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NAS BRUNSWICK
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Work Plan for
Site 9 Direct-Push Investigation
Naval Air Station, Brunswick, Maine

Contract No. N62472-92-D-1296
Contract Task Order No. 0047

U.S. NAVAL AIR STATION
BRUNSWICK, MAINE

Prepared for

Department of the Navy
Engineering Field Activity Northeast
Naval Facilities Engineering Command
10 Industrial Highway
Mail Stop No. 82
Lester, Pennsylvania 19113-2090

Prepared by

EA Engineering, Science, and Technology, Inc.
Southborough Technology Park
333 Turnpike Road, Route 9
Southborough, Massachusetts 01772

May 2003
FINAL
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27 May 2003

Alexander C. Easterday, P.G. — Date
CTO Manager

27 May 2003

Kenneth W. Kilmer — Date
Program Manager

May 2003
FINAL
296.0047

QUALITY REVIEW STATEMENT

Contract No. N62472-92-D-1296 EA Project No.: 29600.47
Contract Task Order No. 0047
Activity: Naval Air Station, Brunswick, Maine

Description of Report/Deliverable:

Final Work Plan for Site 9 Direct-Push Investigation, Naval Air Station, Brunswick, Maine

EA CTO Manager: Alexander C. Easterday, P.G.

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

27 May 2003

Peter A. Conde, P.G. (Date)
Hydrogeologist

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1. INTRODUCTION

Under Contract No. N62472-92-D-1296, Engineering Field Activity Northeast, Naval Facilities Engineering Command issued Contract Task Order No. 0047 to EA Engineering, Science, and Technology, Inc. to conduct additional investigations at Site 9, Naval Air Station (NAS), Brunswick, Maine. This Work Plan details the overall approach of the field activities that will be conducted as part of these additional investigations.

NAS Brunswick is located south of the Androscoggen River between Brunswick and Bath, Maine, as shown on Figure 1. NAS Brunswick is an active base owned and operated by the Federal government through the Department of the Navy. In 1987, NAS Brunswick was placed on the National Priorities List by the U.S. Environmental Protection Agency (EPA) and is currently participating in the Navy's Installation Restoration Program.

1.1 WORK PLAN OBJECTIVES

The additional investigations outlined in this Work Plan are being completed in response to EPA and Maine Department of Environmental Protection (MEDEP) comments regarding Site 9 and associated areas. The goals of this investigation include the following:

- Assess the potential for a contributing source of 1,2-dichloroethene and other VOCs in groundwater which have been detected at Site 9 monitoring well MW-NASB-227
- Collect geologic data at up to 10 soil borings to assess the lateral extent and depth of the ash landfill at Site 9. These data may be used to assess the scope of potential remedial actions being considered for the ash landfill.

The investigation activities outlined in this Work Plan include the following tasks.

- **Direct-Push Soil Borings and Groundwater Sampling**—This task will include installation of 9 direct-push borings to assess groundwater concentrations of volatile organic compounds (VOCs) in the subsurface near monitoring well MW-NASB-227. Groundwater samples will be collected from three different intervals from each of the 9 direct-push soil boring locations.
- **Direct-Push Soil Borings and Soil Sampling at Barrack Buildings 218 and 219**—Install 10 direct-push borings to assess the lateral and vertical extent of the ash landfill underlying Barrack Buildings 218 and 219 at Site 9.

1.2 WORK PLAN ORGANIZATION

This Work Plan details the field activities that will be conducted as part of the additional investigation at Site 9. The field activities at the site will be completed in two stages and, therefore, two separate sections are provided to describe the proposed field work at the site.

Field activities and procedures specific to Site 9 are detailed in Section 2. Field activities and procedures specific to the ash landfill below Barrack Buildings 218 and 219 are detailed in Section 3. Responses to regulator's comments on the Draft Work Plan are provided in Appendix A. Field forms are provided in the Appendix B.

2. FIELD ACTIVITIES

This section provides a summary of the field activities that will be conducted as part of the investigation at Site 9. A total of 9 soil borings will be installed. The specific location of each boring will be identified and marked in the field and will be arranged to best assess the detection of VOCs in groundwater in the vicinity of MW-NASB-227 at locations upgradient, crossgradient, and downgradient from well MW-NASB-227. The proposed soil boring locations are shown on Figure 2.

The following activities will be completed:

- 9 soil boring locations will be marked in the field based on locations shown on Figure 2.
- At each of the 9 locations, soil borings will be advanced with continuous soil sampling until the Presumpscot clay is encountered (estimated at approximately 40-50 ft below ground surface [bgs]).
- At each of the 9 locations, direct-push groundwater samples will be collected at three different intervals throughout the boring for VOC analysis (EPA Method 8260B). The goal of the groundwater sampling is to assess the vertical profile of VOCs that may be present upgradient of MW-NASB-227, and to assess whether VOCs may be related to a specific source area or may be indicative of a base-wide, low concentration impact.

Prior to the start of drilling activities, EA personnel will contact Digsafe (1-800-225-4977) to confirm the presence/absence of utilities at each drilling location. NAS Brunswick Work Control personnel will be notified (prior to commencement of field activities) so they can mark/identify underground utility locations within the facility grounds. Additionally, EA personnel will coordinate subsurface investigation activities with MEDEP and EPA prior to the commencement of work.

2.1 SOIL BORING PROGRAM

A total of 9 soil borings will be advanced at locations to collect additional data on the potential source of VOCs that have been noted at MW-NASB-227. The locations of each soil boring are shown on Figure 2. Soil samples will be collected by a direct-push Geoprobe. The total depth of each deep boring is estimated to be 40-50 ft bgs. Soil samples will be collected continuously to the top of the Presumpscot Clay unit (estimated to be between 40 and 50 ft bgs) using a truck-mounted hydraulic probe direct-push system equipped with a macro-core sampler. The Field Geologist will log the soil characteristics of each sample along with any other pertinent information on the Log of Soil Boring field form (Appendix B) in accordance with American Society for Testing and Materials Method D 2488-93.

Closed-container headspace vapor monitoring will be used as a screening tool for determining the relative concentrations of VOCs in soil samples collected during macro-core sampling of the overburden. Headspace measurements will be collected using a photoionization detector and the static headspace analysis method described below:

- Approximately 2 oz of soil will be collected (composite sample of soil in the macro-core sampler) from the open sampler and placed in a laboratory-cleaned glass jar. The mouth of the jar will then be immediately covered with aluminum foil prior to sealing the jar lid to minimize the loss of VOCs. Headspace samples will be collected for every direct-push soil sample. An additional biased grab soil sample may be collected from intervals of interest (i.e., fine- or coarse-grained intervals) and/or any zones exhibiting an odor or visual evidence of impact (i.e., staining) from each macro-core sampler.

- The jar will be shaken to break up compacted soil or material, and will be placed in a warm location, out of direct sunlight, for a period of no less than 15 minutes to equilibrate prior to field monitoring.

