in the project file upon completion of field activities.

5. FIELD SAMPLING PROCEDURES

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

5.1 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 to be utilized during field investigations are described. Soil sampling will take place only at Site 48.

5.1.1 Sampling Objectives

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

- Assess the concentrations of inorganic chemicals of concern in the soil and compare these concentrations to guidance criteria (Table 1)
- Provide data sufficient to support ecological and human health risk assessments, if required.

5.1.2 Data Types and Needs

A photographic log will be maintained of test pit activities that will depict depth of overlying soil above fill, type and depth of fill, any contact between the fill material and ground water, and any observed impact on underlying soil. The logs will be prepared in the field by a qualified geologist. Visual inspection of soils obtained during direct-push sampling will be documented in boring logs prepared by a qualified geologist.

Chemical analysis of soil samples will consist of Target Analyte List metals and pH. Parameters of concern and specific analytical methods for Site 48 are provided in Table 1.

Analytical data from surface and subsurface soil samples will be used to characterize the nature and extent of target analytes in suspected battery disposal areas. Results of soil analyses will be compared to guidance criteria, or analytical quantitation limits where guidance criteria are not available, and will be used to confirm the presence or absence of analytes of concern at Site 48.

5.1.3 Sample Locations

A minimum of 6 surficial and 6 subsurface soil samples will be collected for analysis. The locations of test borings and test pits will be selected in the field and biased toward areas with visual evidence of battery disposal and/or impacts, as observed during the test pit installation. Additional samples may be selected for analysis during the field investigation based on the presence of mine batteries, visual or olfactory evidence of impacted soils, or stressed vegetation.

Test borings will be advanced to the depth at which ground water is encountered. Subsurface samples will be selected for analysis in the field based on evidence of battery disposal, visual impacts, or corresponding impacts observed in test pits.

5.1.4 Sampling Equipment and Procedures

As noted above, a minimum of 6 surface and 6 subsurface soil samples will be collected for analysis. A minimum of two of the subsurface samples will be collected from the base of the test pits, and two of the surface samples will be collected via hand auger from corresponding surface soils in the location of the test pits prior to test pit installation.

5.1.4.1 Test Boring Methods

Direct-Push Soil Sampling

Soil samples may be recovered by direct-push methods. Direct-push soil sampling includes either discrete interval sampling, (i.e., recovery of a sample at a prescribed depth) or continuous coring. Samples are retrieved using hydraulically driven probes. The sampler remains completely sealed while driven to the sampling depth. At depth, an internal piston is retracted into the sample tube as it is driven to recover a sample. The piston rod and sample tubes are then withdrawn. A licensed New Jersey driller will install direct-push borings. Direct-push boring installation will be performed in accordance with NJDEP's Alternative Ground-Water Sampling Techniques Guide (NJDEP 1994a), and will follow the general steps presented below:

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

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

3. Prior to taking a sample, the direct-push probe will be advanced to the desired depth. The direct-push probe will be pushed with the system hydraulics in order to set it at the desired depth. If necessary, a hydraulic hammer capable of 1,600 taps per minute may be used to drive the direct-push probe to the desired depths.

4. The optimum conditions will permit the direct-push probe to be pushed or, if necessary, driven up to 30 ft and the piston will then be retracted to enable collection of the soil sample.

5. After sampling is completed, the direct-push probe will then be backed out of the hole using the system hydraulic cylinder. The drill rods will be pulled straight out to prevent the direct-push point from bending.

6. The direct-push probe will then be disassembled prior to decontamination. The direct-push probe and rod will be decontaminated after each use in accordance with procedures described in Chapter 6 of the Quality Assurance Project Plan (EA 2000b).

Direct-push methods generally will be used for sampling depths of less than 30 ft when a temporary boring is needed for collection of soil samples.

Hand Auger

A clean, 4-in. diameter hand auger will be advanced to the desired sample interval and removed. The sample will be collected from the hand auger with a stainless steel spoon or trowel, and will be placed in a laboratory-cleaned container and labeled in accordance with Section 4 of the Quality Assurance Project Plan (EA 2000b).

Dedicated, stainless steel trowels or spoons will be used at each sampling location to minimize the potential for cross-contamination. It may be preferable to collect samples using a hand auger when the only samples will be collected from a depth of less than 5 ft, in order to save time and expense. Following completion of site activities, sampling equipment will be decontaminated in accordance with Section 6 of the Quality Assurance Project Plan (EA 2000b).

5.2 MONITORING WELL INSTALLATION AND CONSTRUCTION

It is possible that direct-push methods of ground-water sampling at Site 47 will cause high sample turbidity. This becomes a problem because contaminants like pesticides and metals tend to sorb to soil particles instead of staying in solution. Therefore, high turbidity may bias the samples toward a much greater compound concentration. If it is found that ground-water samples are too turbid to provide an accurate measurement of dissolved constituent concentrations at Site 47, then installation of a monitoring well may become necessary. This section addresses the requirements for the installation and construction of such a well.

5.2.1 Monitoring Well Installation

Drilling and well installations will be performed by driller(s) licensed in the State of New Jersey; drilling and field oversight personnel will have completed Occupational Safety and Health Act certified safety and health training. NWS Earle will provide utility clearance prior to the start of drilling. Following installation, a licensed surveyor will determine the monitoring well for horizontal locations and vertical reference points.

The monitoring well will be installed in accordance with the procedures outlined in the NJDEP Field Sampling Procedures Manual (NJDEP 1992). The depth to ground water and the soil type at NWS Earle make drilling with continuous flight, hollow-stem auger, the method of choice for the installation of monitoring wells in the unconsolidated overburden. This method is preferred because it does not introduce drilling fluids into the borehole, thus eliminating the concern of potential impact of the drilling fluid on ground-water quality.

The monitoring well will be drilled with 6-5/8 in. inside diameter hollow-stem auger to the completion depth, which will be determined after commencing field activities. The diameter of the borehole will be approximately 4 in. greater than the diameter of the installed well casing.

Soil samples will be collected continuously from immediately below the ground surface using a split-barrel sampler in accordance with American Society for Testing and Materials D 1586-84. These soil samples will be described and classified in the field by an experienced geologist using the Unified Soils Classification System. This will provide additional information pertinent to the stratigraphy beneath the site.

Decontamination of sampling equipment and disposal of drilling water or soil cuttings will be handled in accordance with the NJDEP Field Sampling Procedures Manual (NJDEP 1992) and the NWS Earle Quality Assurance Project Plan (EA 2000b).

The site geologist will maintain a log of drilling activities in a bound field logbook. Information recorded in the field logbook will include the following:

- Location
- Time onsite
- Personnel and equipment present
- Down time
- Materials used
- Any other pertinent information necessary to reconstruct field activities at a later date.

Drilling activities will initially be conducted using Level D personal protective equipment. Decisions on upgrading or downgrading of the personal protective equipment levels will adhere to procedures described in the Safety, Health, and Emergency Response Plan (EA 2000a).

5.2.2 Well Design, Completion, and Development

Design, completion, and development of the monitoring well at Site 47, if necessary, will be performed in accordance with the procedures and specifications presented in Section 5 of the Quality Assurance Project Plan (EA 2000b).

