

**FINAL
DIRECT-PUSH
WORK PLAN FOR SITE 9 ASH DELINEATION AND
INVESTIGATIONS AT BUILDING 201 AREA OF CONCERN
AND IRRIGATED PLAYING FIELDS, NAVAL AIR STATION
BRUNSWICK, MAINE**



Prepared for

**Department of the Navy
Naval Facilities Engineering Command
BRAC Program Management Office - Northeast
4911 South Broad Street
Philadelphia, Pennsylvania 19112-1303**

**Contract No. N62472-02-D-0810
Contract Task Order No. 017**

Prepared by

**ECC
33 Boston Post Road West
Suite 340
Marlborough, MA 01752**



May 2007

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May 2007

Alexander Easterday, PG
Senior Project Manager

Date

Gina Calderone, PG, CPG
Project Manager/Senior Hydrogeologist

Date

1. INTRODUCTION

Under Contract No. N62472-02-D-0810, Naval Facilities Engineering Command issued Contract Task Order No. 0017 Modification 06 to ECC to conduct direct-push investigations at the following three areas located within Naval Air Station (NAS), Brunswick: (1) Site 9 Ash Delineation, (2) Building 201 Area of Concern (AOC), and (3) the Irrigated Playing Fields. The locations of these three areas are shown in Figure 1. This Work Plan details the rationale and overall approach of the field activities that will be conducted as part of these investigations.

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. NAS Brunswick is located south of the Androscoggen River between Brunswick and Bath, Maine, as shown on Figure 1. In 2005, NAS Brunswick was included in the Department of Defense (DoD) Base Re-Alignment and Closure (BRAC) list of facilities to be closed, however the base will continue to operate until 2011.

This Work Plan provides a detailed discussion of field activities specific to three areas of investigation, as noted in Section 2 for Site 9 Ash Delineation; Section 3 for Building 201 AOC; and Section 4 for the Irrigated Playing Fields. Site Plans showing the three investigation areas are provided as Figure 2 and 3. Field procedures are detailed in Section 5. Section 6 provides for a summary report detailing the results the field tasks completed and the findings of these investigations. Response to the regulator comments will be provided in Appendix A. Field forms to be used for recording field information during the investigations described in this Work Plan are provided in Appendix B. Standard Operating Procedures for specific tasks to be conducted during these investigations are provided in Appendix C.

Once the investigations activities are completed at the three investigation areas, ECC will prepare a letter summary report of the findings and conclusions of these investigations. MEDEP, EPA, and the Brunswick Area Citizens for a Safe Environment (BACSE) will be notified a minimum of 14 days prior to the start of field activities.

2. FIELD ACTIVITIES FOR SITE 9 ASH DELINEATION

This section provides a summary of the field activities that will be conducted as part of the investigation at Site 9 to identify the southern extent of the ash landfill/dump material. A total of 10 direct-push soil borings will be advanced to confirm the absence or presence of the ash layer in the subsurface south of Avenue C/Neptune Drive. If the presence of ash is confirmed, up to 20 additional direct-push borings will be advanced in this area to delineate the vertical and horizontal extent of ash contamination.

2.1 SAMPLING RATIONALE

The initial 10 direct-push boring locations being considered for the advancement are located along both the north side and south side of Avenue C/Neptune Drive opposite a removal action currently being conducted at Site 9 on the northern side of Avenue C/Neptune Drive. Ash was evident at approximately 12 ft. to 13 ft. below ground surface (bgs) in the excavated area. Excavating activities were halted due the close proximity of Avenue C/Neptune Drive to the southern edge of the current excavation area. It is assumed that the ash layer extends under Avenue C/Neptune Drive in a southerly direction. Sampling along both sides of Avenue C/Neptune Drive will confirm if the ash layer extends under Avenue C/Neptune Drive. If ash is present in this area, up to 20 additional direct-push soil borings will be advanced to delineate the vertical and horizontal extent of the ash material.

2.2 GOALS AND OBJECTIVES

The goal of this investigation is to confirm the absence or presence of subsurface ash along the southern side of Avenue C/Neptune Drive. Specific objectives of the investigation include the following:

- Site 9 Ash Delineation – To define the vertical and horizontal extent of the ash landfill along the northern side of Avenue C/Neptune Drive and in the area south of Avenue C/Neptune Drive. The subsurface investigation results will be used to delineate the remainder of the ash deposit.

The following field activities will be completed as part of the investigation for the Site 9 Ash Delineation.

2.3 FIELD ACTIVITIES

A total of 10 direct-push soil borings will be advanced in the area north and south of Avenue C/Neptune Drive opposite the area of soil excavation currently being conducted along the north side of Avenue C/Neptune Drive. If evidence of ash is confirmed, up to 20 additional direct-push borings will be advanced to delineate the vertical and horizontal extent of the ash layer. All

borings are expected to be advanced to a depth of approximately 15 ft to 25 ft bgs. The borings will be advanced to confirm the depth and thickness of the ash layer or until the top of the clay layer is encountered. The soil borings will not be advanced past the top of the clay layer beneath the Site. The proposed direct-push boring locations for the Site 9 Ash Delineation are shown on Figure 4.

2.4 DIRECT-PUSH BORINGS AND SOIL SAMPLING

Direct-push soil boring and soil sampling activities to be conducted during the ash delineation are presented below.

- Direct-push borings will be advanced using a track or truck-mounted, hydraulic-operated direct-push drill rig. Soil samples will be collected using a Macro-Core[®] (2-in. diameter, 4-ft length) sampler and internal dedicated acetate sleeves. Dedicated acetate liners will be used during sample collection activities to ensure adequate sample recovery and to assist with the removal of soil samples from the Macro-Core[®] sampler. Acetate liners will be replaced following the collection of each soil sample.
- Following retrieval of the sampler, the acetate liner will be removed and cut length-wise. The soil samples will be visually inspected and recorded by the ECC Field Geologist. As part of the soil description, each Macro-Core[®] sampler will be screened for VOCs using a MiniRAE[®] photoionization detector (PID) via headspace analysis. The PID measures the organic vapors (in parts per million [ppm]) with an ionization potential less than 10.6 electron volts (eV). The concentrations in the soil samples detected using the PID will be recorded along with the depth at which the sample was collected. The PID will be calibrated at the beginning of each work day in accordance the manufactures specifications and recorded in the Instrument Calibration Log located in Appendix B.
- The ECC Field Geologist, under the supervision of a ECC licensed Maine Certified Geologist, will then log the soil characteristics of each sample on the Log of Soil Boring field form (provided in Appendix B) in accordance the American Society for Testing and Materials Method D 2488-93.
- Based upon physical observations (evidence of ash or waste material, visual and olfactory observations) and results of the headspace analysis, up to 5 soil samples will be collected which best represent subsurface soil conditions within the area of investigation. The samples will be submitted under chain-of-custody protocol to an off-site laboratory for Target Analyte List (TAL) metals (EPA Method 6010B), Semi-Volatile Organic Compounds (SVOCs [EPA Method 8270C]), and VOCs (EPA Method 5035/8260B). The chain-of-custody forms for the laboratory samples collected are provided in Appendix B. Sampling and analysis will be conducted in accordance with the current Basewide Quality Assurance Project Plan (QAPP) for Long Term

Monitoring Program, NAS Brunswick. Where applicable, sampling and analysis will also be conducted in accordance with an addendum to the QAPP which will be developed and submitted under separate cover to MEDEP, EPA, and BACSE for review and approval. This addendum will be specific to Site 9 soils and will be submitted and approved prior to the start of field activities.

- Following completion of each soil boring, the borehole will be backfilled with native material. If evidence of ash is present, the borehole will be backfilled with benonite pellets. Any residual sample material containing ash will be containerized in Department of Transportation (DOT) 55-gallon drums complete with sealable cover and handled as investigative derived waste (IDW) in accordance with Section 5.5 of this work plan.
- If evidence of ash or waste material is observed, approximate (+ or – 6 inches) ground surface elevations in the area of the borings will be obtained by field personnel using monitoring wells with known elevations as benchmarks. This information will be used to aid in determining the possible volume of ash/waste material.
- All soil borings will be staked and labeled following completion. All boring locations will be surveyed for horizontal location by a State of Maine Registered Land Surveyor using NAD 1983 UTM Zone 19N datum.

3. FIELD ACTIVITIES AT BUILDING 201 AREA OF CONCERN

This section provides a summary of the field activities that will be conducted as part of the investigation at Building 201 AOC. A total of 6 direct-push soil borings will be installed adjacent to Building 201 and monitoring well MW-NASB-075. In addition, a total of 12 pore water samples will be collected along the north bank of the Upper Impoundment Pond. The proposed direct-push boring locations and pore water sampling locations associated with investigation at the Building 201 AOC are shown on Figure 5.

3.1 GOALS AND OBJECTIVES

The goal of this investigation is to determine if a possible release of Diesel Range Organics (DRO) and or VOCs occurred in the vicinity of Building 201 which may be contributing to the conditions (stressed vegetation, sheen on surface water) identified within the Upper Impoundment Pond of Site 9. Specific objectives of the investigation include the following:

- Building 201 Area of Concern – The soil and groundwater sampling will confirm or deny the presence of DRO and VOC compounds in the subsurface adjacent to Building 201 and monitoring well MW-075. Pore water samples will be collected along the northern banks of the Upper Impoundment Pond to determine whether DRO and VOC compounds are present.

3.2 FIELD ACTIVITIES

A total of 6 direct-push borings will be advanced in the area adjacent to Building 201 and monitoring well MW-NASB-075 in order to retrieve representative soil and groundwater samples for analysis of DRO using the State of Maine Modified Method for Determining Diesel Range Organics Method 4.1.25 and VOCs by EPA Method 5035/8260B. The results of this investigation will be compared to the State of Maine Procedural Guidelines for Establishing Action Levels for the Remediation of Contaminated Soil and Groundwater in Maine (Maine Department of Environmental Protection [MEDEP] March 2000). The proposed soil boring and groundwater sampling locations are shown on Figure 5. In addition to the soil and groundwater sampling, 12 pore water samples will be collected along the northern banks of the Upper Impoundment Pond in order to determine the presence of petroleum hydrocarbon impacts as a result of past activities conducted at Site 9. The pore water sampling locations are also shown on Figure 5.

The following field activities will be completed as part of the investigation for the Building 201 AOC:

- Direct-push borings and soil sampling
- Direct-push groundwater sampling
- Pore water sampling of Upper Impoundment Pond

3.3 DIRECT-PUSH BORINGS AND SOIL SAMPLING

Six direct-push borings will be advanced using a track or truck-mounted, hydraulic-operated direct-push drill rig. Soil samples will be collected using a Macro-Core[®] (2-in. diameter, 4-ft length) sampler and internal dedicated acetate sleeves. Dedicated acetate liners will be used during sample collection activities to ensure adequate sample recovery and to assist with the removal of soil samples from the Macro-Core[®] sampler. Acetate liners will be replaced following the collection of each soil sample.