- The jar lid will be removed from the jar. Headspace will be monitored within the jar by piercing the aluminum foil with the photoionization detector probe. Care will be taken to prevent unnecessary mixing of jar headspace and outside air. Monitoring with the photoionization detector will continue for at least 1 minute. The highest photoionization detector concentration observed will be recorded along with the sample interval in the field notebook, and on the Log of Soil Boring field form provided in Appendix B.

Fluids and soil cuttings derived from drilling processes will be containerized in accordance with the procedures detailed in Section 2.4. The drill rig, drill casings, macro-core samplers, and other down-hole equipment will be decontaminated in accordance with the procedures detailed in Section 2.4 prior to soil boring activities at each soil boring location and after the completion of the task. The soil boring locations will be backfilled with bentonite chips or pellets to seal each location (if required). Soil boring locations will be flagged in the field for surveying.

2.2 DIRECT-PUSH GROUNDWATER SAMPLING

Direct-push groundwater samples will be collected at the 9 soil boring locations in order to determine which subsurface intervals may contain elevated concentrations of VOCs. Upon completion of the soil boring, all casing and equipment will be removed from the boring hole and backfilled as described in Section 2.1. The direct-push Geoprobe will be set up approximately 2-3 ft from the soil boring to allow the sampling device to obtain an undisturbed groundwater sample from the previously identified interval.

Direct-push groundwater samples will be collected at three different intervals from the boring. It is assumed that the approximate boring depth will be 40-50 ft bgs extending to the Presumpscot clay. Three intervals will be sampled at each boring. Shallow samples will be collected near the water table. Intermediate samples will be collected approximately half-way between the water table and the top of clay. Deep samples will be collected near the top of the clay unit. The specific sample intervals will be determined based upon the geological and photoionization detector field screening data collected by the Field Geologist. Bias will be given toward coarse-grained geologic units that may be more likely to bear water, elevated photoionization detector readings, odors, or staining.

Three groundwater samples will be collected from each boring and analyzed for VOCs by EPA Method 8260B. The samples to be sent to the laboratory will be determined based on field observations, and on discussions with the EA Project Manager and Navy personnel. Groundwater samples will be submitted to the contracted laboratory for a standard turnaround time of 30 days.

Groundwater sampling will be accomplished using a truck-mounted hydraulic probe direct-push system. This method involves the use of a direct-push water sampling probe, which is pushed under hydraulic pressure to the selected sample depth without boring a pilot hole. The sample probe consists of a 1.0- to 1.4-in. outside diameter steel probe rod with either slotted screen sections or an expendable point attached. Upon arrival at the site, the direct-push sampler will be decontaminated in accordance with the procedures described in Section 2.4. Groundwater samples will be extracted from the direct-push rods by using a bladder pump with dedicated tubing for each boring location. If the groundwater sample retrieval is not successful with the bladder pump, which can be the case with the presence of silt in the groundwater, then a peristaltic pump with dedicated tubing will be used. The third alternative for groundwater sampling, that will only be used if groundwater samples cannot be extracted by the bladder or peristaltic pumps, will be a mini bailer or dedicated polyethylene tubing and a bottom check value. The direct-push probe will then be backed out of the hole using the system hydraulic cylinder. The direct-push probes should be pulled straight out to prevent the direct-push point from bending. The direct-push probes will then be disassembled prior to decontamination in accordance with the procedures detailed in Section 2.4. The direct-push probe assembly will be decontaminated after each use. The O-rings and piston screen will be checked for wear and abrasion. The O-rings will be changed as necessary (after approximately every 3-4 samples) or after high levels of VOCs have been encountered. If the screen does not need to be replaced, it may be left attached to the probe assembly during decontamination.

2.3 QUALITY ASSURANCE/QUALITY CONTROL

Quality assurance/quality control procedures will include the collection of field and laboratory quality control samples. Quality assurance/quality control samples associated with direct-push groundwater samples collected are summarized in this section. Quality assurance/quality control samples collected for the Site 9 direct-push effort are summarized in Table 1.

2.3.1 Field Quality Control Samples

Quality control samples are not included specifically as laboratory quality control samples but are analyzed when submitted. Data for these quality control samples are reported with associated samples and are counted in the maximum batch size of 20 samples.

2.3.1.1 Trip Blanks

Trip blanks are containers of reagent-grade de-ionized water that are secured with the field sample container from the time they leave the laboratory until the time they are returned to the laboratory. The purpose of trip blanks is to determine whether samples have become contaminated during transit or sample collection. Trip blanks apply only to aqueous VOC analyses, therefore, the containers must contain no headspace. One trip blank is needed for each sample cooler containing volatile organic analyte sample bottles per shipment event.

2.3.1.2 Field Duplicates

Field duplicates are two samples of the same matrix which are collected, to the extent possible, from the same location at the same time using the same techniques. Field duplicates provide information on the precision of the sampling and analysis process. Field duplicates will be collected at a frequency of 1 duplicate per 20 sample media.

2.3.1.3 Rinsate Blanks

A rinsate blank is a water sample collected after having been poured through or over a decontaminated piece of sampling equipment to assess and document the thoroughness of the decontamination process. A rinsate blank will be collected on the re-usable steel probe rods and slotted screen section used during direct-push sampling.

2.3.1.4 Source Water Blank

Source water blanks are samples of water used for field decontamination purposes. Specifically, source water blank samples will include laboratory-supplied, reagent-grade, deionized water used for decontamination purposes. Source water blank samples are typically analyzed for all parameters sampled during the field mobilization period. One water source sample will be collected from the water source used for equipment decontamination and will be analyzed for VOCs by EPA Method 8260B.

2.3.2 Laboratory Quality Control Samples

Laboratory quality control samples are included in each analysis to provide information on both method performance and sample measurement bias, and are included in each analytical batch. A batch is defined as a group of field samples of similar matrix, not to exceed 20, which are processed as a unit using the same method and the same lots of standards and reagents. The laboratory quality control samples discussed in the following subsections are counted in the maximum batch size of 20.

2.3.2.1 Method Blank

The method blank is used to monitor laboratory contamination. This is usually a sample of laboratory reagent water processed through the same analytical procedure as the sample. One method blank is prepared and analyzed with each analytical batch.

2.3.2.2 Laboratory Control Spike

The fortified method blank is analyzed with each analytical method. These samples generally consist of laboratory reagent water fortified with the analytes of interest for single-analyte methods and selected analyte for multi-analyte method according to the appropriate analytical method. The analyte recovery from each is used to monitor analytical accuracy and precision.

2.3.2.3 Matrix Spike

A matrix spike is an aliquot of a field sample that is fortified with the analytes of interest and analyzed to monitor measurement bias associated with the sample matrix. A matrix spike and matrix spike duplicate will be performed for every analytical batch.

2.3.2.4 Surrogates

Surrogates are organic compounds that are similar to analytes of interest in chemical composition, extraction, and chromatograph, but are not normally found in environmental samples. Surrogates are added to field and quality control samples in every batch. These compounds are used to monitor system performance as well as sample measurement bias. Percent recoveries are calculated for each surrogate, and evaluated against acceptance criteria.