5.2.3 Location of Monitoring Well

The location of the monitoring well will be selected based on the results of the direct-push ground-water sampling. The well will be installed at the location of the boring showing the highest concentration of pesticides in ground water.

5.3 MONITORING WELL GROUND-WATER SAMPLING

The data quality objectives associated with monitoring well ground-water sampling and analysis are outlined in this section. The need for information in this section is contingent upon the installation of a monitoring well at Site 47. This section focuses on sampling procedures to be used for collection of ground water from a monitoring well, if installed during this investigation.

5.3.1 Sampling Objectives

The objectives for ground-water sampling from a monitoring well are to:

- Obtain low turbidity samples in order to assess the concentration of chemicals of concern present in the ground at Site 47 and to compare reported concentrations to guidance criteria (Table 1)
- Provide data suitable for supporting ecological and human health risk assessments, if required
- Provide data to support or refute the need for further investigation at Site 47.

5.3.2 Data Types and Needs

Field measurements to be obtained from a monitoring well include water levels, analytical results for chemical parameters, and general water quality characteristics (pH, conductivity, turbidity, temperature, and dissolved oxygen). Data collected during monitoring well ground-water sampling activities will be recorded on standard field record sheets. A separate data sheet will be completed for each sampling location. These records will be kept in the project file for reference. Ground-water samples obtained from the monitoring well will be analyzed for total pesticides using EPA Method 8081A. The list of analytes and their reporting limits are presented in Table 1.

5.3.3 Presampling Activities

The following activities will take place at a ground-water monitoring well prior to sample collection. The purpose of these activities is to gather pertinent information, in addition to water quality data. Ground water from a newly installed monitoring well will be sampled after well completion and development. After development, each well will be allowed to stabilize for a minimum of 14 days prior to sampling. The following activities will take place at the well before samples are collected.

5.3.3.1 Well Inspection

The outer casing, inner casing, and well cap will be inspected for signs of tampering. If there is evidence of tapering, or if a lock is missing, this will be recorded in the bound field logbook and on the field record sheet.

5.3.3.2 Determination of Water Level

The well cap will be removed and a measurement of total volatile hydrocarbons taken at the mouth of the well with a photoionization detector. Data will be recorded on the sampling sheet and in the field logbook. The next step will be measurement of the water level using a water level indicator. Any sheen or odor noticed from the well or on the indicator will be noted on the sampling record sheet and in the field logbook. After determination of the water level to the nearest 0.01 ft, the probe will be lowered to the bottom of the well to measure the total depth of the well. This information will also be recorded on the sampling record sheet.

The water level indicator/slope indicator will be decontaminated between uses following the procedure presented in Chapter 6 of the Quality Assurance Project Plan (EA 2000b).

5.3.3.3 Purging

Purging of wells is necessary to draw water into the well casing from the unconsolidated formation. Purge volume requirements will conform to the NJDEP Field Sampling Procedures Manual (NJDEP 1992). Generally, a minimum volume of water equal to three times the volume of standing water in the casing will be purged prior to sampling.

A submersible pump, a peristaltic pump with dedicated tubing, or a disposable polyethylene bailer will be used to purge the well prior to sampling. The well will be bailed or pumped at a rate that does not cause ground water to vigorously cascade down the sides of the screen, potentially causing accelerated loss of VOCs. Conductivity, dissolved oxygen, turbidity, pH, and temperature will be monitored during well evacuation and before and after sample collection. If a low-yielding well goes dry before evacuation of the required volume, the well will be allowed 30 minutes to recover, and bailing or pumping will be resumed. If the well goes dry again, bailing or pumping will cease, and the volume purged will be recorded. Ground-water sampling will occur as soon as a sufficient quantity of water is available.

If the purge water is exceptionally turbid, the EPA low flow procedures will be followed. The pumping rate will be reduced to minimize drawdown of the water column in the well (less than 0.3 ft) and field parameters and water level measurements will be recorded every 3 to 5 minutes. Low flow purging will continue until parameters are stable. Parameters will be considered stable when consecutive readings are within the following tolerances: turbidity – 10 percent for values greater than 1 NTU, dissolved oxygen – 10 percent, conductivity and temperature – 3 percent, and pH – 0.1 unit. The final volume purged must be greater than the stabilized drawdown volume plus the volume of the discharge tubing. When these conditions are met, purging will be considered complete.

Non-dedicated field equipment used during purging will be decontaminated by steam cleaning before the next well is purged. Dedicated disposable polyethylene bailers will be used for each well, and dedicated polyethylene tubing will be used with pumps used for purging. New protective sampling gloves will be worn for each well sampled.

5.3.4 Sampling Procedure

Ground-water sampling activities will be conducted in accordance with the NJDEP Field Sampling Procedures Manual (NJDEP 1992). The following procedure will be used to sample a purged well.

Thew sampler will wear clean, protective gloves and attach fresh line, made of an inert material, to the dedicated polyethylene or stainless steel leader attached to the dedicated polyethylene bailer. The bailer will be slowly lowered into the well to avoid aerating the ground water. The bailer will be submerged and retrieved and the sample will be placed in the proper laboratory containers.

If the well was purged by the low flow method, sampling will be completed according to the Low Stress (low flow) Purging and Sampling Procedure for the Collection of Ground Water Samples from Monitoring Wells, Revision 2 (U.S. EPA 1996). In this case, the ground-water sample will be collected by filling the bottles directly from the discharge tubing. Water for laboratory analysis must be collected before it has passed through a flow through cell.

Once samples for chemical analyses have been collected, a sample for water quality characteristics will be collected and analyzed. Water quality indicator parameters will consist of temperature, pH, turbidity, conductivity, and dissolved oxygen. These parameters will be measured in the field using a properly calibrated multi-parameter water quality instrument. Water quality readings will be recorded on the sample record sheet.

5.4 DIRECT-PUSH GROUND-WATER SAMPLING

For the purposes of the PA/SI at NWS Earle, the direct-push method of choice involves the use of a passively placed narrow diameter well point. Water sampling will be conducted in accordance with NJDEP's Alternative Ground-Water Sampling Techniques Guide (NJDEP 1994a).

5.4.1 Sampling Objectives

The objectives for direct-push ground-water sampling are to:

- Assess the concentration of chemicals of concern present in the ground at Site 47 and to compare these concentrations to guidance criteria (Table 1)

- Provide data suitable for supporting ecological and human health risk assessments, if required

- Provide data to support or refute the need for further investigation at Site 47.

5.4.2 Data Types and Needs

Field measurements for direct-push ground-water sampling will include, if possible, water levels, analytical results for chemical parameters, and general water quality characteristics (pH, conductivity, turbidity, temperature, and dissolved oxygen). Data collected during ground-water sampling activities will be recorded on standard field record sheets. A separate data sheet will be completed for each sampling location. These records will be kept in the project file for reference. Ground-water samples will be analyzed for total pesticides by EPA Method 8081A. The list of analytes and their reporting limits are presented in Table 1.

5.4.3 Sample Locations

Ground-water grab samples will be collected from direct-push soil boring locations, which will be selected as presented in Section 5.1.3.