- Following retrieval of the sampler, the acetate liner will be removed and cut length-wise. The soil samples will be visually inspected and recorded by the ECC Field Geologist. As part of the soil description, each Macro-Core[®] sampler will be screened for VOCs using a MiniRAE[®] PID via headspace analysis. The PID measures the organic vapors (in parts per million [ppm]) with an ionization potential less than 10.6 electron volts. The concentrations in the soil samples detected using the PID will be recorded along with the depth at which the sample was collected. The PID will be calibrated at the beginning of each work day and recorded in the Instrument Calibration Log located in Appendix B.
- The ECC Field Geologist, under the supervision of a ECC licensed Maine Professional Geologist, will then log the soil characteristics of each sample along with any other pertinent information on the Log of Soil Boring field form (provided in Appendix A) in accordance with American Society for Testing and Materials Method D 2488-93.
- If physical evidence (visual and olfactory) and the results of headspace analysis indicate the presence of contamination, one sample will be collected from that interval which exhibits the highest concentration of contamination and submitted for laboratory analysis of DRO and VOCs. A laboratory sample will be collected only if there is evidence of contamination. If collected, the sample will be submitted to an off-site laboratory under chain of custody protocol for DRO analysis using the State of Maine Modified Method for Determining Diesel Range Organics Method 4.1.25 and VOCs by EPA Method 5035/8260B. The chain-of-custody forms for the laboratory samples collected are provided in Appendix B.

3.4 DIRECT-PUSH GROUNDWATER SAMPLING

One groundwater sample will be collected at the groundwater table at each of the 6 boring locations (Figure 5) using the methods described below:

- Ground-water sampling will be conducted at the Building 201 AOC using a truck-mounted hydraulic direct-push system. This method involves the use of a direct-push ground-water sampling probe which is “pushed” under hydraulic pressure to the

selected sample depth without boring a pilot hole. The sample probe is a 1.0- to 1.4-in. outside diameter (o.d.) steel probe with 4-ft slotted screen sections and an expendable point attached.

- The direct-push groundwater sampler will be decontaminated using the procedure outlined in Section 5.4 of this Work Plan. Teflon[®] sample tubing, with a stainless steel bottom check valve, will be inserted into the direct-push probe to collect each groundwater sample. This process will be repeated at each direct-push sampling location using dedicated sample tubing. All reusable sampling equipment (such as the stainless steel bottom check valve) will be decontaminated between each borehole. The details of direct-push groundwater sampling are outline in Chapter 5 of this Work Plan.
- Groundwater samples will be collected using a peristaltic pump set at the lowest possible flow rate while still able to draw groundwater from the temporary sampling point. Field parameters will be collected during sampling (see Section 5.2 of this work plan).
- Groundwater samples will be analyzed for DRO using the State of Maine Modified Method for Determining Diesel Range Organics Method 4.1.25 and VOCs by EPA Method 8260B. The samples will be submitted to an off-site laboratory under chain of custody protocol. The chain-of-custody forms for the laboratory samples collected are provided in Appendix B.
- Following groundwater sampling, the direct-push locations will be backfilled using bentonite pellets.
- The borings locations will be staked and labeled following completion. All boring locations will be surveyed for horizontal location by a Maine Registered Land Surveyor using NAD 1983 UTM Zone 19N datum.

3.5 PORE WATER SAMPLING OF UPPER IMPOUNDMENT POND

- ECC will use sub-meter Geographical Positioning System (GPS) to locate the proposed 12 sampling locations along the northern bank of the Upper Impoundment Pond. Small wooden stakes with flagging will be used to mark the positioning of the sample locations. Sample collection of the pore water will be conducted by ECC personnel using the Pore Water Sampling Protocol as prepared by MEDEP (Appendix C). Guidance documents referenced in Appendix C (SOPDR#12,SOPDR#13, SOPDR#14, SOPDR#16, SOPDR#17, and SOPDR#3014), will not be adopted during pore water sampling.
- Pore water samples will be collected from a minimum depth of at least 8 inches below the top of ground surface. The pore water sample device

consists of a steel drive point with a six inch long slotted screen at the end. A metal stopper plate attached to the drive point will prevent the probe from being installed further than the target depth of six inches. Pore water samples will be collected using a peristaltic pump and a length of Teflon-lined tubing inserted to the depth of the screen. The sample probe will be pushed by hand into the sediment to the target depth and the pump activated.

- Field parameters (DO, ORP, pH, temperature, turbidity and conductivity) will be measured and recorded. Purging will be complete when DO, turbidity, conductivity and pH have achieved stabilization goals for three consecutive readings:

DO and turbidity-10%
Conductivity-10%
pH-+/- 5 SU

- The pore water samples will be analyzed for DRO using the State of Maine Modified Method for Determining Diesel Range Organics Method 4.1.25, and VOCs per EPA Method 8260B. The samples will be submitted to an off-site laboratory under chain of custody protocol. The chain-of-custody forms for the laboratory samples collected are provided in Appendix B.

4. FIELD ACTIVITIES AT THE IRRIGATED PLAYING FIELD

This section provides a summary of the field activities that will be conducted as part of the investigation at the Irrigated Playing Field. A total of 4 direct-push groundwater samples will be collected to determine the potential impact of the irrigating the playing field with treated Groundwater Extraction Treatment System (GWETS) effluent. The Irrigated Playing Field is located within the Base boundary at the northeast corner of Orion Drive, and to the west of Building 50.

4.1 SAMPLING RATIONALE

The 4 proposed direct-push boring locations will be located within the perimeter of the playing field, with one location at approximately each corner of the field, as shown in Figure 6. Analysis of groundwater samples collected from these 4 locations will provide data representative of overall site groundwater conditions.

4.2 GOALS AND OBJECTIVES

As stated above, the goal of this investigation is to determine the potential impact (if any) of the (GWETS) effluents onto the Irrigated Playing Field. The objective of this investigation is to determine if the GWETS effluent discharge to the irrigation field may have impacted the groundwater beneath the Irrigated Playing Field. The groundwater beneath the Irrigated Playing Field is proposed to be sampled for 1,4- dioxane, as described in this Section.

4.3 FIELD ACTIVITIES

A total of 4 direct-push soil borings will be advanced to facilitate the collection of 4 groundwater samples from within the top of the water table, which is expected to be from 3 to 8 ft bgs in the Irrigated Playing Field (Figure 6). The field activities completed as part of the groundwater investigation at the Irrigated Playing Field will follow the soil boring and groundwater sampling activities as previously outlined in Section 3.3 and 3.4 of this Work Plan. Accordingly, the direct-push soil boring will be completed to a shallow depth (above 8 ft bgs) to visually characterize the soil. Once the completed soil boring is characterized and recorded, one groundwater sample will be collected and submitted to an off-site laboratory under chain of custody protocol for laboratory analyses of 1,4-dioxane using EPA Method EIASOP VOADIOX3. The chain-of-custody forms for the laboratory samples collected are provided in Appendix B.

5. FIELD METHODS

This section provides a summary of the general field methods which will be utilized during the investigations to be conducted during the Site 9 Ash Delineation and investigations at Building 201 AOC, and the Irrigated Playing Field.

5.1 SOIL BORING INSTALLATION

Soil borings will be advanced to collect additional data on site geology and to collect subsurface soil and groundwater samples for laboratory analysis. Prior to any subsurface investigations the NAS Brunswick Public Works Department will be contacted at least 2 weeks prior to start of work for appropriate digging permits. Additionally, DigSafe (1-800-DIG-SAFE) will be contacted to identify and mark public utility lines in the area of each site. Borings will be advanced to the desired depth using direct-push drilling methods. The total depth of each deep boring will be determined in the field by the ECC Field Geologist. No borings will be advanced past the top of the Presumpscot Clay unit, which may be encountered at each of the investigation areas.

The procedure for completion of soil borings and groundwater sampling is noted below:

- Direct-push borings will be advanced using a track or truck-mounted, hydraulic-operated direct-push drill rig. Soil samples will be collected using a Macro-Core[®] (2-in. diameter, 4-ft length) sampler and internal dedicated acetate sleeves. Dedicated acetate liners will be used during sample collection activities to ensure adequate sample recovery and to assist with the removal of soil samples from the Macro-Core[®] sampler. Acetate liners will be replaced following the collection of each soil sample.

5.2 SOIL, GROUNDWATER, AND PORE WATER SAMPLING

In addition to the field activities previously outlined in this Work Plan, specific sampling activities to be implemented for each investigation area are summarized below:

- All soil boring holes will be backfilled with bentonite pellets once the soil and/or groundwater samples are collected from that particular sampling location.
- Prior to the collection of groundwater samples, the field parameters will be recorded, including temperature, pH, Eh, turbidity, and dissolved oxygen. Samples for field parameters will be collected directly from the un-developed boring and this data will be noted on field log sheets. Note that these direct-push samples are anticipated to be highly turbid although this data will be collected and may be useful for limited assessment of groundwater conditions.

5.3 QUALITY ASSURANCE/QUALITY CONTROL SAMPLING

Quality assurance/quality control (QA/QC) procedures will include the collection of field and laboratory quality control samples. QA/QC samples associated with the direct-push investigation activities are summarized in this section. Sampling and analysis will be conducted in accordance with the current Basewide QAPP for Long Term Monitoring Program, NAS Brunswick. Where applicable, sampling and analysis will also be conducted in accordance with an addendum to the QAPP which will be developed and submitted under separate cover to MEDEP, EPA, and BACSE for review and approval. This addendum will be specific to Site 9 soils and will be submitted and approved prior to the start of field activities.

5.3.1 Field Quality Control Samples

The following subsections detail the collection and submission of Field Quality Control Samples.

5.3.1.1 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.

5.3.1.2 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 10 sample media.

5.3.1.3 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. Rinsate blank analysis will correspond exactly with the analysis to be performed at each specific site. For example, at Site 9, samples will be collected for VOCs, SVOCs and TAL metals, therefore any rinsate blank associated with sampling at Site 9 will be analyzed for VOCs, SVOCs, and TAL metals.

5.3.1.4 Source Water Blanks

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, SVOCs by EPA Method 8270C, 1,4-dioxane using EPA Method EIASOP VOADIOX3, DRO using the State of Maine Modified Method for Determining Diesel Range Organics Method 4.1.25, and Target Analyte List (TAL) metals (EPA Method 6010B).

5.4 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. Drilling rods 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 down hole equipment, 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. DOT-approved, 55-gal drums and transported to Building 50 (Wastewater Treatment Plant) for disposal and treatment.

5.5 MANAGEMENT OF INVESTIGATION-DERIVED WASTES

Waste materials generated during the field investigation may include:

- Soil cuttings
- Purge water
- Decontamination fluids
- Used personal protective equipment.