2.4 DECONTAMINATION PROCEDURES

To minimize the potential for cross-contamination between soil boring locations, reusable sampling equipment and drilling equipment will be decontaminated via steam cleaner wash before and after the first boring is advanced and after each subsequent boring. Soil and groundwater samplers will be steam-cleaned and then decontaminated as described below. Steam cleaning will be conducted on a pre-approved (by NAS Brunswick personnel), centrally-located decontamination pad.

The procedure for cleaning steel macro-core samplers, submersible pumps, water level/interface probes, direct-push rods, etc., is as follows:

- Wash with potable water and laboratory-grade detergent (e.g., Alconox® detergent)
- Rinse with potable water
- Rinse with deionized water
- Rinse with isopropanol
- Rinse with deionized water

- Air dry
- Wrap in polyvinyl chloride sheeting/foil wrap if equipment will be stored.

The decontamination area will contain a wash solution collection system. The collected decontamination liquids will be temporarily containerized in U.S. Department of Transportation-approved, 55-gal drums and transported to Building 50 (Wastewater Treatment Plant) for disposal and treatment.

2.5 MANAGEMENT OF INVESTIGATION-DERIVED WASTE

Waste materials generated during the field investigation at Site 9 will include:

- Drill cuttings (soil) derived from soil borings and direct-push investigation
- Well development and sampling fluids
- Decontamination fluids
- Used personal protective equipment.

These wastes will be contained, labeled, and handled in the following manner:

- Soil cuttings generated from soil boring activities above the water table will not be containerized as this soil is unimpacted by the VOC groundwater plume. Soil cuttings generated below the water table will be containerized in U.S. Department of Transportation-approved 55-gal drums. The drums will be temporarily staged at an approved location (NAS Brunswick Building 50), dated, and labeled as investigation-derived waste. Final disposal options will be determined pending the review of the direct-push groundwater data, the closed-container headspace vapor monitoring results, and comparison with the established screening levels for the contaminants of concern. It is anticipated that soil concentrations of VOCs will be very low and that this material will not require offsite disposal. The determination for disposal options will be coordinated with site personnel and regulators after the results of groundwater sampling are received.

- Liquids derived from sampling activities and decontamination fluids will be collected and temporarily containerized in U.S. Department of Transportation-approved 55-gal drums and transported to Building 50 (Wastewater Treatment Plant) for disposal and treatment.

- Used personal protective equipment will be double-bagged and disposed of on NAS Brunswick Base as general refuse.

3. FIELD ACTIVITIES AND PROCEDURES FOR BARRACK BUILDINGS 218 AND 219

This section provides a summary of the field activities that will be conducted as part of the soil investigation in the vicinity of Barrack Buildings 218 and 219. Up to 10 direct-push borings will be installed to investigate the extent of the ash landfill underlying Barrack Buildings 218 and 219 at Site 9. The location of the borings will be determined in the field by the Field Geologist. The approximate extent of ash landfill is shown on Figure 2.

Activities to be conducted at Barrack Buildings 218 and 219 include:

- Completion of up to 10 soil boring to delineate the lateral and vertical extent of the ash landfill in the vicinity of Barrack Buildings 218 and 219.

- Up to 2 soil samples will be collected from 5 of 10 soil borings completed to determine chemical composition of the material in the ash landfill for a total of 10 samples. Samples will be analyzed for VOCs by EPA Method 5035/8260B, semivolatile organic compounds (SVOCs) by EPA 8270C, and Target Analyte List (TAL) metals. Two samples of the ash which show the highest concentration of ash material as determined by the Field Geologist will be collected as well for analysis of dioxins by EPA Method 8290: Tetra-Octa(1).

Prior to the start of drilling activities, EA personnel will contact Digsafe (1-800-225-4977) to confirm the presence/absence of utilities at the drilling location. NAS Brunswick Work Control personnel will be notified (prior to commencement of field activities) so they can mark/identify underground utility locations within the facility grounds. Additionally, EA personnel will coordinate subsurface investigation activities with MEDEP and EPA prior to the commencement of work.

3.1 SOIL BORING PROGRAM

A total of 10 soil borings will be advanced at the location of the ash landfill in the vicinity of Barrack Buildings 218 and 219. Soil borings will be installed by a direct-push Geoprobe rig. The total depth of the boring will be determined in the field by the Field Geologist (depth is dependent on the vertical extent of the ash landfill). Borings will be advanced at least 3 ft into native material (i.e., no ash or waste material is observed) using a truck-mounted hydraulic probe direct-push system with a 2-in. inner diameter, 4-ft length, macro-core sampler. Soil samples will be collected continuously for the length of the boring. The Field Geologist will log the soil characteristics of each sample along with any other pertinent information in accordance with the American Society for Testing and Materials Method D 2488-93. Soil characteristics will be logged on a Log of Soil Boring field form (Appendix B).

Up to 2 soil samples will be collected from 5 of 10 soil borings completed to determine extent of the ash landfill, for a total of 10 samples. Samples will be collected and analyzed for VOCs by EPA Method 5035/8260B, SVOCs by EPA 8270C, and TAL metals. Where ash is encountered, one sample of the ash material would be collected and submitted for laboratory analysis by EPA Method 5035/8260B, EPA Method 8270C, EPA Method 8290, and TAL metals which will allow the Navy to determine disposal options for the ash material. Soil samples will be submitted to the contracted laboratory for a standard turnaround time of 30 days. Two samples of the ash which show the highest concentration of ash material as determined by the Field Geologist will be collected as well for analysis of dioxins by EPA Method 8290: Tetra-Octa(1). The ash sample for dioxin analysis will be submitted to the contracted laboratory for a standard turnaround time of 30 days

Closed-container headspace vapor monitoring will be used as a screening tool for determining the relative concentrations of VOCs in soil samples collected during sampling of the overburden. Headspace measurements will be collected using the static headspace analysis method described below:

- Approximately 2 oz of soil will be collected from the opened macro-core sampler and placed in a laboratory-cleaned glass jar. The mouth of the jar will then be immediately covered with aluminum foil prior to sealing the jar lid to minimize the loss of VOCs. Headspace samples will be collected for every macro-core soil sample.

- The jar will be shaken to break up compacted soil or material, and will be placed in a location, out of direct sunlight, for a period of no less than 15 minutes to equilibrate prior to field monitoring.

- The jar lid will be removed from the jar. Headspace will be monitored within the jar by piercing the aluminum foil with the photoionization detector probe. Care will be taken to prevent unnecessary mixing of jar headspace and outside air. Monitoring with the photoionization detector will continue for at least 1 minute. The highest photoionization detector concentration observed will be recorded along with the sample interval in the field notebook, and on the Log of Soil Boring field form provided in Appendix B.

Fluids and soil cuttings derived from drilling processes will be containerized in accordance with the procedures detailed in Section 3.4. The drill rig, and other downhole equipment, will be decontaminated in accordance with the procedures detailed in Section 3.3.