5.4.4 Sampling Methodology

The direct-push sample probe is "pushed" under hydraulic pressure to the selected sample depth, and a narrow diameter screened polyvinyl chloride casing is dropped into the borehole. The following steps will be taken when sampling ground water using the direct-push method:

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

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

3. Prior to taking a sample, the push rod will be advanced to the water table. The rod will be pushed with the system hydraulics in order to set it at the desired depth. If necessary, a hydraulic hammer capable of 1,600 taps per minute may be used to drive the rod to the desired depths.

4. The optimum conditions will permit the push rod to be driven up to 30 ft, and then the PVC screened casing to be passively placed into the borehole.

5. The well point will be allowed to sit undisturbed for approximately 24 hours prior to sampling, to reduce sample turbidity.

6. Dedicated tubing with a bottom check valve/mini-bailer (disposable) will be inserted down PVC casing to collect the sample. Water quality indicator parameters and, if possible, a depth to water will also be measured at this point.

7. The casing will then be backed out of the hole using the system hydraulic cylinder.

Six ground-water samples will be collected via direct-push sampling at Site 48 and analyzed for Target Analyte List metals and pH. Up to 6 ground-water samples will be collected via direct-push sampling at Site 47 and analyzed for total pesticides. Three ground-water samples will be collected via direct-push sampling at the Guadalcanal Road location and analyzed for Target Compound List VOCs and Target Compound List SVOCs.

5.5 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 will take place. This section focuses on the sampling procedures to be used for the collection of these samples.

5.5.1 Sampling Objectives

The objectives for surface water and sediment sampling are to:

- Assess the concentrations of inorganic constituents of concern in surface water and sediment of West Pond at Site 48 and, if present, to compare these concentrations to guidance criteria (Table 1)

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

5.5.2 Data Types and Needs

Chemical analysis of surface water and sediment samples will consist of total and dissolved Target Analyte List metals and pH. Up to 3 surface water and 3 sediment samples will be collected from West Pond, and 2 surface water and 2 sediment samples will be collected from the adjacent tributary to Mine Brook.

5.5.3 Sample Locations

EA will collect up to 3 surface water and 3 sediment samples from West Pond, and 2 sediment samples and 2 surface water samples from the adjacent tributary to Mine Brook. One sample set will be obtained from the tributary exiting West Pond, and another set will be obtained downstream of the confluence of this tributary with Mine Brook. The remaining West Pond sample locations will be selected in the field, based on visual evidence of battery disposal and/or other impacts to site media.

5.5.4 Sampling Equipment and Procedures

The surface water sampling procedure is as follows:

- Surface water samples will be collected prior to collecting sediment samples in order to minimize the presence of suspended solids.
- The sampling location will be approached from downstream to ensure that no sediments are disturbed that may flow into the sampling area.
- Water quality indicator parameters will be measured first. Field parameters consist of pH, specific conductivity, and temperature. Color and turbidity will also be noted on the sample log form for each surface water sample collected.
- Surface water samples will be measured by slowly immersing the sample container into the surface water. If insufficient water is present to sample in this manner, then a depression will be made in the sediment and allowed to fill with surface water for collection.

Sediment samples will be collected from depositional locations immediately downstream of the confluence of the drainage ditch and the brook. Sediments will be collected with a scoop sampler or stainless steel trowel. Visual characteristics of sediment samples will be noted in the field logbook. If there is water present in the sediment sample jars, it will not be decanted as this may cause a loss of fines.

Sediment and surface water sample containers will be labeled immediately after sample collection. Because surface water samples will be collected using the sample container, no decontamination will be required. Sediment sampling scoops/trowels will be decontaminated prior to sampling and discarded or decontaminated again prior to reuse. A dedicated sampling instrument will be used for each sediment sample during each sampling event.

Surface water and sediment sample locations will be marked with stakes immediately following sample collection, and surveyed as discussed in Section 5.6.

5.6 LOCATION SURVEYING

The scope of work, field procedures, and equipment for location surveying of sample stations for the sites are discussed in this section.

5.6.1 Survey Objectives

The locations of newly installed monitoring wells, ground-water sampling points, soil borings, test pit locations, surface water and sediment samples, and pond boundaries will be surveyed in the field by a licensed New Jersey land surveyor to establish reference elevations and horizontal locations.

5.6.1.1 Data Quality Objectives

The data quality objectives for location surveying are to:

- Establish monitoring well and temporary well point reference elevations for static 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 soil boring, monitoring well, and temporary well point locations.

Horizontal and vertical control will conform 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 will be performed and closure will be confirmed. Horizontal control surveying will tie into established permanent benchmarks at NWS Earle.

Field data will be recorded in bound surveying logbooks with numbered pages.

Surveying instruments will be calibrated prior to the start of work, and calibration will be checked at the conclusion.

5.6.2 Equipment and Procedures

Locations of soil borings, test pits, and monitoring wells will be field surveyed by a licensed New Jersey land surveyor to establish vertical and horizontal controls, as discussed above. Field equipment will include direct reading levels and level rods, theodolite, steel tapes graduated to hundredths of a foot, an electronic distance meter, and other necessary equipment including, but not limited to, plumb bobs, paint, stakes, and nails. Surveying activities will be recorded in bound field logbooks.

5.6.2.1 Vertical Control

Vertical control will be established through level runs to establish surface elevations with respect to known benchmarks. Permanent benchmarks identified by NWS Earle, for which horizontal and vertical control have been established and tied into a vertical control datum and horizontal coordinate grid system, will be used as initial control points. Level runs will be tied back into initial control points as a check on closure. Level notes will be recorded for each control level circuit identifying benchmark of origin, benchmarks and temporary benchmarks established, benchmark tied into, and error of closure. Benchmarks and temporary benchmarks will be

clearly described and the location recorded to tie in with the NWS Earle planar coordinate grid system. Elevations will be reported with respect to the NWS Earle vertical datum.

5.6.2.2 Horizontal Control

Horizontal control will be established through traverse runs to establish location with respect to the NWS Earle planar horizontal coordinate grid system. Horizontal traverses will be tied into established permanent benchmarks for vertical control, as described above. Traverse notes will include traverse data, sketches showing property or section lines, baselines or centerline alignments, control points, major visible features, existing roads, and other pertinent details. Control point locations will be noted with a sketch showing the distance and bearing to each reference object. Horizontal traverse runs will be tied back to initial control points as a check for closure, and error of closure will be recorded.

6. REPORTING

The data from the Site 47 and 48 site investigation will be incorporated into a PA/SI report that will include:

- Descriptions of the completed field work
- Description of observations made during field work
- Presentation of analytical results and comparison to relevant criteria
- Recommendations for any necessary followup investigations
- A PA/SI data validation report
- A photographic log of test pits.

Analytical data obtained from the PA/SI activities at Sites 47 and 48, and the additional groundwater monitoring at the Guadalcanal Road site, will be provided in electronic format to the NJDEP, NWS Earle, and Northern Division, in accordance with the electronic data deliverable requirements of NJDEP's Technical Requirements for Site Remediation (N.J.A.C. 7:26E) within 60 days of completion of the site sampling activities.