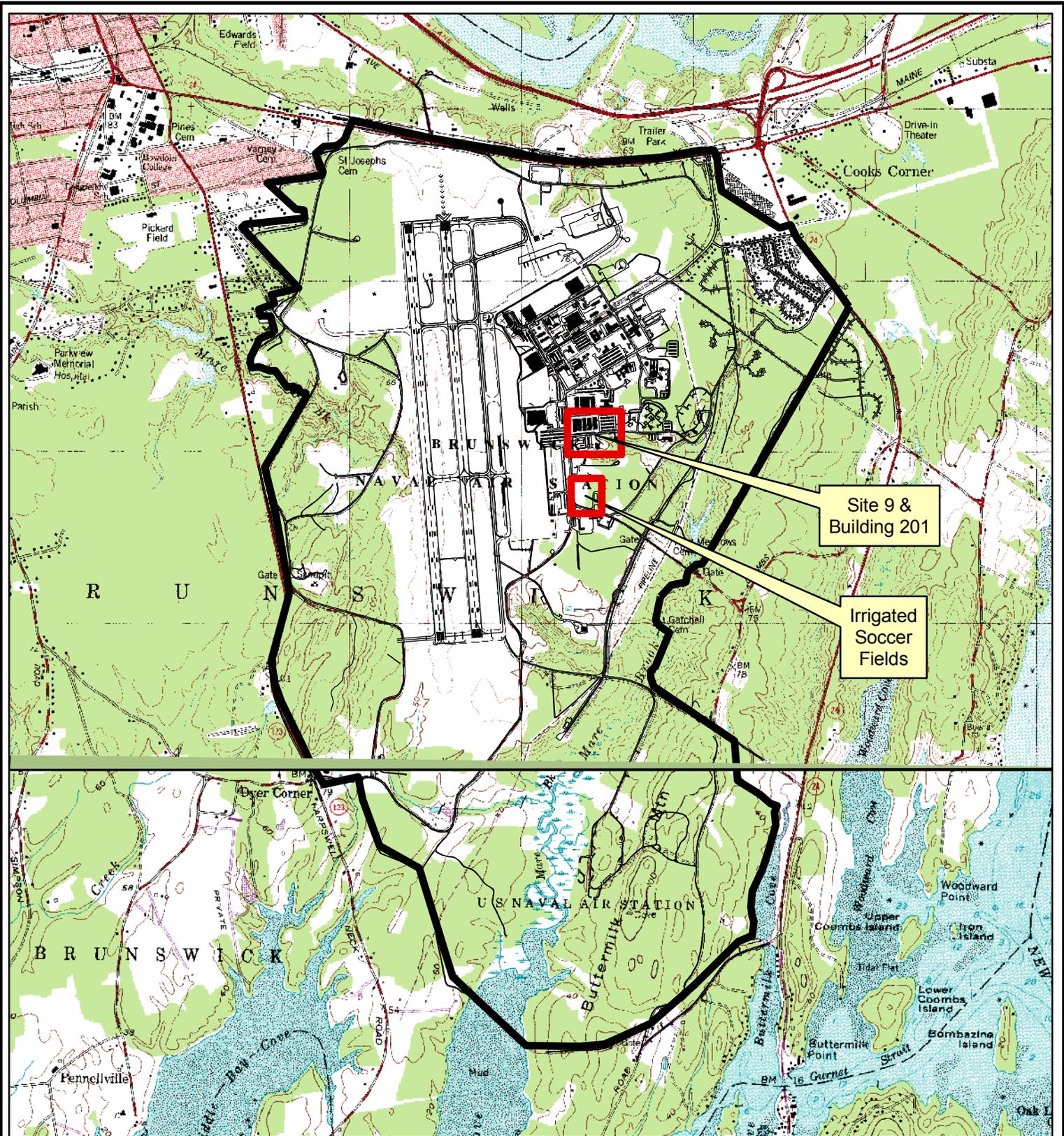
The generated wastes will be contained, labeled, and handled in the following manner:

- Soil cuttings are not anticipated to be generated from direct-push activities. However, if cuttings are generated, they will be handled in the following manner. Soil cuttings will be containerized in U.S. DOT-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, and comparison with the established screening levels for the contaminants of concern. 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.

6. REPORTING

Following completion of the field investigation activities at the three separate areas described in this Work Plan, ECC will prepare a Summary Report of the investigation results and conclusions, along with any recommendations for further investigative or remedial actions. Deviations from the approved Final Work Plan will also be included in the Summary Report.

LIST
OF FIGURES



Contract No.	N62472-02-D-0810			
Description	NASB Brunswick, ME			
Coordinate system	NAD 1983, UTM Zone 19N			
Sources	Naval Base Boundary provided by Navy.			

Date	Rev.	Date	App. By
11-JAN-2007			
DB	C. Guido		
CB	A. Easterday		
AB			

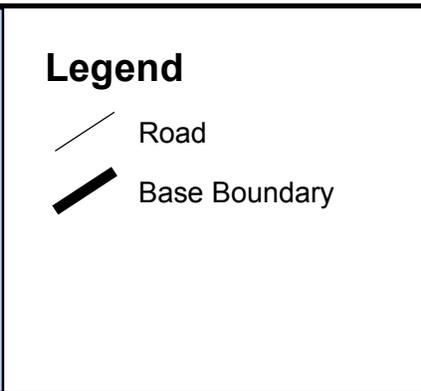


Figure 1

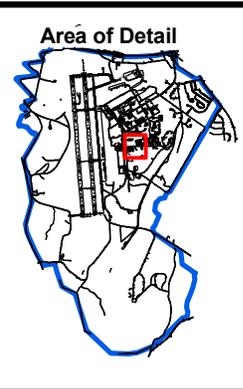
**Location Map
3 Investigation Areas
Naval Air Station
Brunswick, Maine**

ECC Marlborough, MA
C:\NAVY_GIS\TO07_Brunswick\GIS\data\Site_3AOC_LocMap.mxd

0 750 1,500 3,000 Feet



Contract No.	N62472-02-D-0810			
Description	NASB Brunswick, ME			
Coordinate system	NAD 1983, UTM Zone 19N			
Sources	Naval Base Boundary provided by Navy.			
Notes				
Date	29-DEC-2006	Rev.	Date	App. By
DB	C. Guido			
CB	A. Easterday			
AB				



Legend

- ⊗ Previous Cone Penetrometer Location
- ⊕ Existing Monitoring Well
- ▲ Existing Surface Water Location
- Existing Sediment/Leachate Location
- ▭ Building
- Road

Figure 2

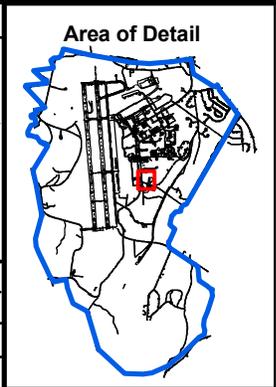
**Site Plan
Site 9/
Building 201
Naval Air Station
Brunswick, Maine**

ECC Marlborough, MA, C:\NAVY_GIS\TO07_Brunswick\Site9\MapDocuments\Site9_SitePlanFig2.mxd

0 35 70 140 Feet



Contract No.	N62472-02-D-0810			
Description	NASB Brunswick, ME			
Coordinate system	NAD 1983, UTM Zone 19N			
Sources	Naval Base Boundary provided by Navy.			
Notes				
Date	11-JAN-2007	Rev.	Date	App. By
DB	C. Guido			
CB	A. Easterday			
AB				



Legend

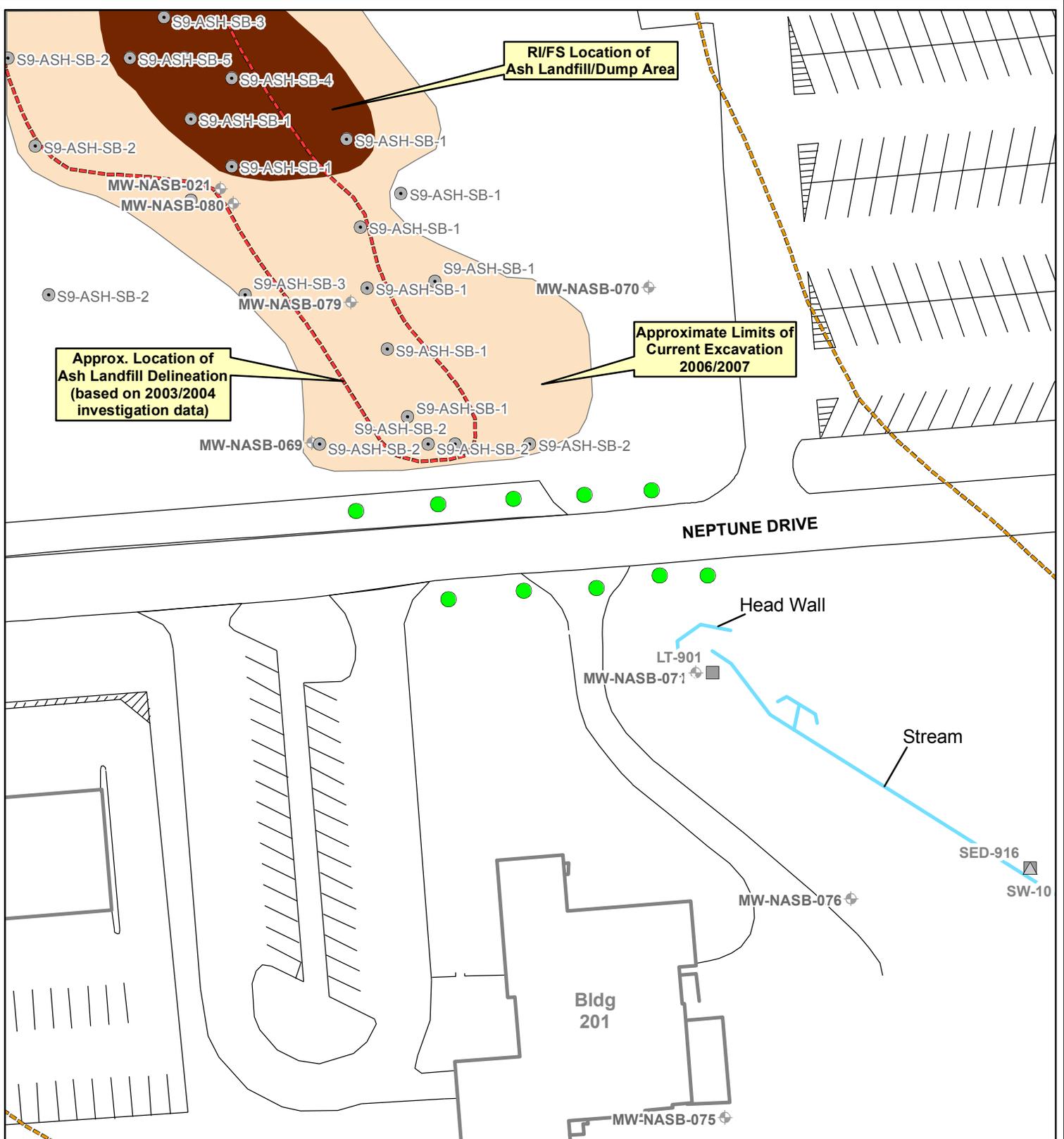
- Existing Monitoring Well
- Building
- Road

Figure 3

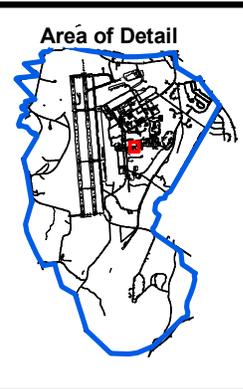
**Site Plan
Irrigated Playing Field
Naval Air Station
Brunswick, Maine**

ECC Marlborough, MA, C:\NAVY_GIS\TO07_Brunswick\Site9\MapDocuments\Site9_SitePlanFig3.mxd

0 25 50 100 Feet



Contract No.	N62472-02-D-0810			
Description	NASB Brunswick, ME			
Coordinate system	NAD 1983, UTM Zone 19N			
Sources	Naval Base Boundary provided by Navy.			
Notes				
Date	22-MAY-2007	Rev.	Date	App. By
DB	C. Guido			
CB	J. Donovan			
AB				