3.2 QUALITY ASSURANCE/QUALITY CONTROL

Quality assurance/quality control procedures will include the collection of field and laboratory quality control samples. Quality assurance/quality control samples associated with the soil borings to identify the ash landfill at Site 9 will be submitted for laboratory analysis in accordance with the general methodologies established in the current Long-Term Monitoring Plan (EA 2000[1]) for NAS Brunswick. Quality assurance/quality control samples associated with the soil samples collected during this investigation are summarized in this section.

3.2.1 Field Quality Control Samples

These samples are not included specifically as laboratory quality control samples, however, the samples are analyzed when submitted. Data for these quality control samples are reported with associated samples and are counted in the maximum batch size of 20 samples.

3.2.1.1 Trip Blanks

Trip blanks are containers of reagent-grade deionized water that are secured with the field sample container from the time they leave the laboratory until the time they are returned to the laboratory. The purpose of trip blanks is to determine whether samples have become contaminated during transit or sample collection. Trip blanks apply only to aqueous VOC analyses, therefore, the containers must contain no headspace. One trip blank is needed for each sample cooler containing volatile organic analyte sample bottles per shipment event.

3.2.1.2 Field Duplicates

Field duplicates are 2 samples of the same matrix that are collected, to the extent possible, from the same location at the same time using the same techniques. Field duplicates provide information on the precision of the sampling and analysis process. Field duplicates will be collected at a frequency of 1 duplicate per 20 sample media.

3.2.1.3 Rinsate Blanks

A rinsate blank is a water sample collected after having been poured through or over a decontaminated piece of sampling equipment to assess and document the thoroughness of the decontamination process. A rinsate blank will be collected on the drilling tools used to collect the soil samples at Barrack Buildings 218 and 219.

3.2.1.4 Source Water Blank

Source water blanks are samples of water used for field decontamination purposes. Specifically, source water blank samples will include laboratory-supplied, reagent-grade, deionized water used for decontamination purposes. Source water blank samples are typically analyzed for all parameters sampled during the field mobilization period. One water source sample will be collected from the water source used for equipment decontamination and will be analyzed for VOCs by EPA Method 8260B.

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1 EA Engineering, Science, and Technology. 2000. Final Revision 0, Long-Term Monitoring Plan, Sites 1and 3 and Eastern Plume, Naval Air Station, Brunswick, Maine. February.

3.2.2 Laboratory Quality Control Samples

Laboratory quality control samples are included in each analysis to provide information on both method performance and sample measurement bias, and are included in each analytical batch. A batch is defined as a group of field samples of similar matrix, not to exceed 20, which are processed as a unit using the same method and the same lots of standards and reagents. The laboratory quality control samples discussed in the following subsections are counted in the maximum batch size of 20.

3.2.2.1 Method Blank

The method blank is used to monitor laboratory contamination. This is usually a sample of laboratory reagent water processed through the same analytical procedure as the sample. One method blank is prepared and analyzed with each analytical batch.

3.2.2.2 Laboratory Control Spike

The fortified method blank is analyzed with each analytical method. These samples generally consist of laboratory reagent water fortified with the analytes of interest for single-analyte methods and selected analyte for multi-analyte method according to the appropriate analytical method. The analyte recovery from each is used to monitor analytical accuracy and precision.

3.2.2.3 Matrix Spike

A matrix spike is an aliquot of a field sample that is fortified with the analytes of interest and analyzed to monitor measurement bias associated with the sample matrix. A matrix spike and matrix spike duplicate will be performed for every analytical batch.

3.2.2.4 Surrogates

Surrogates are organic compounds that are similar to analytes of interest in chemical composition, extraction, and chromatograph, but are not normally found in environmental samples. Surrogates are added to field and quality control samples in every batch. These compounds are used to monitor system performance as well as sample measurement bias. Percent recoveries are calculated for each surrogate, and evaluated against acceptance criteria.

3.3 DECONTAMINATION PROCEDURES

To minimize the potential for cross-contamination between soil boring locations, reusable sampling equipment and drilling equipment will be decontaminated via steam cleaner wash before and after the first boring is advanced and after each subsequent boring. Soil samplers will be steam-cleaned and then decontaminated as described below. Steam cleaning will be conducted on a pre-approved (by NAS Brunswick personnel), centrally-located decontamination pad.

The procedures for cleaning steel macro-core samplers are as follows:

- Wash with potable water and laboratory-grade detergent (e.g., Alconox® detergent)
- Rinse with potable water
- Rinse with deionized water
- Rinse with methanol
- Rinse with deionized water
- Air dry
- Wrap in polyvinyl chloride sheeting/foil wrap if equipment will be stored.

The decontamination area will contain a wash solution collection system. The collected decontamination liquids will be temporarily containerized in U.S. Department of Transportation-approved 55-gal drums and transported to Building 50 (Wastewater Treatment Plant) for disposal and treatment.

3.4 MANAGEMENT OF INVESTIGATION-DERIVED WASTE

Waste materials generated during the field investigation at Barrack Buildings 218 and 219 will include:

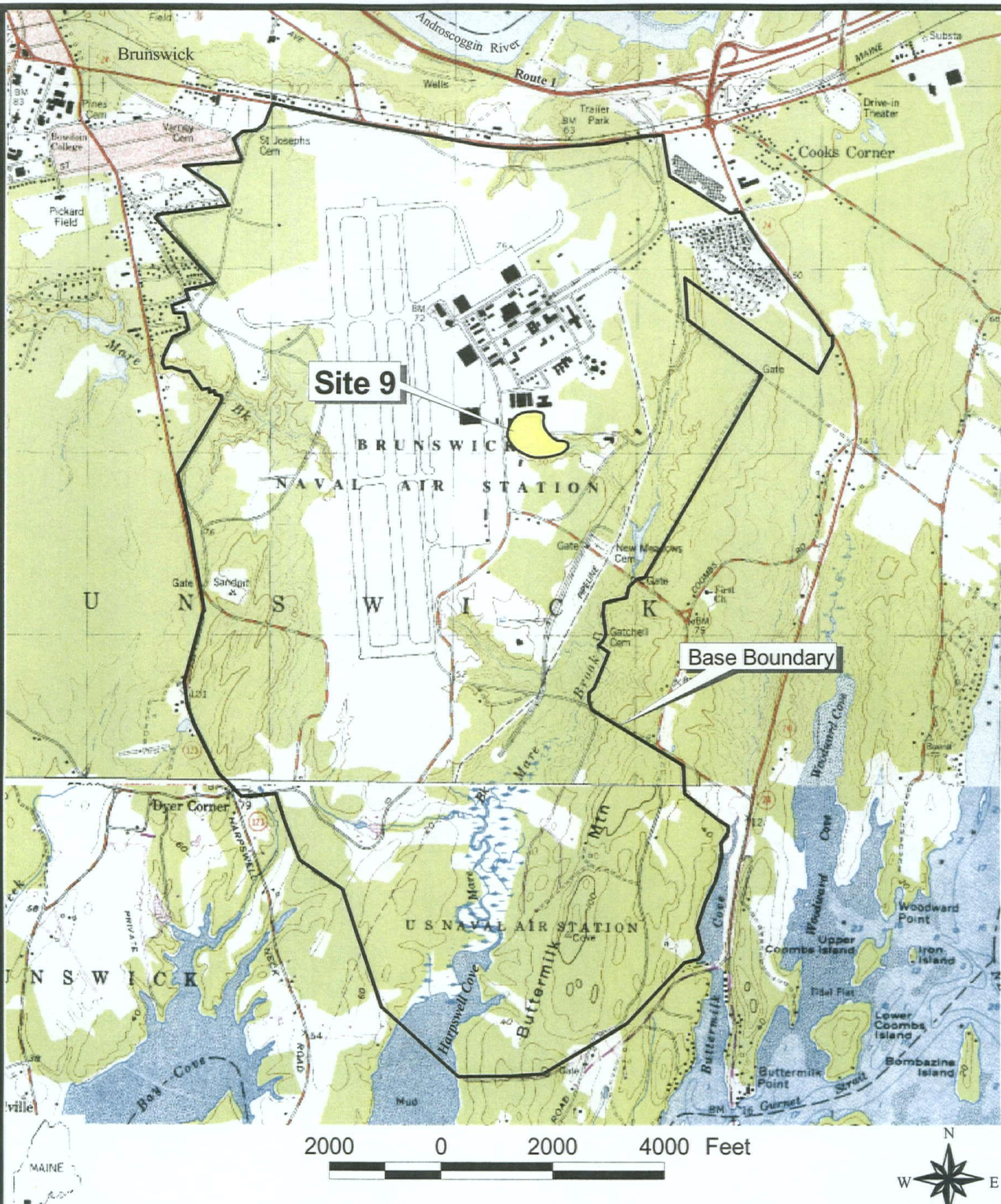
- Drill cuttings (soil) derived from soil boring
- Decontamination fluids
- Used personal protective equipment.