REFERENCES

Foster Wheeler Environmental Corporation (Foster Wheeler). 2000a. Action Memorandum and Engineering Evaluation/Cost Analysis for the Pesticide Shop Remediation. February.

Foster Wheeler. 2000b. Draft Removal Action Report, Site 47. July.

N.J.A.C 7:26E-3.11. 1997. Technical Requirements for Site Remediation. March.

New Jersey Department of Environmental Protection (NJDEP). 1992. Field Sampling Procedures Manual. May.

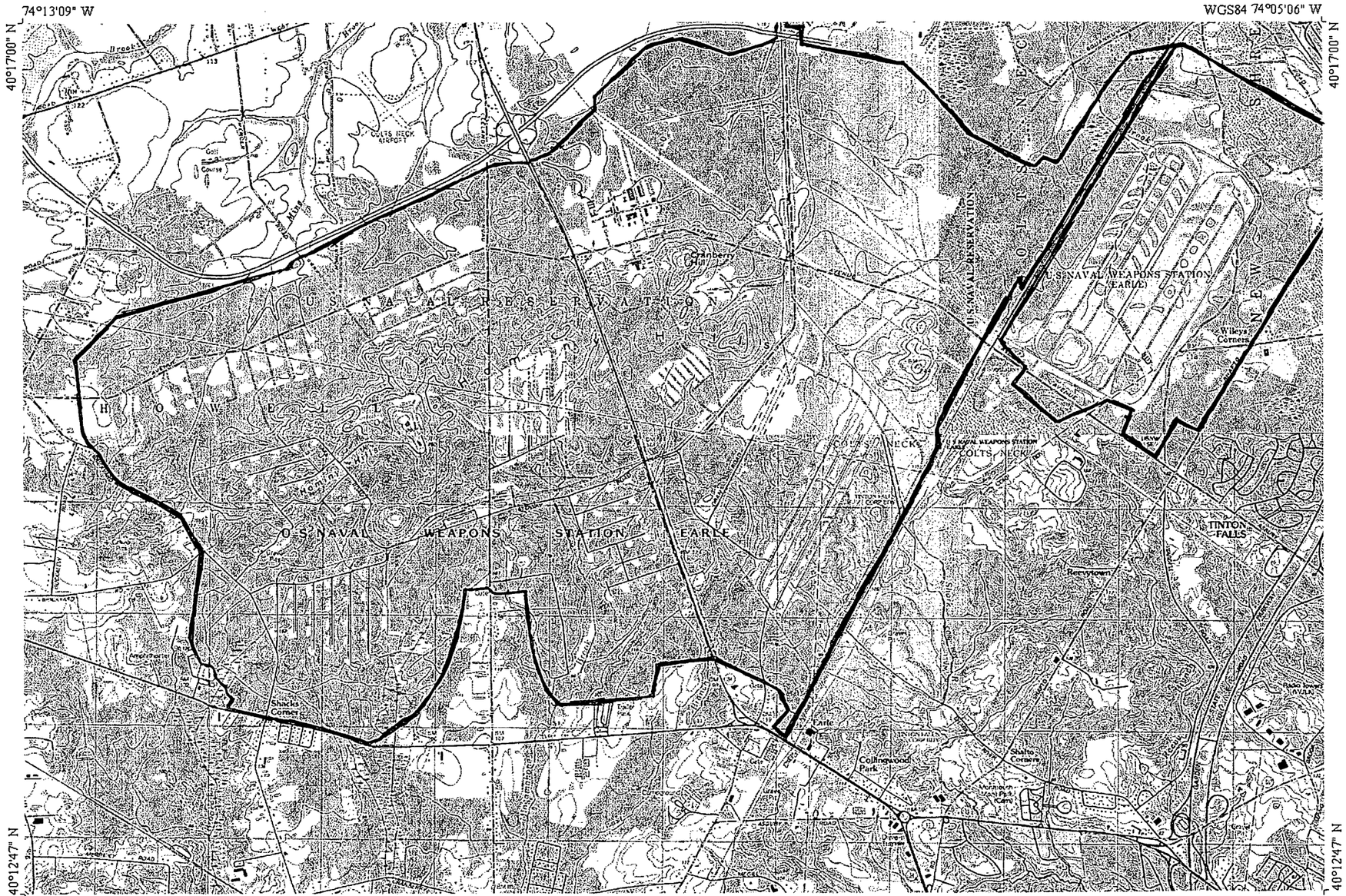
NJDEP. 1994a. Alternative Ground-Water Sampling Techniques Guide. July.

NJDEP. 1994b. Field Analysis Manual. July.

Northern Division, Naval Facilities Engineering Command. 1996. Remedial Investigation Report. July.

Northern Division, Naval Facilities Engineering Command. 1998. Remedial Investigation Addendum Report. January.

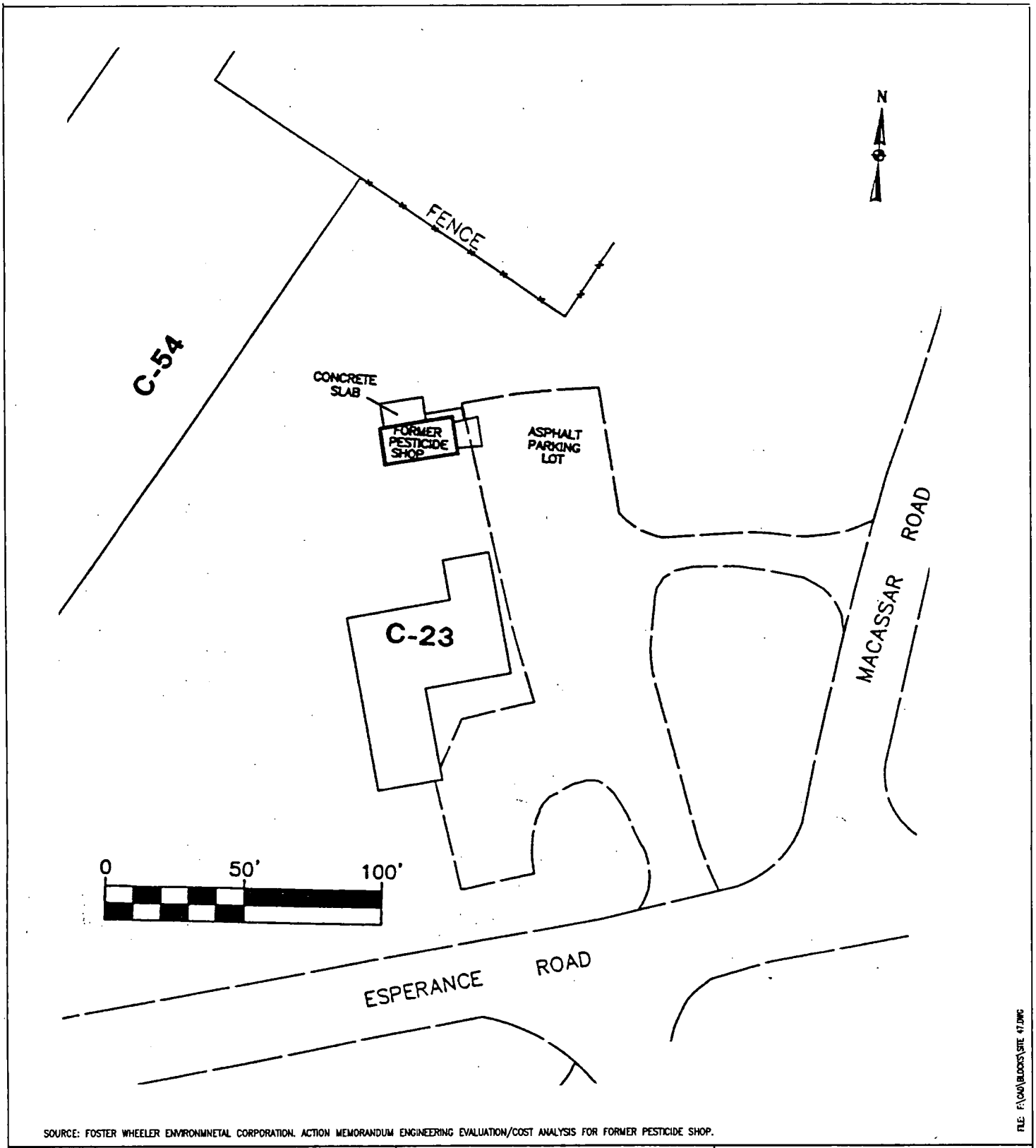
U.S. Environmental Protection Agency (EPA) Region I. 1996. Low Stress (Low-Flow) Purging and Sampling Procedure for the Collection of Ground Water Samples from Monitoring Wells, Revision 2. July.