Legend

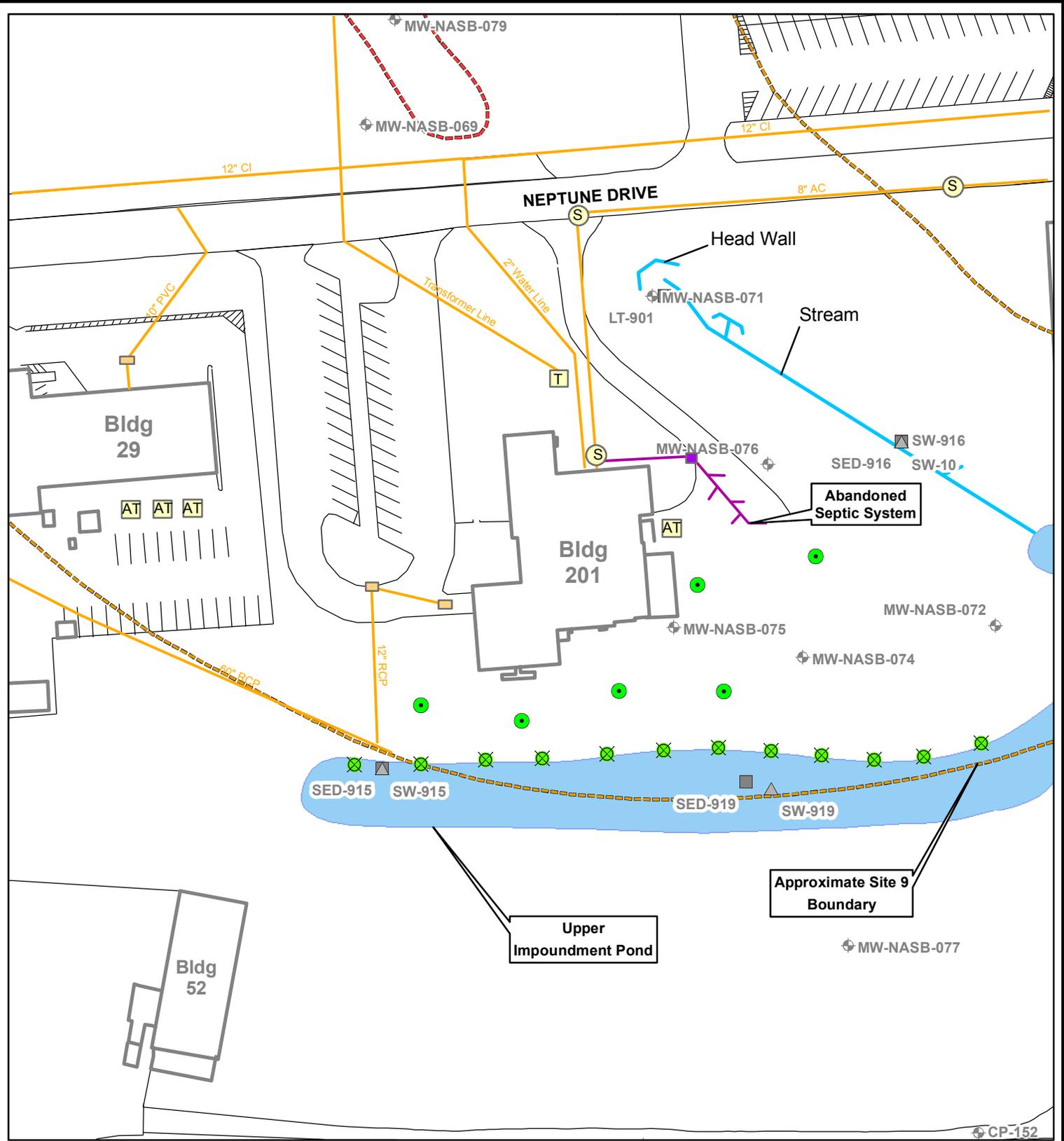
- Previous Direct Push Location
- Proposed Direct Push Location
- ⊕ Existing Monitoring Well
- ▲ Existing Surface Water Location
- Existing Sediment/Leachate Location
- ⊞ Approximate Site Boundary

Figure 4

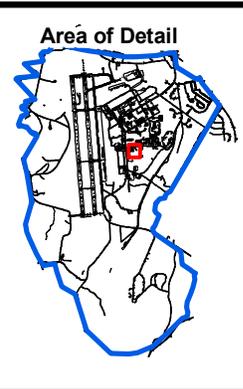
**Sample Locations
Site 9/
Neptune Drive
Disposal Site
Naval Air Station
Brunswick, Maine**

ECC Marlborough, MA, C:\NAVY_GIS\TC07_Brunswick\Site9\MapDocuments\Site9_SouthNeptuneDrive_r2.mxd

0 15 30 60 Feet



Contract No.	N62472-02-D-0810			
Description	NASB Brunswick, ME			
Coordinate system	NAD 1983, UTM Zone 19N			
Sources	Naval Base boundary and utilities provided by Navy. Abandoned septic system adapted from "Source Investigation Sampling and Analysis Plan Site 9", Figure 1-2 (ABB, January 1995)			
Date	22-MAY-2007	Rev.		App. By
DB	C. Guido			
CB	J. Donovan			
AB				



Legend

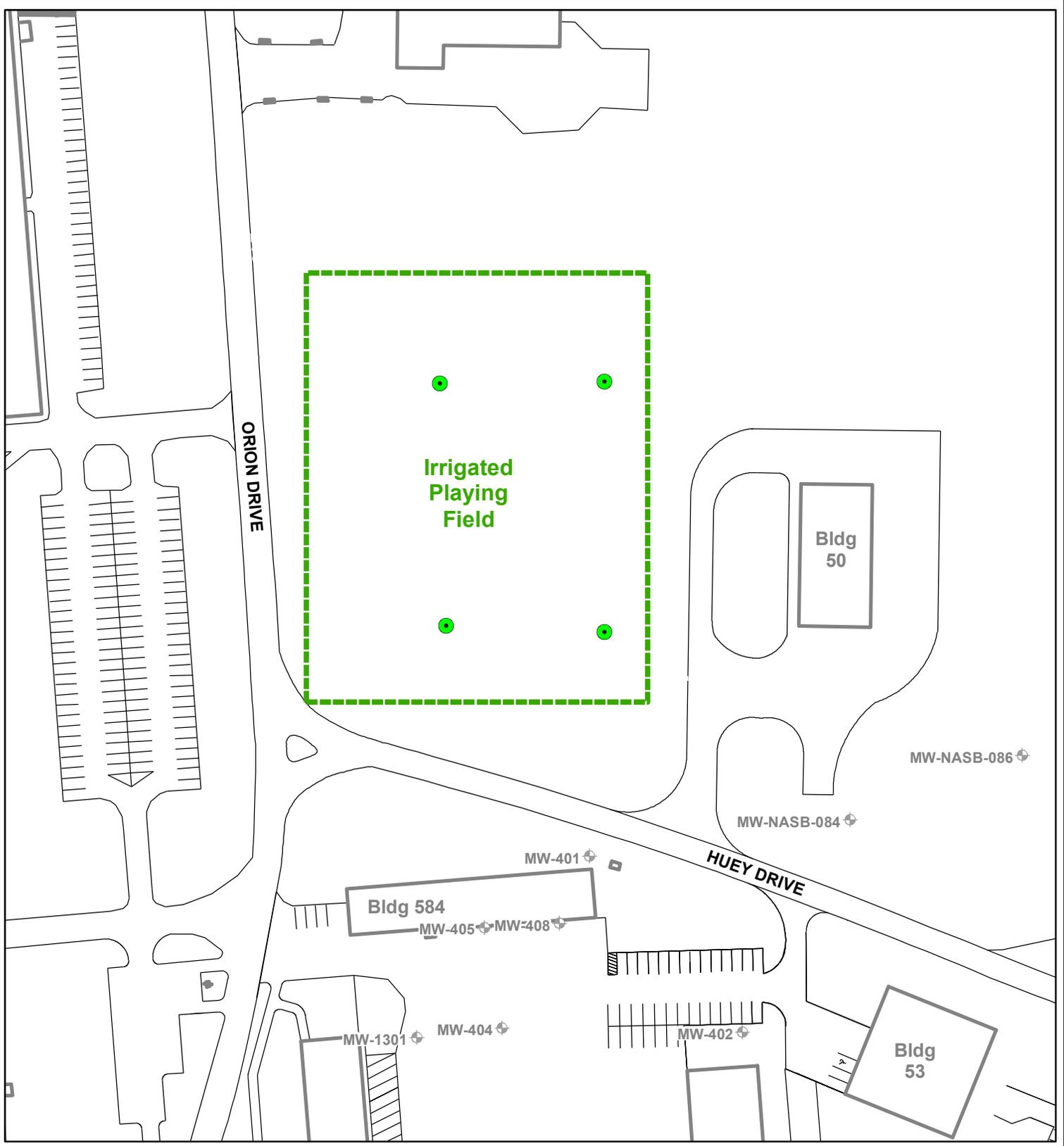
- Proposed Direct Push Location
- ⊗ Proposed Porewater Location
- ⊕ Existing Monitoring Well
- ▲ Existing Surface Water Location
- Existing Sediment/Leachate Location
- Abandoned Septic System
- Building 201 Area Pipes
- ⊞ Approximate Site 9 Boundary

Figure 5

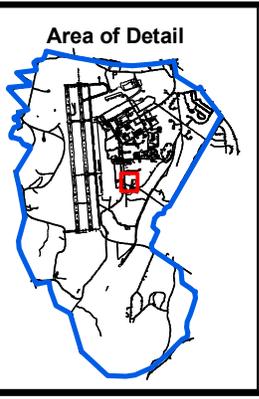
**Sample Locations
Building 201
Area of Concern
Naval Air Station
Brunswick, Maine**

ECC Marlborough, MA, C:\NAVY_GIS\T007_Brunswick\Site9\MapDocuments\Site9_SampLoc_Bld201.mxd

0 20 40 80 Feet



Contract No.	N62472-02-D-0810			
Description	NASB Brunswick, ME			
Coordinate system	NAD 1983, UTM Zone 19N			
Sources	Naval Base Boundary provided by Navy.			
Notes				
Date	23-MAY-2007	Rev.	Date	App. By
DB	C. Guido			
CB	J. Donovan			
AB				



Legend

- Proposed Direct Push Location
- ⊕ Existing Monitoring Well
- ▭ Building
- Road
- Approximate Area of Investigation

Figure 6

**Sample Locations
Irrigated Playing Field
Naval Air Station
Brunswick, Maine**

ECC Marlborough, MA, C:\NAVY_GIS\TC07_Brunswick\Site9\MapDocuments\Site9_SampLoc_SoccerField.mxd
 0 25 50 100 Feet

APPENDIX A

Response to Regulator Comment Letters and Follow-up Concurrence Letters

**Regulator
Comment Letters**

**RESPONSE TO COMMENTS FROM THE
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
DRAFT WORK PLAN FOR SITE 9, BUILDING 201 AOC, & IRRIGATED
PLAYING FIELDS
NAVAL AIR STATION BRUNSWICK, BRUNSWICK, MAINE**

Commenter: Christine A.P. Williams, RPM	
Comment Issue Date: 28 March 2007	Navy Response Date: 15 May 2007

Pursuant to Section VI of the Naval Air Station, Brunswick, Maine Federal Facility Agreement (Oct 1990), as amended, the United States Environmental Protection Agency (USEPA) has reviewed the draft “Direct-Push Work Plan for Site 9 Ash Delineation and Investigation at Building 201 Area of Concern and Irrigated Play Fields” , dated February 2007, prepared by Environmental Chemical Corporation. Based on that review USEPA has the following comments and issues.