These wastes will be contained, labeled, and handled in the following manner:

- Soil cuttings generated from soil boring activities above the water table will not be containerized. Soil cuttings generated below the water table will be containerized in U.S. Department of Transportation-approved 55-gal drums. The drums will be temporarily staged at an approved location (NAS Brunswick Building 50), dated, and labeled as investigation-derived waste. Final disposal options will be determined pending the review of the sampling data, the closed-container headspace vapor monitoring results, and comparison with the established screening levels for the contaminants of concern. A final determination of the disposal options for this material will be made after consultation with Navy personnel and others.

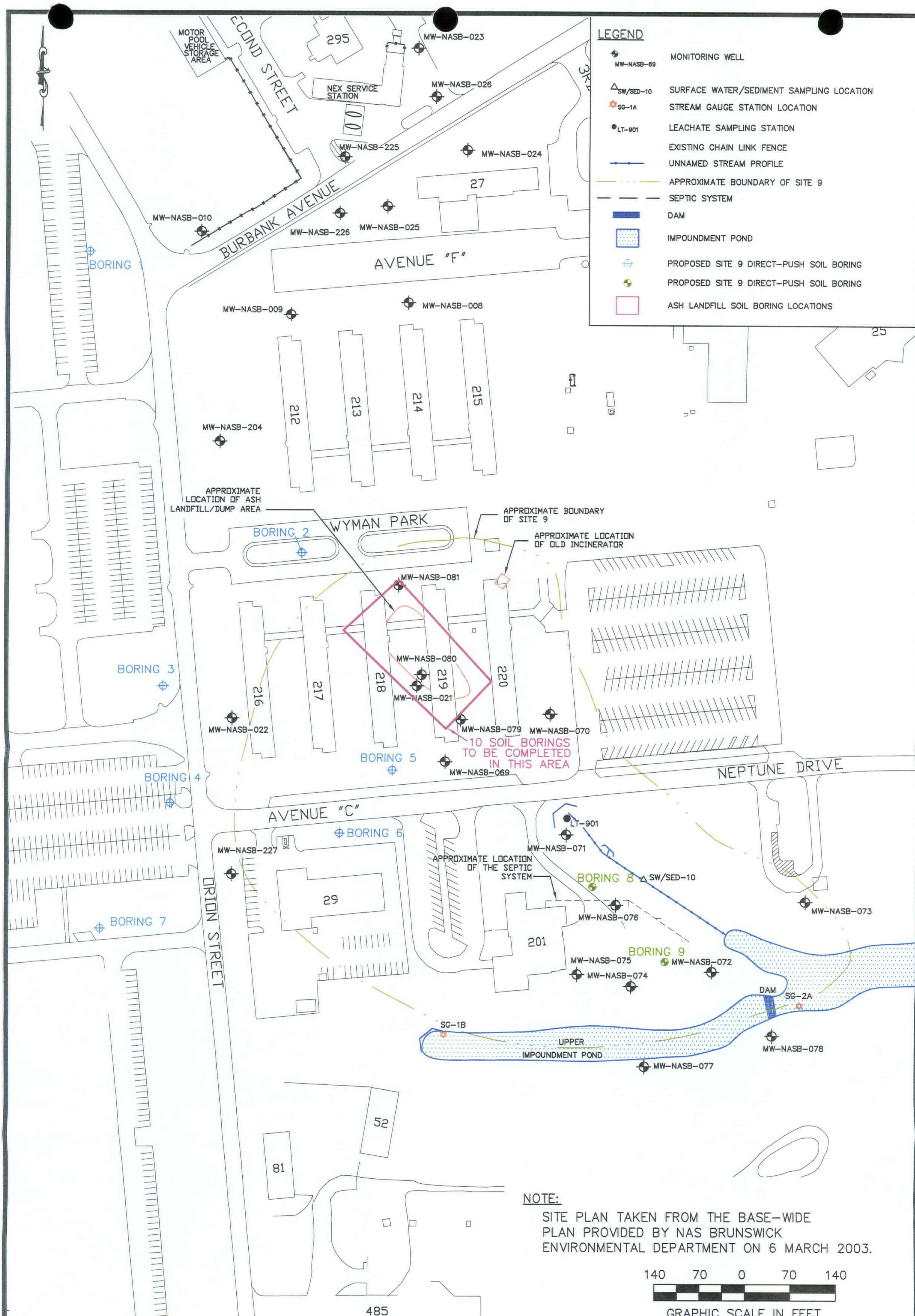
- Liquids derived from sampling activities, and decontamination fluids, will be collected and temporarily containerized in U.S. Department of Transportation-approved 55-gal drums and transported to Building 50 (Wastewater Treatment Plant) for disposal and treatment.

- Used personal protective equipment will be double-bagged and disposed of on the NAS Base as general refuse.



SOURCE MAPS: USGS ORRS ISLAND (1978) AND BRUNSWICK (1980) 7.5 MINUTE QUADRANGLES.