Printed from TOPO! ©1999 Wildflower Productions (www.topo.com)

FILE: F:\2960100\PA-SI\FIG1.DWG

EA ENGINEERING, SCIENCE, AND TECHNOLOGY	DESIGNED BY: CN	DRAWN BY: CN	DATE: 4-16-01	PROJECT NO.: 2960100	PRELIMINARY ASSESSMENT AND SITE INVESTIGATION WORK PLAN FOR SITES 47, 48 AND GUADALCANAL ROAD COLTS NECK, NEW JERSEY
	CHECKED BY:	PROJECT MGR.: CK	SCALE: AS SHOWN	FIGURE: 1	SITE LOCATION MAP NAVAL WEAPON STATION EARLE COLTS NECK, NEW JERSEY



SOURCE: FOSTER WHEELER ENVIRONMINETAL CORPORATION. ACTION MEMORANDUM ENGINEERING EVALUATION/COST ANALYSIS FOR FORMER PESTICIDE SHOP.

FILE: F:\CAD\BLOCKS\SITE 47.DWG

EA ENGINEERING, SCIENCE, AND TECHNOLOGY

PRELIMINARY ASSESSMENT AND SITE INVESTIGATION WORK PLAN FOR SITES 47, 48, AND GUADACANAL ROAD
COLTS NECK, NEW JERSEY

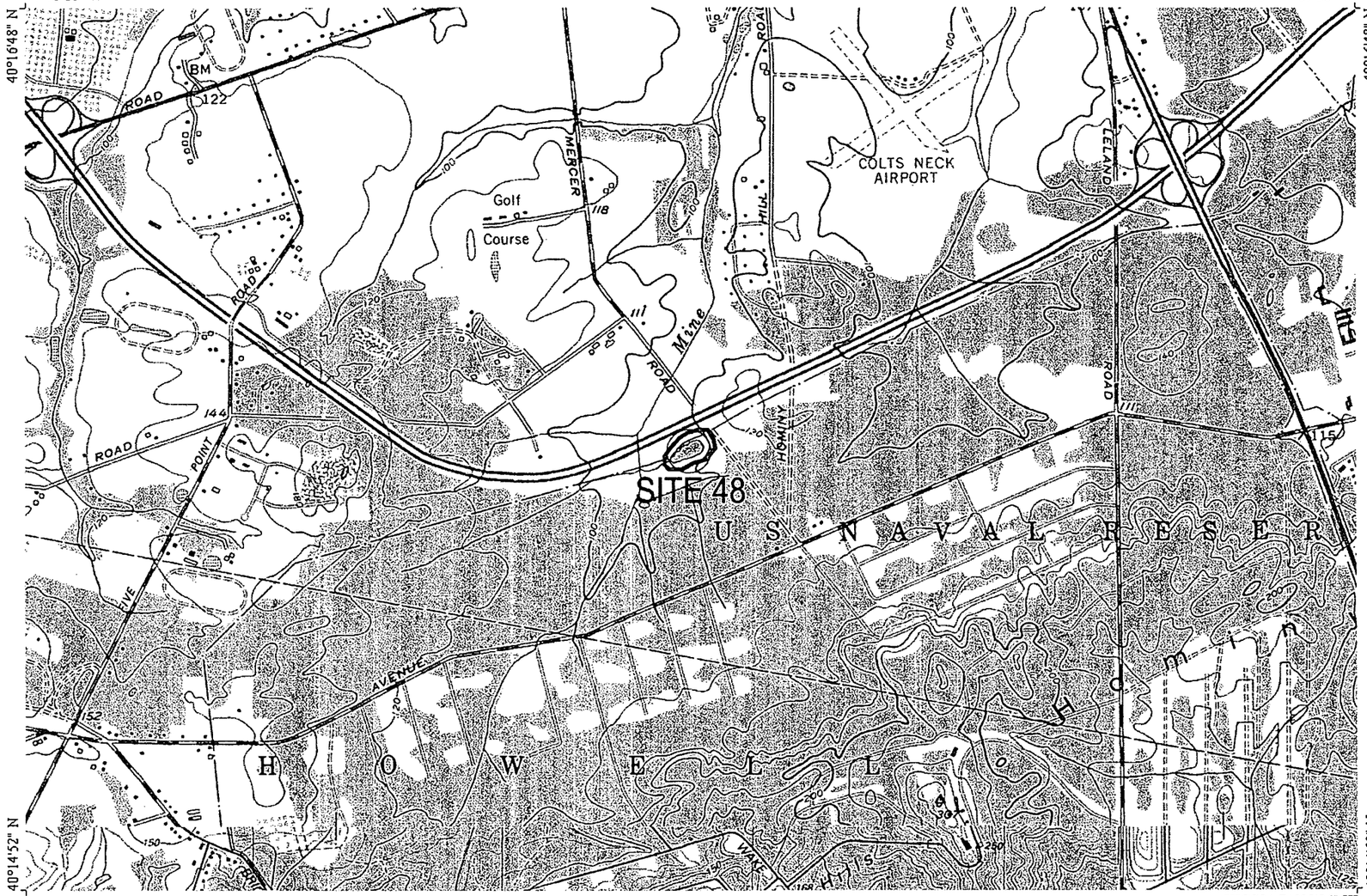
SITE PLAN - SITE 47
NAVAL WEAPONS STATION EARLE
COLTS NECK, NEW JERSEY

PROJECT MGR.	DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE	PROJECT NO.	FILE NAME	DRAWING NO.	FIGURE
CK	MB	MB	CN	12-22-00	AS SHOWN	2960100	SITE 47	2	2