GENERAL COMMENTS:

1. **p.1, sec. 1:** typo “Response the regulator comments” add “to” in the 4th sentence

Response: Agreed.

2. **p.2, sec. 2 & 2.1:** How will the “presence of ash” be determined? Visually or through chemical analysis?

Response: As stated in Section 2.4, fourth bullet, up to 5 soil samples which best represent subsurface soil conditions will be collected and submitted for analysis. The presence of ash will first be determined through visual observation followed by chemical analysis.

3. **p. 2, sec. 2.1:** The Work Plan indicates that 10 DP borings will be advanced in the neighborhood of Neptune Drive to attempt to delineate the extent of the ash layer that was still present when excavation was halted at its southern extreme. Up to 20 additional DP borings are allocated in the event that the ash is detected, but not bounded, by the initial 10 holes. It is noted that Figure 4 shows 15 boring locations. It is not clear if this is only intended to be “schematic” (i.e., showing only the general concept) or “exact.” If the latter, it is not clear which ten of the locations shown are intended as initial targets. Also, please elaborate on the process envisioned for continuing with (and locating) additional borings after the initial ten. Is the intent to continue with up to 30 borings in a single mobilization, or will there be an interim step of reporting results from the initial 10 borings? Will regulators have an opportunity to discuss the locations of the additional borings, if such are indicated?

Response: Figure 4 will be revised to show 5 boring locations on the north side of Neptune Drive (as currently shown between the current excavation and Neptune Drive), and 5 locations on the south side of Neptune Drive, opposite the borings on the north side of Neptune Drive. These locations may be adjusted in the field based on results from the first few borings. If results from the initial 10 borings indicate the presence of ash, it is intended to continue with the investigation without having to re-mob. The regulators will be advised of the results from the initial borings, and will be given the opportunity to comment promptly on the additional borings.

4. **p. 3, sec. 2.4, fourth bullet:** The Work Plan indicates that soil samples, if collected, will be analyzed for SVOCs and TAL metals by TCLP. Because site groundwater in this area (e.g., at MW-NASB-069) has shown detections of chlorinated solvents (cis-1,2-DCE, VC), and their origin is somewhat ambiguous, it is recommended that soil samples be analyzed for VOCs, as well. This may provide further insight into the nature of the CVOCs in site groundwater (e.g., are they associated with the fill?).

Response: Agreed. Also, in response to MEDEP Comment No. 10 b, samples will be submitted under chain-of-custody protocol to an off-site laboratory for analysis for TAL Metals (EPA Method 6010B), Semi-Volatile Organic Compounds (SVOCs) (EPA Method 8270C), and VOCs (EPA Method 5035/8260B)."

5. **p. 3, sec. 2.4, fourth bullet:** please reference the QAPP that will be used

Response: The existing Basewide QAPP will be referenced where applicable. In the event that the existing QAPP does not support one or more of the investigative methods, an addendum will be developed and added to the existing QAPP. A QAPP Addendum specific to the Site 9 soil sampling as specified in the Draft Site 9 Direct-Push Work Plan will be issued separately for Regulator review, comment and approval prior to commencing the Site 9 field activities.

6. **Figure 4:** please include the outline of the current excavation.

Response: Agreed. Figure 4 will be revised in accordance with this comment and included in the Final Report.

7. **p. 5, sec. 3.2:** *typo:* Please note that the reader is referred to Figure 4 rather than to Figure 5 for the direct-push boring locations.

Response: Agreed. Text will be revised in accordance with this comment.

8. **p. 5, sec. 3.2 and Fig. 5:** Please provide the rationale for the proposed boring locations. It would appear that the working hypothesis is that the fuel compounds detected in groundwater and in the pond may have been released somewhere in close proximity to

the south side of Building 201. In that event, one or more of the six borings distributed in that area are likely to detect hydrocarbons in soil and/or groundwater. However, if the release was off another side of the building, or farther from the building, these locations may be too closely clustered to detect anything. In particular, if DROs were detected in groundwater at MW-NASB-076, it seems possible that the release was hydraulically upgradient of this point, and there is no boring coverage that is clearly upgradient. Most of the proposed borings are cross-gradient to the west of MW-NASB-076. Based on whatever constraints are available (e.g., DRO detections at MW-NASB-076 and detections in pond pore water, sheen on surface water, stressed vegetation, etc.), what is the relationship of the proposed boring locations to what is believed to be the most likely area of release?

Response: According to sampling data from January 2006, MW-NASB-74 and MW-NASB-76 were non-detect for DRO. Based on the historical detections of DRO in MW-NASB-75, and the presence of a sheen and stressed vegetation along the Upper Impoundment Pond northern bank, the rationale for the sampling locations is to identify a potential contaminant source south and to the west of Building 201.

9. Page 6 of 14, 3.3 Direct-Push Boring and Soil Sampling

- Page 6 of 14, 3.4 Direct-Push Groundwater Sampling
- Page 10 of 14, 5.1 Soil Boring Installation
- Page 10 of 14, 5.2 Soil, Groundwater, and Pore Water Sampling

These Sections indicate that the soil and ground water samples will be collected using the Direct-Push sampling procedure and the samples will be analyzed using the State of Maine Modified Method for Determining Diesel Range Organics Method 4.1.25 and Method 8260B for the VOCs. The EPA Region 1's 1,4-Dioxane Method will be used for the water samples. However, the Work Plan does not include the site's action limits (e.g., clean-up levels), sampling procedures, the laboratory's analytical standard operating procedures, quality control information (field and lab), and how the data are to be reviewed nor does the Work Plan reference the Quality Assurance Project Plan for the Site. Please provide this information. Note if this information is in the Base-Wide Quality Assurance Project Plan for the Long-Term Monitoring Program (January 2006) then the document can be referenced for the information.

Response: Please see Response to Comment No. 5.

10. Page 6 of 14, 3.3 Direct-Push Boring and Soil Sampling

If the field photoionization detector (PID) head space analysis does not indicate the presence of organic vapor in the boring, will a sample be sent to the off-site laboratory to

verify the PID results? It is unclear in the Section that a sample would be analyzed. EPA recommends that a sample be sent to the off-site laboratory for verification.

Response: If a soil sample does not register a response on the PID through head space analysis, and there are no physical characteristics (odor, visual evidence) indicating the presence of contamination, then no soil sample will be collected. If the presence of contamination is suspected, based on the above mentioned screening methods, then a soil sample will be collected from that interval. A groundwater sample will be collected from each boring regardless of whether or not evidence of contamination is observed.

11. **Figure 5:** add the storm and sanitary utility lines associated with building 201 and the hobby shop. Also add the location of the restaurant grease trap and storage area and previous location of the hobby shop waste oil tank.

Response: Agreed. Figure 5 will be revised to the extent that the information requested is available. The revised figure will be include in the Final Report.

12. **p. 7, sec. 3.4:** The Work Plan does not specify the “low-flow” procedure for the groundwater sampling. It is recommended that field parameters be collected at the time of sampling, as these may provide important insight into the predominant transport processes at the site (e.g., indications of active degradation of hydrocarbons).

Response: Low flow sampling will be conducted using a peristaltic pump set at the lowest possible flow rate while still able to draw groundwater from the temporary sampling point. Field parameters are sampled on a regular basis at existing monitoring wells located within the area of investigation. Also, temporary sampling points are being used for one-time sampling. If results indicate the presence of contamination, the Navy will consider installing and sampling permanent monitoring wells, at which time field parameters can be recorded. If results are negative, there will be no need for field parameter data.

13. **p. 8, sec 3.5:** Since there were significant levels of acetone and MEK found in the pond by the ME DEP during a previous sampling round and the site 9 ROD was for VOCs in groundwater, please add VOCs to the pore water analysis.

Response: Agreed. Porewater sample analysis for VOCs using EPA Method 8260 will be added to Section 3.5, fourth bullet.

14. **p. 9, sec 4.2:** Since the GWETS treats VOCs and the Navy’s recent data has shown the levels to be non-detect, please provide the rationale for analyzing for both VOC and 1,4-dioxane.

Response: The Navy agrees with the logic of not analyzing for VOCs; therefore, groundwater samples collected from the Irrigated Playing Field will only be sampled for 1,4-dioxane.

15. **p. 9, sec. 4.3 and Fig. 6:** The Work Plan proposes four water-table samples to be collected from within the footprint of the playing field. What is the anticipated groundwater flow direction at this site, and how do the proposed DP locations relate to the flow? Based on the general location of the field, it seems likely that the flow is from NW to SE. If this is the case, the proposed DP locations near the NE, NW, and SW corners of the field have very little of the irrigated area lying upgradient. Only the SE corner is downgradient of a significant portion of the field. If it is believed that the flow is from NW to SE, it is recommended that the NE location be moved south (e.g., to the midpoint of the E side of the field), and the SW location be moved east (e.g., to the midpoint of the S side of the field), so that more of the irrigated area lies upgradient of these points. The NW point (as shown) will provide a comparison to groundwater that has received little recharge from the irrigation system.

Response: The Navy will take this comment into consideration when implementing the field program at the Irrigated Playing Field. One of the main considerations which should be taken into account when choosing the sampling locations is the location of the sprinkler heads which discharge the effluent water from the GWETS to the playing field surface. In the Navy's response to MEDEP Comment No. 20 a, the Navy agreed to contact the NASB Public Works Department to ascertain the location of the sprinkler heads prior to marking the direct push locations. These locations can be adjusted in the field when taking into account the location of the sprinkler heads and the interpreted groundwater flow direction at the playing field.

16. **p. 11, sec. 5.3:** please reference the site-wide QAPP for groundwater and provide a QAPP for soils.

Response: The existing Basewide QAPP will be referenced where applicable. In the event that the existing QAPP does not support one or more of the investigative methods, an addendum will be developed and added to the existing QAPP. A QAPP Addendum specific to the Site 9 soil sampling as specified in the Draft Site 9 Direct-Push Work Plan will be issued separately for Regulator review, comment and approval prior to commencing the Site 9 field activities.

17. **p. 11, sec. 5.3.1.3:** please provide details as to what the rinsate blanks will be analyzed for.

Response: Agreed. As this investigation involves three separate sites, rinsate blank analysis will depend on site specific parameters. The following text will be added to Section 5.3.1.3, "Rinsate blank analysis will correspond exactly with the analysis to be

performed at each specific site. For example, at Site 9, samples will be collected for VOCs, SVOCs and TAL metals, therefore any rinsate blank associated with sampling at Site 9 will be analyzed for VOCs, SVOCs, and TAL metals.”