EA ENGINEERING, SCIENCE, AND TECHNOLOGY		NAVAL AIR STATION BRUNSWICK, MAINE			FIGURE 1 SITE LOCATION MAP, SITE 9 (NEPTUNE DRIVE DISPOSAL SITE)		
PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT No	FILE No
PLN	BT	BT	PLN	AS SHOWN	1 AUGUST 2002	29600.47	I:\NASB_GIS \NAVY.APR



FILE No. F:\FEDERAL\DOD\NAVY\2960047\CAD\SITE9 INVEST 03\SITEPLAN.DWG (TAB: LAYOUT 1)

SITE 9
(NEPTUNE DRIVE DISPOSAL SITE)
NAVAL AIR STATION
BRUNSWICK, MAINE

FIGURE 2
PROPOSED SOIL BORING LOCATIONS

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FILE No.
AE	CDS	SAP	GMC	1"=140'	6 MAY 2003	29600.47	SITEPLAN

TABLE 1 SUMMARY OF QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

Site	Sample Matrix	Parameter	Sample Type	Number of Samples	Analytical Method	Sample Preservation	Laboratory
Direct-Push Groundwater	Water	Volatiles	Field	27	EPA 8260B	HCl – Cool to 4°C	AMRO Environmental
	Water	Volatiles	Duplicate	2	EPA 8260B	HCl – Cool to 4°C	AMRO Environmental
	Water	Volatiles	Matrix spike	2	EPA 8260B	HCl – Cool to 4°C	AMRO Environmental
	Water	Volatiles	Matrix spike duplicate	2	EPA 8260B	HCl – Cool to 4°C	AMRO Environmental
	Water	Volatiles	Rinsate	1	EPA 8260B	HCl – Cool to 4°C	AMRO Environmental
	Water	Volatiles	Source water	1	EPA 8260B	HCl – Cool to 4°C	AMRO Environmental
	Water	Volatiles	Trip blank	1	EPA 8260B	HCl – Cool to 4°C	AMRO Environmental
Ash Landfill	Soil	Volatiles	Field	10	EPA 8260B	EPA 5035 – Cool to 4°C	Katahdin Analytical
	Soil	Volatiles	Duplicate	1	EPA 8260B	EPA 5035 – Cool to 4°C	Katahdin Analytical
	Soil	Volatiles	Matrix spike	1	EPA 8260B	EPA 5035 – Cool to 4°C	Katahdin Analytical
	Soil	Volatiles	Matrix spike duplicate	1	EPA 8260B	EPA 5035 – Cool to 4°C	Katahdin Analytical
	Water	Volatiles	Rinsate	1	EPA 8260B	EPA 5035 – Cool to 4°C	Katahdin Analytical
	Water	Volatiles	Source water	1	EPA 8260B	EPA 5035 – Cool to 4°C	Katahdin Analytical
	Water	Volatiles	Trip blank	1	EPA 8260B	EPA 5035 – Cool to 4°C	Katahdin Analytical
	Soil	Semivolatiles	Field	10	EPA 8270B	Cool to 4°C	Katahdin Analytical
	Soil	Semivolatiles	Duplicate	1	EPA 8270B	Cool to 4°C	Katahdin Analytical
	Soil	Semivolatiles	Matrix spike	1	EPA 8270B	Cool to 4°C	Katahdin Analytical
	Soil	Semivolatiles	Matrix spike duplicate	1	EPA 8270B	Cool to 4°C	Katahdin Analytical
	Water	Semivolatiles	Rinsate	1	EPA 8270B	Cool to 4°C	Katahdin Analytical
	Water	Semivolatiles	Source water	1	EPA 8270B	Cool to 4°C	Katahdin Analytical
	Water	Semivolatiles	Trip blank	1	EPA 8270B	Cool to 4°C	Katahdin Analytical
	Soil	TAL metals	Field	10	EPA 6010/7471	HNO_3 – Cool to 4°C	Katahdin Analytical
	Soil	TAL metals	Duplicate	1	EPA 6010/7471	HNO_3 – Cool to 4°C	Katahdin Analytical
	Soil	TAL metals	Matrix spike	1	EPA 6010/7471	HNO_3 – Cool to 4°C	Katahdin Analytical
	Soil	TAL metals	Matrix spike duplicate	1	EPA 6010/7471	HNO_3 – Cool to 4°C	Katahdin Analytical
	Water	TAL metals	Rinsate	1	EPA 6010/7471	HNO_3 – Cool to 4°C	Katahdin Analytical
	Water	TAL metals	Source water	1	EPA 6010/7471	HNO_3 – Cool to 4°C	Katahdin Analytical
	Water	TAL metals	Trip blank	1	EPA 6010/7471	HNO_3 – Cool to 4°C	Katahdin Analytical
	Soil	Dioxin	Field	2	EPA 8290 1613 Tetra-Octa	Cool to 4°C	Paradigm
	Soil	Dioxin	Duplicate	1	EPA 8290 1613 Tetra-Octa	Cool to 4°C	Paradigm

NOTE: EPA = U.S. Environmental Protection Agency.
HCl = Hydrochloric acid.
TAL = Target Analyte List.
HNO_3 = Nitric acid.

Appendix A

Responses to Regulator's Comments on the Draft Work Plan

RESPONSE TO COMMENTS FROM THE MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION FOR SITE 9 DRAFT WORK PLAN DIRECT-PUSH INVESTIGATION NAVAL AIR STATION, BRUNSWICK, MAINE

COMMENTOR: Claudia Sait **DATED**: 1 May 2003

The Maine Department of Environmental Protection (MEDEP) has reviewed the report entitled *Draft Direct-Push Investigation Work Plan for Site 9*, dated 11 April 2003, prepared by EA Engineering, Science, and Technology. Based on that review, MEDEP has the following comments and issues.

GENERAL COMMENTS

1. These comments reflect the status of the draft work plan after the April 24th Technical Meeting, at which the proposed locations of field investigations draft work plan were discussed and revised. The meeting participants visited the locations and staked drilling spots avoiding utilities however, this will be confirmed by Dig Safe.

   MEDEP is satisfied that the number and locations of direct pushes, as staked, addresses our concerns regarding the goal of identifying an upgradient source(s) of the vinyl chloride (and low levels of PCE and TCE) documented at Site 9. However, should any of the direct pushes find residual concentrations of these contaminants above MCLs/MEGs, additional subsurface investigations may be needed. (No response required.)

   Response—Comment noted.

2. The draft work plan proposed to install two pairs of piezometers near the retention ponds for the primary purpose of determining if upward gradients exist and that the shallow groundwater overlying the clay discharges to the pond. Apparently, the Navy believed that more definition of the groundwater flow path was needed, whereas the data gap is actually groundwater quality depth profiling at locations where monitoring wells do not exist. The current groundwater elevation data provide strong support that the shallow system at Site 9 is drawn toward and discharges into the retention ponds (particularly the lower pond). MEDEP continues to believe that the pre-pond flow path has migrated northward and now discharges into the lower pond, and that a "wedge" of cross-flow occurs from the upper pond to the lower pond. Therefore, MW-NASB-072 cannot be expected to intercept groundwater containing vinyl chloride documented at upgradient MW-NASB-069, even though the downgradient well is screened deep (just above the clay). As stated by MEDEP at the April 24th Technical Meeting, the screen of MW-MASB-076 is probably too shallow to intercept the vinyl chloride plume even if that well is located within the plan-view flow path. (The bottom of the screen is 13 feet above the top of the clay.) The Navy agreed to perform a direct push approximately 50 feet northwest of MW-NASB-076 and another half way between MW-NASB-072 and MW-NASB-076, as staked on April 24, 2003. Groundwater samples are to be withdrawn at three elevations; the bottom sample will be immediately above the clay. If significant contamination is found, the need for additional long-term monitoring wells must be addressed. (No response required.)