74°13'21" W

WGS84 74°09'36" W

40°16'48" N



40°14'52" N

74°13'21" W

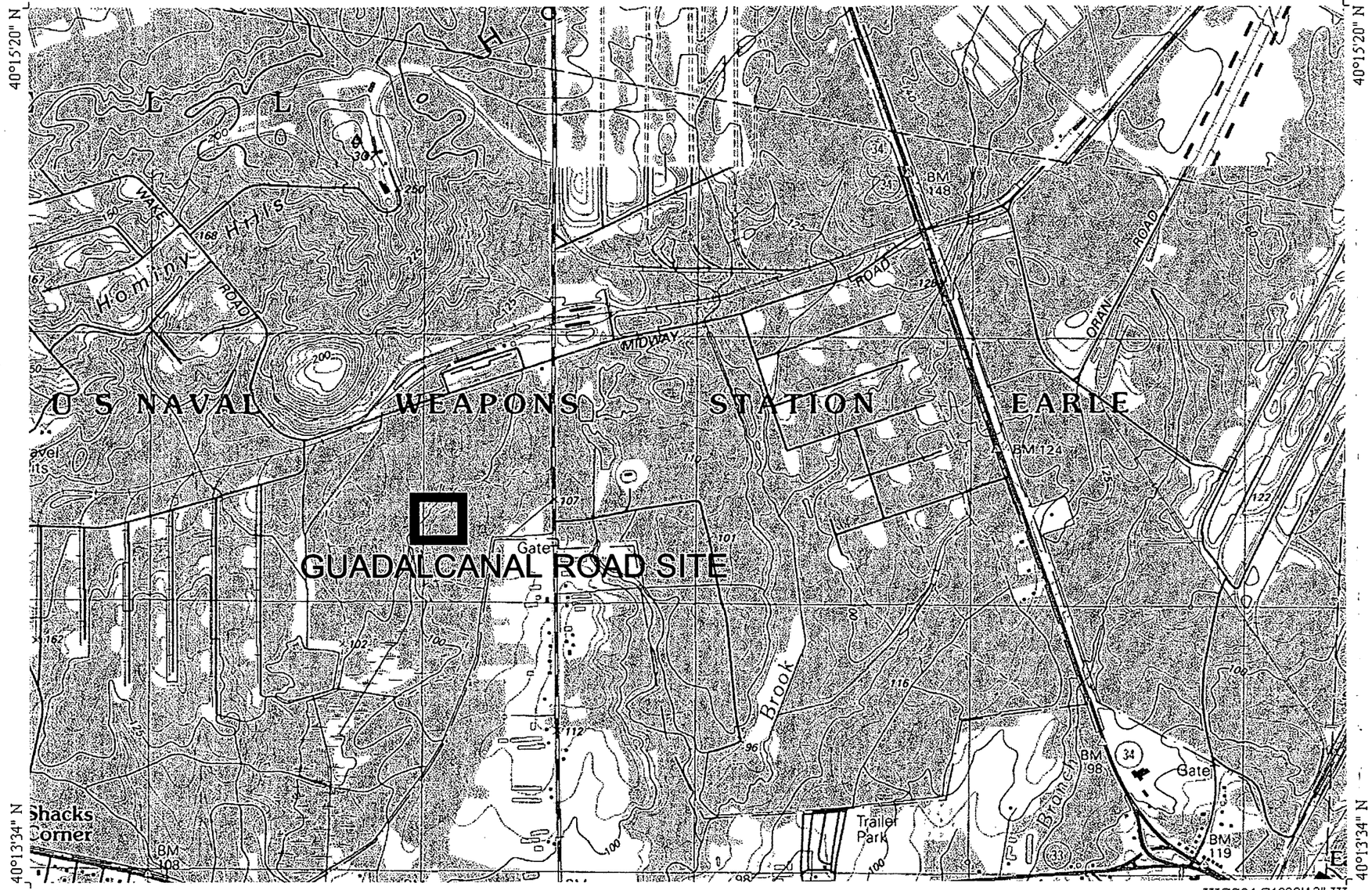
WGS84 74°09'36" W

40°14'52" N

Printed from TOPO! ©1999 Wildflower Productions (www.topo.com)

FILE: F:\2960100\FINAL\SITE48.DWG

EA ENGINEERING, SCIENCE, AND TECHNOLOGY	DESIGNED BY: CN	DRAWN BY: CN	DATE: 4-16-01	PROJECT NO.: 2960100	PRELIMINARY ASSESSMENT AND SITE INVESTIGATION WORK PLAN FOR SITES 47, 48, AND GUADALCANAL ROAD COLTS NECK, NEW JERSEY	SITE PLAN – SITE 48 NAVAL WEAPON STATION EARLE COLTS NECK, NEW JERSEY
	CHECKED BY: CK	PROJECT MGR.: CK	SCALE: AS SHOWN	FIGURE: 3		



FILE: F:\2960100\PA-SI\FIG4.DWG

EA ENGINEERING, SCIENCE, AND TECHNOLOGY	DESIGNED BY: CN	DRAWN BY: CN	DATE: 4-16-01	PROJECT NO.: 2960100	PRELIMINARY ASSESSMENT AND SITE INVESTIGATION WORK PLAN FOR SITES 47, 48 AND GUADALCANAL ROAD COLTS NECK, NEW JERSEY	SITE LOCATION MAP GUADALCANAL ROAD SITE NAVAL WEAPONS STATION EARLE COLTS NECK, NEW JERSEY
	CHECKED BY: CN	PROJECT MGR.: CK	SCALE: AS SHOWN	FIGURE: 4		

Please check one:

☐ 110 Route 4
Englewood, NJ 07631
(201) 567-6868
Fax (201) 567-1333

☐ 205 Campus Plaza 1
Edison, NJ 08837
(732) 225-4111
Fax (732) 225-4110

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CHEMTECH
CHAIN OF CUSTODY RECORD

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY:

ADDRESS:

CITY: STATE: ZIP:

ATTENTION:

PHONE: FAX:

PROJECT INFORMATION

PROJECT NAME:

PROJECT NO.:

PROJECT MANAGER:

LOCATION:

PHONE: FAX:

BILLING INFORMATION

BILL TO: PO #:

ADDRESS:

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *
HARD COPY: _____ DAYS *
EDD: _____ DAYS *
* TO BE APPROVED BY CHEMTECH
** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

☐ RESULTS ONLY ☐ USEPA CLP
☐ RESULTS + QC ☐ NYS ASP "B"
☐ NJ REDUCED ☐ NYS ASP "A"
☐ NJ CLP ☐ EDD
☐ EDD FORMAT: _____

ANALYSIS

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	PRESERVATIVES 1	2	3	4	5	6	7	8	9	COMMENTS
1.																	
2.																	
3.																	
4.																	
5.																	
6.																	
7.																	
8.																	

← Specify Preservatives
A – HCl B – HNO_3
C – H_2SO_4 D – NaOH
E – ICE F – Other

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1.		1.
RELINQUISHED BY:	DATE/TIME:	RECEIVED BY:
2.		2.
RELINQUISHED BY:	DATE/TIME:	RECEIVED FOR LAB BY:
3.		3.