**RESPONSE TO COMMENTS FROM THE
BRUNSWICK AREA CITIZENS FOR A SAFE ENVIRONMENT (BACSE)
DRAFT WORK PLAN FOR SITE 9, BUILDING 201 AOC, & IRRIGATED
PLAYING FIELDS
NAVAL AIR STATION BRUNSWICK, BRUNSWICK, MAINE**

Commenter: Carolyn A. Lepage, C.G., Lepage Environmental Services, Inc	
Comment Issue Date: 15 May 2007	Navy Response Date: 16 May 2007

The following comments regarding the February 2007 Draft *Direct-Push Work Plan for Site 9 Ash Delineation and Investigations at Building 201 Area of Concern and Irrigated Playing Fields* (prepared by ECC) are submitted on behalf of the Brunswick Area Citizens for a Safe Environment (BACSE).

GENERAL COMMENTS:

1. General Comment. BACSE concurs with comments submitted by the Maine Department of Environmental Protection (MEDEP) and the U. S. Environmental Protection Agency (EPA) dated April 11, 2007 and March 28, 2007, respectively.

Response: Comment is noted.

2. Page 1, Section 1. The first two sentences in the second paragraph duplicate the fourth and fifth sentences. Please correct.

Response: This duplication will be corrected in the Final Work Plan.

3. Page 2, Section 2. MEDEP comment number 7 states that the landfill may be following the former stream channel which continues to the southeast as an unnamed stream. The former stream channel appears on aerial photographs from the 1940s. Are there other features on aerial photographs from other years that would also help guide the investigations at Site 9? Do the proposed boring locations address MEDEP's observation? BACSE notes that Figure 5-1 of the February 1996 Draft *Site 9 Source Investigation Report* shows the trace of the former 40-inch drain pipe that trends from the northwest to the southeast, toward the unnamed stream. How does this feature relate to the former stream channel? The ash landfill? Contaminant migration pathways?

Response: As stated in the work plan, the objective of the investigation at Site 9 is to define the vertical and horizontal extent of the ash landfill, specifically to the area south of Avenue C/Neptune Drive. This objective does not include establishing contaminant migration pathways, which were identified during the 1990's RI. Based on Figure 3-1 from the Source Investigation Sampling and Analysis Plan (ABB, January 1995), the southern end of the drain pipe is located within the proposed Site 9 sample locations shown on the revised Figure 4 (provided with these RTCs) of the Draft Work Plan.

4. Figure 4. The trace of the former stream channel (MEDEP comment number 7) and the former 40-inch drainpipe shown on Figure 5-1 of the 1996 Draft *Site 9 Source Investigation Report* should be added to Figure 4.

Response: Figure 4 will be revised to show the approximate location of the former 40-inch drainpipe as shown in Figure 3-1 from the Source Investigation Sampling and Analysis Plan (ABB, January 1995). The former stream channel will also be shown provided ECC can obtain a copy of the 1940's aerial photograph referenced in MEDEPs comment No. 7. This revised Figure will be included in the Final Report.

5. Page 5, Section 3. MEDEP comment number 14 addresses an additional source of petroleum contamination observed at the impoundment pond. What follow-up action is the Navy considering for this additional source?

Response: The proposed investigations as outlined in this Work Plan are expected to provide information on this comment in order to evaluate whether further investigations may be warranted.

6. Page 5, Section 3. The 1990 Draft Final *Remedial Investigation Report* describes fuel-related and other volatile organic compound detections at Site 9. How were these and other historic data factored into the design of the investigation near Building 201? Of particular concern is the solvent burning area discussed on pages 11-21 and 11-23, and outlined on Figure 11-12 (page 11-22) of the RI report. The solvent burning area as described in the RI is based on the 1983 *Initial Assessment Study* (IAS), which BACSE did not review. While the solvent burning area was suspected of being a source in the 1990 RI report, in the 1991 Draft Final *Supplemental Remedial Investigation Report*, attention turned to the abandoned leachfield adjacent to Building 201 as a more significant potential source.

Response: Based on the locations of the solvent burning area and the septic system, as shown in Figure 3-2 from the Source Investigation Sampling and Analysis Plan (ABB, January 1995), four of the adjusted proposed boring locations for the Site 9 investigation are located within these two referred to areas (see revised Figure 5). The investigation near Building 201 was developed in order to investigate any occurrence or additional sources of fuel-related organics and other VOCs present in the subsurface near the Building. By using the direct-push methods, if a "hot-area" is suspected (as determined by the field photoionization detector), both groundwater and soil samples will be taken and the data will be evaluated. The sampling program was designed to provide data in the vicinity near Building 201 to specifically determine if an unknown source area remains present at Site 9. The data will be evaluated and also compared to the Long-Term Monitoring data for Site 9 to determine if the presence or potential extent of a groundwater plume.

It is not clear from the historic data that the solvent burning area was investigated sufficiently to determine if it is or is not (or was or was not) a source of the contaminants detected at Site 9. With base closure now on the horizon, this potential source area should be evaluated more thoroughly in order to have confidence in any future decisions regarding the environmental conditions and risk of Site 9. BACSE understands that this task may be beyond the scope of work covered by this Work Plan, but believes that the uncertainty about the solvent burning area as a potential source must be addressed.

Response: Comment noted. See response to No. 6. This data, as well as data from the Long-Term Monitoring Program, will be used to assess the potential for an unknown remaining source at the site.

7. Page 5, Section 3.1. Are the detection levels for the proposed analyses lower than applicable action levels? In particular, BACSE is concerned with the interpretation of non-detect results. For example, can they can be acceptable as indicating that no further action is needed?

Response: Comment noted. This comment will specifically be addressed in the Quality Assurance Project Plan (QAPP) Addendum which will be developed specific to the Site 9 soil sampling, as specified in the Draft Site 9 Direct-Push Work Plan. This QAPP Addendum will be issued separately for Regulator review, comment and approval prior to commencing the Site 9 field activities.

8. Page 14, Section 6. The Summary Report should also identify any deviations from the final approved Work Plan. The Summary Report should also include a figure identifying the area or plume of contaminated groundwater at Site 9.

Response: The Summary Report following the Site 9 Direct-Push Work Plan will have a section listing any deviations from the Final approved Work Plan, if any and will include a figure identifying the plume or impacted groundwater area.

9. Additional Porewater Sampling. BACSE believes that the investigations proposed in the Work Plan will move the understanding of, and decision-making for, Site 9 in a positive direction. However, additional porewater sampling along the unnamed stream northeast of Building 201 will likely be needed in the future to better understand and address the distribution and migration of fuel-related and other volatile organic compounds at the site.

Response: Comment noted. The need for any additional sampling can be evaluated once this initial proposed investigation has been completed and the results assessed.

**RESPONSE TO COMMENTS FROM THE
MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION
DRAFT WORK PLAN FOR SITE 9, BUILDING 201 AOC, & IRRIGATED
PLAYING FIELDS
NAVAL AIR STATION BRUNSWICK, BRUNSWICK, MAINE**

Commenter: Claudia Sait	
Comment Issue Date: 11 April 2007	Navy Response Date: 15 May 2007

Pursuant to Section VI of the Naval Air Station, Brunswick, Maine Federal Facility Agreement (Oct 1990), as amended, the Maine Department of Environmental Protection (MEDEP) has reviewed the draft “Direct-Push Workplan for Site 9 Ash Delineation and Investigation at Building 201 Area of Concern and Irrigated Play Fields”, dated February 2007, prepared by Environmental Chemical Corporation. Based on that review MEDEP has the following comments and issues.

GENERAL COMMENTS:

1. MEDEP concurs with EPA’s comments and attempted not to repeat them.

Response: Comment noted.

2. The Federal Facility Agreement, Section 9.2, requires that the Navy provide EPA and MEDEP with 14 days prior notice. Please revise.

Response: Agreed. The following text will be added to the last paragraph in Section 1, “MEDEP, EPA, and BACSE will be notified a minimum of 14 days prior to the start of field activities.”

3. Please provide a QAPP or reference an existing QAPP, where appropriate, for the various investigations.

Response: Agreed. The existing Basewide QAPP will be referenced where applicable. In the event that the existing QAPP does not support one or more of the investigative methods, an addendum will be developed and added to the existing QAPP.

4. Please identify the project team for these projects.

Response: The project team will consist of Project Managers Al Easterday, PG, Gina Calderone, PG, CPG, and Jeff Donovan, Environmental Scientist.

Site 9

5. It is unclear from the various descriptions on page 2 whether the initial 10 borings will be south of Avenue C or north and south of Avenue C. (See Section 2, Section 2.1,

Section 2.2, and Section 2.3). These internal contradictions must be resolved. However for MEDEP's review, after discussing it with Mr. Al Easterday of ECC, it is assumed that the 10 initial 10 direct pushes will be divided evenly between north and south of Avenue C.

Response: As shown in Figure 4 in the Draft Work Plan, the proposed borings are located on both sides (north and south) of Avenue C/Neptune Drive.

6. For the workplan please clarify which borings will be completed initially and the number that are contingent on finding ash. MEDEP supports completing the 5 borings to the north of Avenue C if there is room between the excavation and underground utilities and 10 additional borings to the south and then determining if additional locations are needed. Based on the extent of the ash found during the excavation of the ash landfill relative to the volume predicted from the previous soil borings, a conservative approach is warranted.

Response: Ten borings, 5 on the north side of Neptune Drive (as currently shown between the current excavation and Neptune Drive), and 5 locations on the south side of Neptune Drive, opposite the borings on the north side of Neptune Drive will be completed as originally proposed. These locations may be adjusted in the field based on results from the first few borings. The regulators will be advised of the results from the initial borings, and will be given the opportunity to promptly comment on the additional borings locations.

7. It appears from the 1940's aerial photograph of the area that the landfill may be following the former stream channel which continues to the southeast as an unnamed stream.

Response: Comment noted. This information will be considered during the field activities.

8. Section 2.1: Email correspondence from Lisa Joy dated May 25, 2006 notes that on the southern end of the excavation the contractor was down 20-22 feet and still hitting ash. The proposed borings should be completed to at least this depth or to the clay if it is encountered first. Please revise as necessary.

Response: Agreed. As stated in Section 2.3, 3rd sentence, "All borings are expected to be advanced to a depth of approximately 15 ft to 25 ft bgs. The borings will be advanced to confirm the depth and thickness of the ash layer or until the top of the clay layer is encountered. The soil borings will not be advanced past the top of the clay layer beneath the Site".

9. Section 2.2, Goals and Objectives: Please update the objective to include the detection of ash between the current excavation and of Neptune Drive to the north.

Response: Agreed. **Note:** Neptune Drive is to the south of the current excavation. The objective will be revised to read,

- Site 9 Ash Delineation – To define the vertical and horizontal extent of the ash landfill along the Northern side of Avenue C/Neptune Drive and in the area south of Avenue C/Neptune Drive. The subsurface investigation results will be used to delineate the remainder of the ash deposit

10. Section 2.4, Direct-Push Boring..., bullet 4:

- a.) “Based upon physical observations and results of the headspace analysis, up to 5 soil samples will be collected...”

The physical observations should include ash or waste material, staining, and olfactory evidence. Please revise.

Response: Agreed. The first sentence will be revised to read, “Based upon physical observations (evidence of ash or waste material, visual and olfactory observations) and results of the headspace analysis, up to 5...”

- b.) The samples will be submitted under chain of custody protocol to an off-site laboratory for Toxicity Characteristic Leaching Procedure...”