Response—Comment noted.

SPECIFIC COMMENTS

3. ***Section 2, Field Activities, Page 3***—The specific location of each boring well be identified and marked in the field and will be arranged to best assess the detection of 1,2-dichloroethene in groundwater at MW-NASB-227.

   While 1,2-dichloroethene is an important contaminant compound at Site 9, its concentrations have not yet exceeded state or federal drinking water standards. However, the most significant contaminant is vinyl chloride as the regulatory standards have been exceeded by several order of magnitude. This statement should not single out any one contaminant at Site 9. Please revise as follows: "The specific location of each boring well be identified and marked in the field and will be arranged to best assess the detection of vinyl chloride and its parent compounds in groundwater at MW-NASB-227." (ED)

   Response—Comment noted; however, the majority of the direct-push borings are being advanced to investigate the detection of 1,2-dichloroethene at MW-NASB-227. Some of the direct-push boring locations may have vinyl chloride, but it has not been detected at MW-NASB-227.

   The 2nd sentence has been revised as follows:

   > *The specific location of each boring will be identified and marked in the field and will be arranged to best assess the detection of <u>VOCs</u> in groundwater in the vicinity of MW-NASB-227 and <u>at locations upgradient, crossgradient, and downgradient from well MW-NASB-227</u>.*

4. ***Section 2.1, Soil Boring Program, Page 4***—MEDEP agrees with the soil data collection procedure outlined in this section. (NR)

   Response—Comment noted.

5. ***Section 2.2, Direct-Push Ground-Water Sampling, Page 5, 3rd Paragraph***—Two of 3 ground-water samples will be collected from each boring and analyzed for VOCs by EPA Method 8260B.

   Is this a correct statement? If so, MEDEP questions the rationale behind not analyzing all three samples collected. Explain why samples will be collected, and then not analyzed. If the Navy is not willing to analyze all samples collected, the specific criteria that will be used to discard the sample from one depth interval must be detailed. (ED)

   Response—This text and other related Work Plan text have been revised to state that three groundwater samples will be collected from each direct-push soil boring location (identified as Borings 1 through 9 in Figure 2).

The revised text is as follows:

> ~~*Two of 3*~~ *Three groundwater samples will be collected from each boring and analyzed for VOCs by EPA Method 8260B.*

6. ***Section 2.2, Direct-Push Ground-Water Sampling, Page 5, 4th Paragraph***—Because vinyl chloride is very volatile, MEDEP recommends that a bladder pump be used to extract the groundwater sample. Extreme care must be taken when using a peristaltic pump, and a waterra-type pump is not appropriate. Bladder pumps are available that will fit into a ¾ inch inside diameter tube, and perhaps even down to ½ inch in diameter. Feel free to call us to obtain more information. (ED)

   Response—Agreed. EA will use a bladder pump to extract groundwater from the direct-push groundwater sampler; however, in conversations regarding these small diameter bladder pumps, the vendors have stated that minor amounts of silt in the groundwater can foul the bladder pump return line. Therefore, we propose to use the bladder pump as the primary sampling device and the peristaltic pump as an alternative if the bladder pump is not successful. Sampling with the peristaltic pump would be conducted with extreme care as noted by MEDEP. If EA is unable to extract a sample with a peristaltic pump, then a mini bailer would be used as a last resort to obtain a groundwater sample from the direct-push point. The text of the Work Plan has been revised to reflect the order of preference for groundwater sampling from the direct-push point.

7. ***Sections 2.3, 2.4 and 2.5***—These sections need to be revised or eliminated now that the Navy and regulators agree that the installation of piezometers will not serve to collect the desired data. (ED)

   Response—Agreed. These sections have been revised to delete text concerning the installation of piezometers in the Work Plan for Site 9 as discussed during the 24 April 2003 Technical Meeting.

8. ***Figure 2, Proposed Soil Boring and Piezometer Locations***—Please update the proposed locations with those locations that were agreed on during the April 24, 2003 Technical Meeting and field trip. Also, delete "and Piezometers" from the figure title. (ED)

   Response—Agreed. Figure 2 has been revised.

RESPONSE TO COMMENTS FROM THE U.S. ENVIRONMENTAL PROTECTION AGENCY ON SITE 9 DRAFT WORK PLAN, NAVAL AIR STATION BRUNSWICK, BRUNSWICK, MAINE

COMMENTOR: Christine Williams **DATE:** 17 April 2003

1. ***Page 5, Section 2.2.***—Please include in the text an explanation of the timing of the boring vs the groundwater sampling activities. Also add to the text that the lithology of the boring will be logged and the log will be used to determine the groundwater sampling locations/depths.

   Response—At each boring location, two separate direct-push boring will be advanced. The first direct-push boring is for collecting soil samples and to identify lithology. After the first boring for soil sampling and lithology has been completed, the direct-push rig will advance a second direct-push boring located approximately 2-3 ft from the first boring to allow for collection of undisturbed groundwater samples. Lithology will be recorded by the field geologist as noted in Section 2.1, Page 4 on a boring log for the boring advanced for soil sampling purposes.

2. ***Page 5, Section 2.2.***—Why doesn't the site warrant all 3 groundwater samples being sent to the lab? If there has been a relatively recent release the upper layers are the most likely to be contaminated, depending on the distance from the release. If the release was relatively old, the mid and deep samples are the more likely areas to be contaminated. Since this is a screening type of investigation very low levels of contaminates are not likely to be detected, especially using peristaltic pumps, it therefore, stands to reason that all three layers should be investigated with laboratory analysis.

   Response—Three groundwater samples will be collected from each of the 9 boring locations and submitted for laboratory analysis. The text of the Work Plan has been revised to reflect this response.

3. ***Page 5, Section 2.2.***—Please include a table that lists all the planned samples (including QA samples) and associated analysis. Once received, EPA will evaluate the methodology proposed and provide comments.

   Response—Table 1 has been generated and included in the Work Plan as requested.

4. ***Page 5, Section 2.2.***—Will the PID SOP for determining the groundwater sampling locations be the same as the one described in section 3.1?

   Response—No. There are no groundwater samples being collected from the borings being advanced to determine the extent of the ash landfill. EA will screen (macro core sampler sleeve and headspace method) the soils collected from these borings (ash landfill borings around Barrack Buildings 218 and 219) with a photoionization detector and record that information on the boring log and/or field log book. EA will follow the field photoionization detector screening procedures presented in Section 2.1, Page 4, second paragraph, bullets 1 through 3 for the ash landfill borings.