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____
Comments:

Page _____ of _____

Shipment Complete: Yes _____ No _____

NATIONWIDE PRINTING 800-628-2626

EA ENGINEERING, SCIENCE, AND TECHNOLOGY	DESIGNED BY: CN	DRAWN BY:	DATE: 4-16-01	PROJECT NO.: 2960100	PRELIMINARY ASSESSMENT–SITE INVESTIGATION WORK PLAN FOR SITES 47, 48, AND GUADALCANAL ROAD COLTS NECK, NEW JERSEY
	CHECKED BY	PROJECT MGR.: CK	SCALE	FIGURE: 5	SAMPLE CHAIN OF CUSTODY NAVAL WEAPON STATION EARLE COLTS NECK, NEW JERSEY

TABLE 1
REPORTING LIMITS AND CRITERIA FOR GROUND-WATER SAMPLES FOR SITES 47 AND SITE 48, AND GUADALCANAL ROAD AT NAVAL WEAPONS STATION EARLE

Parameter	Units	Reporting Limit[a]	Guidance Criteria[b]
VOLATILE ORGANICS GC/MS (SW846 8260B) – AQUEOUS (GUADALCANAL ROAD SITE)			
Acetone	µg/L	5	700
Benzene	µg/L	1	1
Bromodichloromethane	µg/L	1	1
Bromoform	µg/L	1	4
Bromomethane	µg/L	1	10
2-Butanone	µg/L	5	300
Carbon disulfide	µg/L	1	---
Carbon tetrachloride	µg/L	1	2
Chlorobenzene	µg/L	1	4
Chloroethane	µg/L	1	---
Chloroform	µg/L	1	6
Chloromethane	µg/L	1	30
Dibromochloromethane	µg/L	1	10
1,1-Dichloroethane	µg/L	1	70
1,2-Dichloroethane	µg/L	1	2
1,1-Dichloroethene	µg/L	1	2
cis-1,2-Dichloroethene	µg/L	1	10
trans-1,2-Dichloroethene	µg/L	1	100
1,2-Dichloropropane	µg/L	1	1
cis-1,3-Dichloropropene	µg/L	1	0.2(d)
trans-1,3-Dichloropropene	µg/L	1	0.2(d)
Ethylbenzene	µg/L	1	700
2-Hexanone	µg/L	5	---
4-Methyl-2-pentanone (MIBK)	µg/L	5	400
Methylene chloride	µg/L	1	2
Styrene	µg/L	1	100
1,1,2,2-Tetrachloroethane	µg/L	1	2
Tetrachloroethene	µg/L	1	1
Toluene	µg/L	1	1,000
1,1,1-Trichloroethane	µg/L	1	30
1,1,2-Trichloroethane	µg/L	1	3
Trichloroethene	µg/L	1	1
Vinyl chloride	µg/L	1	5
Xylenes (total)	µg/L	1	40

Parameter	Units	Reporting Limit[a]	Guidance Criteria[b]
SEMIVOLATILE ORGANICS GC/MS - (SW846 8270C) – AQUEOUS (GUADALCANAL ROAD SITE)			
Acenaphthene	µg/L	2	400
Acenaphthylene	µg/L	2	---
Anthracene	µg/L	2	2,000
Benzo[a]anthracene	µg/L	2	---
Benzo[b]fluoranthene	µg/L	2	---
Benzo[k]fluoranthene	µg/L	2	---
Benzo[a]pyrene	µg/L	2	---
Benzo[ghi]perylene	µg/L	2	---
Bis(2-chloroethyl) ether	µg/L	2	10
Bis(2-chloroethoxy)methane	µg/L	2	---
Bis(2-ethylhexyl) phthalate	µg/L	2	30
Bis(2-chloroisopropyl) ether	µg/L	2	300
4-Bromophenyl phenyl ether	µg/L	2	---
Butylbenzyl phthalate	µg/L	2	100
Carbazole	µg/L	2	---
4-Chloroaniline	µg/L	2	---
4-Chloro-3-methylphenol	µg/L	2	---
2-Chloronaphthalene	µg/L	2	---
2-Chlorophenol	µg/L	2	40
4-Chlorophenyl phenyl ether	µg/L	2	---
Chrysene	µg/L	2	---
Dibenzo[a,h]anthracene	µg/L	2	---
Dibenzofuran	µg/L	2	---
Di-n-butyl phthalate	µg/L	2	900
1,2-Dichlorobenzene	µg/L	2	600
1,3-Dichlorobenzene	µg/L	2	600
1,4-Dichlorobenzene	µg/L	2	75
3,3'-Dichlorobenzidine	µg/L	2	60
2,4-Dichlorophenol	µg/L	2	20
Diethyl phthalate	µg/L	2	5,000
2,4-Dimethylphenol	µg/L	2	100
Dimethyl phthalate	µg/L	2	---
2,4-Dinitrophenol	µg/L	2	40
2,4-Dinitrotoluene	µg/L	2	10 (e)
2,6-Dinitrotoluene	µg/L	2	---
Di-n-octyl phthalate	µg/L	2	100
Fluoranthene	µg/L	2	300
Fluorene	µg/L	2	300
Hexachlorobenzene	µg/L	2	10
Hexachlorobutadiene	µg/L	2	1
Hexachlorocyclopentadiene	µg/L	2	50
Hexachloroethane	µg/L	2	10
Indeno[1,2,3-cd]pyrene	µg/L	2	---
Isophorone	µg/L	2	100
4,6-Dinitro-2-methylphenol	µg/L	2	---
2-Methylnaphthalene	µg/L	2	---

Parameter	Units	Reporting Limit[a]	Guidance Criteria[b]
2-Methylphenol	µg/L	2	---
3&4-Methylphenol	µg/L	2	---
Naphthalene	µg/L	2	---
2-Nitroaniline	µg/L	2	---
3-Nitroaniline	µg/L	2	---
4-Nitroaniline	µg/L	2	---
Nitrobenzene	µg/L	2	10
2-Nitrophenol	µg/L	2	---
4-Nitrophenol	µg/L	2	---
N-Nitrosodiphenylamine	µg/L	2	20
N-Nitrosodi-n-propylamine	µg/L	2	20
Pentachlorophenol	µg/L	2	1
Phenanthrene	µg/L	2	---
Phenol	µg/L	2	4,000
Pyrene	µg/L	2	200
1,2,4-Trichlorobenzene	µg/L	2	9
2,4,5-Trichlorophenol	µg/L	2	700
2,4,6-Trichlorophenol	µg/L	2	20
PESTICIDES GC/ECD - ORGANOCHLORINE COMPOUNDS (SW846 8081A) – AQUEOUS (SITE 47)			
Aldrin	µg/L	0.02	0.04
alpha-BHC	µg/L	0.02	0.02
beta-BHC	µg/L	0.02	0.2
delta-BHC	µg/L	0.02	---
gamma-BHC	µg/L	0.02	0.2
Chlordane	µg/L	0.5	---
Chlordane-A	µg/L	0.5	---
Chlordane-B	µg/L	0.5	---
Chlordane-C	µg/L	0.5	---
Chlordane-D	µg/L	0.5	---
Chlordane-E	µg/L	0.5	---
Chlordane-F	µg/L	0.5	---
alpha-Chlordane	µg/L	0.02	0.5
gamma-Chlordane	µg/L	0.02	0.5
Chlorobenzilate	µg/L	0.02	---
Dieldrin	µg/L	0.02	0.03
2,4'-DDD	µg/L	0.02	---
4,4'-DDD	µg/L	0.02	0.1
2,4'-DDE	µg/L	0.02	---
4,4'-DDE	µg/L	0.02	0.1
2,4'-DDT	µg/L	0.02	---
4,4'-DDT	µg/L	0.02	0.1
Endrin	µg/L	0.02	2
Endosulfan Sulfate	µg/L	0.02	0.4
Endrin aldehyde	µg/L	0.02	---
Endrin Ketone	µg/L	0.02	---
Endosulfan-I	µg/L	0.02	0.4
Endosulfan-II	µg/L	0.02	0.4