For characterization purposes the analyses should be totals for TAL Metals (EPA Method 6010B), Semi-Volatile Organic Compounds (SVOCs) (EPA Method 8270C), and VOCs (EPA Method 5035/8260B) for this site. The TCLP methods are more appropriate for determining disposal options.

Response: Agreed. Text will be revised to read, “The samples will be submitted under chain-of-custody protocol to an off-site laboratory for analysis for TAL Metals (EPA Method 6010B), Semi-Volatile Organic Compounds (SVOCs) (EPA Method 8270C), and VOCs (EPA Method 5035/8260B).”

11. Section 2.4, Bullet 6: Navy should consider obtaining the vertical ground elevation to aid in determining the possible volume of ash detected as part of the survey.

Response: Agreed. During the field investigation, approximate (+ or – 6 inches) ground surface elevations in the area of the borings can be obtained by using known elevations from a number of monitoring wells located within Site 9.

12. Section 2.4, Bullet 3, and 3.3: The State of Maine licenses geologists as Certified Geologist rather than Professional Geologist. Please correct.

Response: Agreed. Text will be revised in accordance with this comment.

13. Figure 4:

a.) It would be more helpful if the current pit boundary was shown of the figure rather than the 2003/2004 delineation which we now know was in error. Please revise.

Response: Agreed. Figure 4 will be revised to reflect the current excavation as close as possible. The revised Figure will be included in the Final Report.

b.) Also add the unnamed stream/drainage. The location of the stream may effect the location of the proposed soil borings.

Response: Agreed. Figure 4 will be revised to include the location of the unnamed stream/drainage area. The revised Figure will be included in the Final Report.

c.) Since the figure depicts 15 proposed direct push locations please indicate which are the initial 10 borings and which are the follow-up points.

Response: Figure 4 will be revised to show 5 boring locations on the north side of Neptune Drive (as currently shown between the current excavation and Neptune Drive), and 5 locations on the south side of Neptune Drive, opposite the borings on the north side of Neptune Drive. These are the initial 10 borings. These locations may be adjusted in the field based on results from the first few borings. The regulators will be advised of the results from the initial borings, and will be given the opportunity to promptly comment on the additional borings locations. The revised Figure will be included in the Final Report.

Building 201 Area:

14. On April 4, 2007, MEDEP and EPA staff visited Site 9 for the purpose of selecting a location for a new monitoring well in the southwesterly corner of the Site 9 boundary. During that visit MEDEP and EPA as well as Navy and its consultants observed an iridescent sheen on the upper impoundment pond which coalesced when disturbed which is indicative of petroleum. MEDEP and EPA staff also walked down to the rock dam and spill way for the impoundment pond and could smell a petroleum distillate coming from the concrete control riser. The sheen was most observable at the western end of the pond near the headwall for the storm drains. The sausage boom installed to capture product coming from the storm drains was still in place which would indicate that this product is discharging from another source.

Response: Comment noted. This area will be inspected periodically during the field program to note if the sheen is consistently or intermittently present. The results of this investigation may provide additional information with regards to the source of the sheen.

15. Section 3.2, Field Activities, and Sections 3.4 and 3.5: MEDEP supports the inclusion of analyses of the groundwater and porewater for volatiles by EPA Method 8260B and 1,4 dioxane by EPA's Region 1 method, as noted in EPA's comments.

Response: The Navy agrees to include VOC analysis for the porewater samples as noted in EPA comment No. 13. 1,4-Dioxane was not included in the EPA's comments.

16. Section 3.4, Direct-Push Groundwater Sampling:

a). If there is evidence of fuel contamination below the water table detected in the soil borings, Navy should consider shifting the groundwater sample depth to target that zone. Also, MEDEP supports the USEPA comment regarding the collection of field parameters prior to sampling.

Response: Comment noted. The Navy will consider adjusting the groundwater sampling depth if evidence of fuel contamination below the water table is observed.

Field parameters are sampled on a regular basis at existing monitoring wells located within the area of investigation. Also, temporary sampling points are being used for one-time sampling. If results indicate the presence of contamination, the Navy will consider installing and sampling permanent monitoring wells, at which time field parameters can be recorded. If results are negative, there will be no need for field parameter data.

b.) MEDEP suggests that for purposes of improving the control on groundwater elevations a temporary water table piezometer should be installed in the soil boring/groundwater sample location west of Building 201.

Response: At this time, the Navy does not agree with the need for a piezometer to be located in this area. There are a number of existing wells located within the area of investigation. Once the direct-push investigation is complete, the project stakeholders can discuss the need for an additional gauging point.

c.) Please note in the workplan that the selected laboratory must be certified to perform the Maine Modified Method for Determining Diesel Range Organics Method 4.1.25.

Response: Agreed. In Section 3.3, 3rd bullet, it is stated that the samples will be submitted for analysis using this method. The selected laboratories certification to perform this method of analysis will be confirmed prior to the start of the field program.

17. Sections 3.4 and 3.5: Based on the site visit by stakeholders on April 4th 2007, MEDEP understands that the soil boring and associated groundwater sample locations will be revised from those shown on Figure 5. MEDEP suggests that the two western locations and the location north of MW-NASB-075 are appropriate, but agrees that one of the remaining locations should be relocated north and east of MW-NASB-074 and MW-NASB-075.

Response: Agreed. Figure 5 will be revised and include in the Final Report.

18. Section 3.5:

a.) MEDEP's SOP recommends collection of porewater from a depth of at least 8 inches, to ensure that surface water is not entering the screen. See section 5.2 of MEDEP sampling protocol. No specific depth should be specified rather the collection of groundwater. If the Navy wants to use the proposed 6 inches, please provide the rationale.

Response: Agreed. The first sentence, second bullet under Section 3.5 will be revised to read:

- Pore water samples will be collected from a minimum depth of at least eight inches below the top of ground surface.

b.) MEDEP standard operating procedure for pore water sampling requires training and experience in pore water sampling. Please provide the experience and training of the person to perform this procedure.

Response: A number of ECC personnel helped in the 2004/2005 Mere Brook porewater sampling event conducted jointly by the MEDEP and EPA. The Navy is confident that ECC will be able to conduct on-site training during the porewater sampling at the upper impoundment pond. In addition, the MEDEP pore water SOP reference should provide adequate instruction for the sampling.

c.) Due to the detection of DRO at MW-NASB-074 and possibly at MW-NASB-072, the porewater locations should extend about 100 feet further to the east, through redistribution of points or additional locations.

Response: The porewater points will be evenly redistributed to cover this area. Figure 5 will be revised in accordance with this comment.

d.) The workplan must note that the other MEDEP SOPs referenced in Appendix A will not necessarily be adopted, such as the QAPP guidance.

Response: Agreed.

“Irrigated” Playing Field

19. Section 4, Field Activities at the Irrigated Playing Field:

Please add a brief description of where the playing field is located since it could not be located by the “Irrigated Playing Field”.

Response: Agreed. The following text will be added as the last sentence of the first paragraph in Section 4, “The irrigated playing field is located within the Base boundary at the northeast corner of Orion Drive and Huey drive, and to the west of Building 50.”

20. Section 4.1, Sampling Rationale:

a.) Please provide information on the locations of the sprinklers. The direct push locations should be based on where the sprinklers would have discharged the greatest amount of water.

Response: Agreed. The NASB Public Works department will be contacted and asked to mark the location of the sprinklers prior to marking the direct push locations.

b.) Based on a conversation with Dale Mosher on the irrigation of the field, MEDEP suggests that due to the likely groundwater flow direction the two westerly points should be moved approximately 50 feet to the east, where they have a better chance of detecting inputs from the ball field irrigation.

Response: Agreed. Figure 6 will be revised in accordance with this comment and included in the Final Report.

21. Section 4.3: *“Accordingly, the direct-push soil boring...”*

The soil boring should be described first, as it will be completed before the groundwater locations, and deserves a mention under the Section 4.1 Sampling Rationale.

Response: Agreed. Section 4.3 will be revised to read, “A total of 4 direct-push soil borings will be advanced to facilitate the collection of 4 groundwater samples from within the top of the water table, which is expected to be from 3 to 8 ft bgs in the Irrigated Playing Field (Figure 6). The field activities....”

23. Page 11, Section 5.3.1.2, Field Duplicates: “Field duplicates will be collected at a frequency of 1 duplicate per 20 sample media.”

Field duplicates must be collected at a frequency of 1 duplicate per 10 sample media per location since these are very different investigations.

Response: Agreed. Field duplicate samples will be collected at a frequency of 1 duplicate per 10 sample media per location.

**Follow-up Comment Letter
and Concurrence Letters**

May 22, 2007

Mr. Orlando Monaco
Department of Navy
Base Realignment and Closure
Program Management Office-Northeast
4911 South Broad Street
Philadelphia, PA 19112-1303

Re: Site 9, Building 201 & Irrigated Playing Field Workplan
Response to Comments (RTCs)
Naval Air Station, Brunswick, Maine

Dear Mr. Monaco:

MEDEP has reviewed the Navy's responses dated May 15, 2007, to the Maine Department of Environmental Protection (MEDEP) comments, dated April 11, 2007, for the draft "Workplan for Site 9, Building 201 Area of Concern, and Irrigated Playing Fields. Based on that review and telephone call with Gina Calderone and Jeff Donovan of ECC on May 22, 2007, MEDEP gives conditional concurrence on the workplan provided that:

- As discussed with ECC personnel, revised figures 4, 5, and 6 are submitted to MEDEP today or tomorrow (May 21 or 22, 2007) for review and comment and the agreed upon figures will be included the final workplan, not just the final report as written;
- Per our discussion, Figure 4 (emailed 5/15/07) is revised again to include the approximate location of the existing excavation and the unnamed stream south of Neptune Drive. If feasible, the western most direct push point south of Neptune Drive will be relocated to the extreme east to determine if the ash landfill was located in the old stream channel;
- Per our discussion, Figure 5 (emailed 5/15/07) is revised again to extend the pore water sample locations approximately 100 feet by evenly redistributing the sample locations;
- Per our discussion, Figure 6 is revised by moving the two most westerly sampling points directly east approximately 50 feet, however ECC personnel and Chris Evans will reevaluate these locations in the field once the information on the irrigation is supplied and taking into consideration EPA's recommendations;
- (Comment 3) The Quality Assurance Project Plan is reviewed by ECC as soon as possible to determine if an addendum must be developed to accommodate the work proposed in this workplan. (Additional time for review and comment period must be figured into the schedule to implement this workplan if an addendum is necessary.);

- (Comment 16 a): Per our discussion the field parameters are collected prior to sampling and;
- The proposed revisions and additions in the RTC letter and those listed above are incorporated into the final report along with regulator comments, responses and this letter.

Please contact me at (207) 287-7713 or claudia.b.sait@maine.gov, if you have any questions or comments.

Respectfully,

Claudia Sait
Project Manager-Federal Facilities
Bureau of Remediation & Waste Management

Cf: File
Dale Mosher-BNAS
Carolyn Lepage-Lepage Environmental
Ed Benedikt
Carol Warren-(email only)
Gina Calderone-EA (email only)

Chris Evans-MEDEP
Christine Williams-EPA
Al Easterday-ECC
Jeff Donovan-ECC (email only)
Catherine Guido-ECC (email only)
David Chipman (email only)

Lepage Environmental Services, Inc.