5. ***Page 9, Section 2.5.***—Why are peristaltic pumps being used at the piezometers? Peristaltic pumps are known for losing volatiles. Since one of the COCs here is vinyl chloride, care should be taken to use less mechanical pumping action. Include field calibration SOPs are requested in previous comment letters.

   Response—Piezometers are no longer part of this investigation as discussed during the 24 April 2003 Technical Meeting; however, these locations will be incorporated into the soil and groundwater sampling program for the other seven borings being completed at Site 9. The text of the Work Plan has been revised to remove all text concerning installation of piezometers.

6. ***Page 11, Section 2.7.***—Why is methanol being used? Methanol may require deconfluids to be handled as hazardous waste whereas, isopropanol may not.

   Response—Agreed. EA will use isopropanol rather than methanol for decontamination. The Work Plan text has been revised accordingly.

7. ***Page 17, Section 3.4***—Is the drum staging area secure? Please ensure all IDW is removed from the site within 90 days of determining if the material is hazardous waste.

   Response—Yes. There is limited access to the site since access to the base is restricted to authorized personnel. In addition, the drums of investigation-derived waste will be staged in an area that can be observed (and patrolled) by military police. EA will notify the IR Program Manager that drums have been generated due to execution of site investigation tasks, and he will allow for access by a licensed waste transporter for removal of the drums. Also, EA will ask that the IR Program Manager notify the appropriate chain of command that the Navy's consultant will be conducting investigation activities at Site 9 that will require investigation-derived waste to be containerized and temporarily secured at the site until transport and disposal can be arranged. Each night prior to leaving the site, the site manager will check that the drum lids are secure (bolt tighten). The drums will be removed from the site within 90 days from date of generation.

8. Please provide at lease a 2 business day notice of when field work will occur and provide a specific task schedule for oversight purposes.

   Response—Agreed. The upcoming schedule was discussed during the 16 April 2003 conference call. The direct-push investigation of the ash landfill will occur on 27-29 May 2003, and the remaining Site 9 direct-push borings will be completed from 30 May through 6 June 2003, except for Sunday, 1 June 2003.

Appendix B

Field Forms

EA® EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING

Site Name: ____________	Project Number: ____________
Well ID: ____________	Well Lock Status: ____________
Well Condition: ____________	Weather: ____________

Gauge Date: ____________	Gauge Time: ____________
Sounding Method: ____________	Measurement Ref: ____________
Stick Up/Down (ft): ____________	Well Diameter (in.): ____________

Purge Date: ____________	Purge Time: ____________
Purge Method: ____________	Field Personnel: ____________
Ambient Air VOCs (ppm): ____________	Well Mouth VOCs (ppm): ____________

WELL VOLUME

A. Well Depth (ft): ____________	D. Well Volume/ft (L): ____________
B. Depth to Water (ft): ____________	E. Well Volume (L) (C*D): ____________
C. Liquid Depth (ft) (A-B) ____________	F. Three Well Volumes (L) (E*3): ____________

G. Measurable LNAPL? Yes ________ /ft No ________

Parameter	Beginning	1	2	3	4	5
Time (min.)						
Depth to Water (ft)						
Purge Rate (L/min)						
Volume Purged (L)						
pH						
Temperature (°C)						
Conductivity (µmhos/cm)						
Dissolved Oxygen (mg/L)						
Turbidity (NTU)						
eH (mV)						

Total Quantity of Water Removed (L): ____________

Samplers: ____________	Sampling Time (Start/End): ____________
Sampling Date: ____________	Decontamination Fluids Used: ____________
Sample Type: ____________	Sample Preservatives: ____________

Sample Bottle IDs: ____________

Sample Parameters: ____________

EA Engineering, Science, and Technology

FIELD RECORD OF WELL GAUGING, PURGING, AND SAMPLING (OVERFLOW PAGE)

Site Name:	Project Number:	Date:
Well ID:	Field Personnel:	

Parameter	6	7	8	9	10	11
Time (min.)						
Depth to Water (ft)						
Purge Rate (L/min)						
Volume Purged (L)						
pH						
Temperature (EC)						
Conductivity (µmhos/cm)						
Dissolved Oxygen (mg/L)						
Turbidity (NTU)						
eH (mV)						

Parameter	12	13	14	15	16	17
Time (min.)						
Depth to Water (ft)						
Purge Rate (L/min)						
Volume Purged (L)						
pH						
Temperature (EC)						
Conductivity (µmhos/cm)						
Dissolved Oxygen (mg/L)						
Turbidity (NTU)						
eH (mV)						

Comments and Observations:

EA Engineering, Science, and Technology

FIELD RECORD OF WELL DEVELOPMENT

Project Name:	Project No:	Date:
EA Personnel:	Development Method:	
Weather/Temperature/Barometric Pressure:		Time:

Well No.:	Well Condition:
Well Diameter:	Measurement Reference:
Well Volume Calculations	
A. Depth To Water (ft):	D. Well Volume/ft:
B. Total Well Depth (ft):	E. Total Well Volume (gal)[C*D]:
C. Water Column Height (ft):	F. Five Well Volumes (gal):

Parameter	Beginning	1 Volume	2 Volumes	3 Volumes	4 Volumes	5 Volumes
Time (min)						
Turbidity (nTu)						
Purge Rate (gpm)						
Volume Purged (gal)						
pH						
Temperature (EF)						
Conductivity (µmhos/cm)						
eH (mV)						
Parameter	**6 Volumes**	**7 Volumes**	**8 Volumes**	**9 Volumes**	**10 Volumes**	**End**
Time (min)						
Turbidity (nTu)						
Purge Rate (gpm)						
Volume Purged (gal)						
PH						
Temperature (EF)						
Conductivity (µmhos/cm)						
eV (mV)						

COMMENTS AND OBSERVATIONS:____

EA Engineering, Science, and Technology	Job. No.	Client	Location
LOG OF SOIL BORING	Drilling Method:		Boring No.
Coordinates:	Sampling Method:		Sheet of
Surface Elevation:			Drilling
Casing Below Surface:	Water Lev.		Start / Finish
Reference Elevation:	Time		
Reference Description:	Date		
	Reference		

Sample Type	Inches Drvn/In. Recvrd	Dpth. Csg.	Samp. # /samp. depth	PID (ppm) HNu	Blows per 6 in.	Depth in Feet		USCS Log	Surface Conditions:
						0			
						1			
						2			
						3			
						4			
						5			
						6			
						7			
						8			
						9			
						10			
						11			
						12			
						13			
						14			
						15			
						16			
						17			
						18			
						19			
						20			SS = Split barrel sample.

Logged by: ____________________ Date: ____________

Drilling Contractor: ____________________ Driller: ____________

WELL SPECIFICATIONS:

Diam. of casing: ________ Screen Interval: ____________ Sandpack: ____________ Grout: ____________

BOH: ________ Riser Interval: ____________ Bentonite: ____________ Cover: ____________