Parameter	Units	Reporting Limit[a]	Guidance Criteria[b]
Heptachlor	µg/L	0.02	0.4
Heptachlor epoxide	µg/L	0.02	0.2
Kepone	µg/L	0.25	---
Methoxychlor	µg/L	0.05	40
Toxaphene	µg/L	0.25	3
Toxaphene-A	µg/L	0.25	---
Toxaphene-B	µg/L	0.25	---
Toxaphene-C	µg/L	0.25	---
Toxaphene-D	µg/L	0.25	---
Toxaphene-E	µg/L	0.25	---
Toxaphene-F	µg/L	0.25	---
METALS - ICP (SW846 6010B) – AQUEOUS (SITE 48)			
Aluminum	µg/L	83.6	200
Antimony	µg/L	6.0	20
Arsenic	µg/L	5.5	8
Barium	µg/L	6.8	2,000
Beryllium	µg/L	1.5	20
Cadmium	µg/L	1.1	4
Calcium	µg/L	27.1	---
Chromium	µg/L	1.5	100
Cobalt	µg/L	1.9	---
Copper	µg/L	2.0	1,000
Iron	µg/L	20.0	300
Lead	µg/L	2.1	10
Magnesium	µg/L	164	---
Manganese	µg/L	0.3	50
Mercury	µg/L	0.2	2
Nickel	µg/L	2.3	100
Potassium	µg/L	40.6	---
Selenium	µg/L	4.8	50
Silver	µg/L	1.6	---
Sodium	µg/L	281.1	50,000
Thallium	µg/L	5.2	10
Vanadium	µg/L	0.8	---
Zinc	µg/L	1.2	5,000

(a) Chemtech Laboratories has established *Reporting Limits* as laboratory quantitation levels. These are the minimum concentrations to be reported for routine laboratory analyses in clean environmental matrices. The Reporting Limits are values believed to provide greater than 50% probability of avoiding a false-negative. In instances where the reporting limit is greater than the guidance criteria, the laboratory may report to the Minimum Detection Limit (MDL) as established according to 40 CFR 136 Appendix B. MDLs represent best available technology and current laboratory capability. In cases where individual MDLs are greater than the risk-based criteria required, the laboratory will report to their MDL.

(b) Water guidance criteria-based on the New Jersey Department of Environmental Protection's Ground Water Quality Criteria Standards for Class II-A Ground Water and Practical Quantitation Levels. Higher of the two values is presented. Soil guidance criteria based on the New Jersey Department of Environmental Protection's Non-Residential Direct Contact Soil Cleanup Criteria (last revised 2/3/94). Criteria are health-based using an incidental ingestion exposure pathway except where noted. Criteria are subject to change based on site-specific factors (e.g., aquifer classification, soil type, natural background, environmental impacts, etc.).

(c) Criterion for *cis*-1,2-Dichloroethene is 10 µg/L. Criterion for *trans*-1,2-Dichloroethene is 100 µg/L.

(d) No separate criteria listed for *cis*- or *trans*-1,3-Dichloropropene. Criteria listed as 0.2 µg/L for 1,3-Dichloropropene (*cis* and *trans*)

(e) Criteria listed is for a 2,4-Dinitrotoluene/2,6-Dinitrotoluene mixture.

TABLE 2
REPORTING LIMITS AND CRITERIA FOR SOIL SAMPLES FOR SITE 48 AT NAVAL WEAPONS STATION, EARLE

Parameter	Units	Reporting Limits[a]	Guidance Criteria
METALS - ICP (SW846 3050/6010) - SOIL (SITE 48) RESIDENTIAL/NON-RESIDENTIAL			
Aluminum	mg/kg	0.82	---
Antimony	mg/kg	0.75	14 / 340
Arsenic	mg/kg	0.45	2 / 20 (e)(f)
Barium	mg/kg	0.03	700 / 47,000 (n)
Beryllium	mg/kg	0.01	1 / 1 (f)
Cadmium	mg/kg	0.05	1 / 100
Calcium	mg/kg	0.31	---
Chromium	mg/kg	0.05	---
Cobalt	mg/kg	0.11	---
Copper	mg/kg	0.12	600 / 600 (m)
Iron	mg/kg	2.06	---
Lead	mg/kg	0.15	100 / 600 (p)
Magnesium	mg/kg	0.55	---
Manganese	mg/kg	0.03	---
Mercury	mg/kg	0.05	14 / 270
Nickel	mg/kg	8	250 / 24,000 (k) (n)
Potassium	mg/kg	2.23	---
Selenium	mg/kg	0.48	63 / 3,100 (n)
Silver	mg/kg	0.16	110 / 4,100 (n)
Sodium	mg/kg	28.9	---
Thallium	mg/kg	0.52	2 / 2 (f)
Vanadium	mg/kg	0.08	370 / 7,100 (n)
Zinc	mg/kg	0.12	1,500 / 1,500 (m)

(a) Chemtech Laboratories has established *Reporting Limits* as laboratory quantitation levels. These are the minimum concentrations to be reported for routine laboratory analyses in clean environmental matrices. The Reporting Limits are values believed to provide greater than 50% probability of avoiding a false-negative. In instances where the reporting limit is greater than the guidance criteria, the laboratory may report to the Minimum Detection Limit (MDL) as established according to 40 CFR 136 Appendix B. MDLs represent best available technology and current laboratory capability. In cases where individual MDLs are greater than the risk-based criteria required, the laboratory will report to their MDL.

(e) Cleanup standard proposal was based on natural background.

(f) Health-based criterion is lower than analytical limits; cleanup criterion based on practical quantitation level.

(k) Criterion based on inhalation exposure pathway that yielded a more stringent criterion than the incidental ingestion exposure pathway.

(m) Criterion based on ecological (phytoxicity) effects.

(n) Level of the human health-based criterion is such that evaluation for potential envrionmental impacts on a site by site basis is recommended.

(p) Criterion based on the goal that children should be exposed to the minimal amount of lead that is practicable and is reflective of natural background as altered by diffuse anthropogenic pollution. Criterion corresponds to both a median value for urban land which has not been impacted by any local point source of lead and a 90th percentile value for similar suburban land.