P. O. Box 1195 ! Auburn, Maine 04211-1195 ! 207-777-1049 ! Fax: 207-777-1370

May 22, 2007

Mr. Orlando Monaco
Department of Navy
Base Realignment and Closure PMO-Northeast
4911 South Broad Street
Philadelphia, PA 19112-1303

Subject: Responses to Comments on the February 2007 Draft *Direct-Push Work Plan for Site 9 Ash Delineation and Investigations at Building 201 Area of Concern and Irrigated Playing Fields*

Dear Mr. Monaco:

We have reviewed the Navy's responses to comments on the February 2007 Draft *Direct-Push Work Plan for Site 9 Ash Delineation and Investigations at Building 201 Area of Concern and Irrigated Playing Fields* (prepared by ECC). Responses to the Maine Department of Environmental Protection April 11, 2007 comment letter, and the U. S. Environmental Protection Agency March 28, 2007 comment letter are dated May 15, 2007. Responses to the Brunswick Area Citizens for a Safe Environment (BACSE) May 15, 2007 comment letter are dated May 16, 2007.

BACSE has no further comments provided that BACSE's proposed revisions and additions are incorporated in the final Work Plan along with stakeholder comments, responses, and this letter.

Please do not hesitate to call if you have any questions.

Sincerely,

Carolyn A. Lepage, C.G.
President

cc: Loukie Lofchie, BACSE
Ed Benedikt, BACSE (email only)
Dale Mosher, NASB
Christine Williams, EPA
Al Easterday, ECC
Gina Calderone, ECC (email only)
Dave Chipman, RAB (email only)

Tom Fusco, BACSE (email only)
Suzanne Johnson, BACSE (email only)
Claudia Sait, MEDEP
Carol Warren, LRA (email only)
Catherine Guido, ECC (email only)
Jeff Donovan, ECC (email only)
102Site9DPworkplanRTCCConcur22.MY7

From: <williams.christine@epamail.epa.gov>
To: <orlando.monaco@navy.mil>
Date: 5/15/2007 3:24:43 PM
Subject: Re: Revised Site 9 Direct-push Work Plan RTCs for concurrence.

EPA has no further comments on the Revised Site 9 Direct-push Work Plan RTCs provided all appropriate and agreed to changes are made to the work plan.

Christine A.P. Williams
Federal Facility Superfund Section
US EPA New England
Suite 1100 (HBT)
1 Congress Street
Boston, MA 02114-2023

phone - (617) 918-1384
fax - (617) 918- 0384
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"Gina Calderone"
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05/15/2007 02:32
PM

To

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Subject

Revised Site 9 Direct-push Work
Plan RTCs for concurrence.

Hi All - Please replace the completed RTCs I sent earlier today with these pdf files, as the others were my working files for the Draft Site 9 Direct-Push Work Plan. The figure edits, as requested by both EPA and MEDEP, will be completed and provided in the Final Report.

Carolyn will be providing comments tomorrow and we will send those out for concurrence separately.

Sorry for the double emails on this!

Gina/Jeff

Gina M. Calderone, PG, CPG
Project Manager/Sr. Hydrogeologist
ECC
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Marlborough, Massachusetts 01752
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[attachment "MEDEP Site 9 DP WP RTCs.REV3.pdf" deleted by Christine Williams/R1/USEPA/US] [attachment "EPA Site 9 DP WP RTCs.REV3.pdf" deleted by Christine Williams/R1/USEPA/US]

CC: "Al Easterday" <AEasterday@ecc.net>, "Arnie Ostrofsky" <Arnold.Ostrofsky@ttnus.com>, "Carolyn Lepage" <calepage@adelphia.net>, "Carol Warren" <carol@wacubu.com>, "Catherine Guido" <CGuido@ecc.net>, "claudia sait" <Claudia.B.Sait@maine.gov>, "Dale CIV NAS BRUNSWICK Mosher" <dale.mosher@navy.mil>, "Dan Waddill" <dan.waddill@navy.mil>, "chris evaans" <Gordon.C.Evans@maine.gov>, "Jeff Donovan" <JDonovan@ecc.net>, "Jennifer Wright" <jennifer.h.wright@navy.mil>, "Jackson Kiker" <JKiker@ecc.net>, "Lisa M CIV NAS Brunswick N45 Joy" <lisa.joy@navy.mil>, "gannett fleming" <pgolonka@gfnet.com>, <GCalderone@ecc.net>, <dmctigue@gfnet.com>

Appendix B

Field Forms

INSTRUMENT CALIBRATION LOG

Project/Site Name _____

Calibrated By _____

Instrument/Serial Number	Pre-calibration Reading	Post-calibration Reading	Calibration Gas/Concentration	Date
Photovac 20/20 PID			Isobutylene / 100ppm	
Photovac 20/20 PID			Isobutylene / 100ppm	
Photovac 20/20 PID			Isobutylene / 100ppm	
Photovac 20/20 PID			Isobutylene / 100ppm	
Photovac 20/20 PID			Isobutylene / 100ppm	
Photovac 20/20 PID			Isobutylene / 100ppm	
Photovac 20/20 PID			Isobutylene / 100ppm	
Photovac 20/20 PID			Isobutylene / 100ppm	
Photovac 20/20 PID			Isobutylene / 100ppm	
Photovac 20/20 PID			Isobutylene / 100ppm	
Photovac 20/20 PID			Isobutylene / 100ppm	
Photovac 20/20 PID			Isobutylene / 100ppm	



Environmental Chemical Corporation

LOG OF SOIL BORING

Coordinates: _____
 Surface Elevation: _____
 Casing Below Surface: _____
 Reference Elevation: _____
 Reference Description: _____

Job. No.		Client		Location	
Drilling Method:				Boring No.	
Sampling Method:				Sheet of _____ Drilling	
Water Lev.				Start	Finish
Time					
Date					
Reference					

Digital Picture #	Sample Type	In. Drvn / In. Recvrd	Dpth. Csg.	Samp. # / Samp. depth	PID (ppm)	Blows per 6 in.	Depth (feet)	USCS Log	Surface Conditions:
							0		
							1		
							2		
							3		
							4		
							5		
							6		
							7		
							8		
							9		
							0		
							1		
							2		
							3		
							4		
							5		
							6		
							7		
							8		
							9		

Logged by: _____
 Drilling Contractor: _____

Date: _____
 Driller: _____

WELL SPECIFICATIONS:

Diam. of casing: _____ Screen Interval: _____ Sandpack: _____ Grout: _____
 BOH: _____ Riser Interval: _____ Bentonite: _____ Cover: _____

INSTRUMENT CALIBRATION LOG

Project/Site Name _____

Date _____

Weather _____

Calibrated By _____

Instrument _____

Serial Number _____

Parameters	Pre-calibration Reading	Post-calibration Reading	Temperature °C	Comments
Conductivity				
pH (7)				
pH (4)				
pH (10)				
ORP				
Dissolved Oxygen				
Barometric Pressure				

Appendix C

Standard Operating Procedures

**PROTOCOL FOR GROUNDWATER/SURFACE WATER INTERFACE
SAMPLING USING A PORE WATERSAMPLER**

Maine Department of Environmental Protection

Division of Site Remediation

Standard Operating Procedure: DR#023
Revision: 2
Date: July 12, 2004
Written by: Joe Siviski
Reviewed by: Brian Beneski

1.0 PURPOSE

The purpose of this document is to describe the Maine Department of Environmental Protection, Bureau of Remediation and Waste Management, Division of Site Remediation (MEDEP/DR) standard operating procedure (SOP) for collecting groundwater samples using a pore water sampler.

2.0 INTRODUCTION

MEDEP/DR is responsible for the investigation and remediation of uncontrolled hazardous substance sites throughout Maine. In the course of these investigations, samples are sometimes taken from groundwater discharge points beneath surface water bodies. This Standard Operating Procedure (SOP) is designed to be a guideline for MEDEP/DR staff for collecting such groundwater samples for chemical analysis. This procedure is based on current methodology guidelines and field experience of MEDEP personnel.

It is often difficult to determine the extent and origin of contamination using solely surface water sampling techniques. In some cases, a surface water body may be clean but the groundwater beneath it may be contaminated. Thus, sampling the groundwater prior to its discharge to a surface water body may lead to a better understanding of the extent and origin of contamination. This can be accomplished by using a pore water sampler.

Underlying this procedure is the assumption that surface water bodies are common discharge points for groundwater. Thus, a sample of the water beneath a stream or riverbed would be characteristic of the groundwater in the area. This SOP identifies sampling protocols to be followed when collecting samples using a pore water sampler.

3.0 RESPONSIBILITIES

All MEDEP/DR staff must follow this procedure when using a pore water sampler to perform groundwater sampling activities. Typically, MEDEP/DR field staff (OHMS positions) conduct this type of sampling, although other staff may collect these types of samples in specific instances if accompanied by, or once appropriately trained

in, this methodology. The respective managers and supervisors for MEDEP/DR are responsible for ensuring that their staff receive adequate training, are familiar with, and adhere to these procedures.

4.0 EQUIPMENT

The following is a list of equipment currently owned and available to MEDEP/DR staff for collecting groundwater samples using the pore water sampler method.

--Peristaltic Pump

--Tubing - Two types of tubing are needed for this sampling technique. Polyethylene tubing with an inside diameter (ID) of one-quarter (1/4) inch is the standard size tubing used in conjunction with peristaltic pumps. This size tubing should also be used to fit around the top opening of the pore water sampler. Additionally, three-eighths (3/8) inch inside diameter (ID) polyethylene tubing will be necessary to connect the pore water sampler to the peristaltic pump. A knife or other tool to cut tubing to desired lengths is recommended.

--Power Supply - A power supply will be necessary to operate the peristaltic pump. A deep cycle battery is recommended for this procedure.

--Hip Waders - This sampling method will likely require the sampler to wade into stream or river in order to insert pore water sampler in a suitable location.

--Pore Water Samplers - A pore water sampler comes in two parts, a strengthening rod and the pore water sampler itself, both made of stainless steel. The pore water sampler is basically a hollow tube with small holes in its tip that allow groundwater to percolate through. The strengthening rod slides into the pore water sampler, and while in place, blocks all water from entering pore water sampler. Both pieces are placed in a PVC sheath for protection. Although the pore water sampler is fairly sturdy, exercise caution during use, as once either piece becomes bent, the equipment is useless. Bring at least as many pore water samplers as there are sampling locations, as onsite decontamination is difficult and should be avoided.

--Sample Collection Containers - These will be provided by the lab, and will vary depending on parameters to be sampled.

5.0 GUIDELINES/PROCEDURES FOR USE OF PORE WATER SAMPLER

5.1 Preparation

Prior to undertaking any groundwater sampling using the pore water sampler, a site and event specific Sampling and Analysis Plan (SAP) and/or a Quality Assurance Project Plan (QAPP) should be developed (see SOP DR#014 - Development of a Sampling and Analysis Plan and SOP DR#016 - Requirements for the Development of a Site Specific Quality Assurance Project Plan). A SAP for a groundwater sampling event should specify the means of accessing the sample points.

5.2 Sampling Procedure

Once an appropriate sampling location has been determined, obtain pore water sampler and carefully insert into river/streambed to desired depth. Do not remove strengthening rod until instrument has been securely placed in sediment. Pore water sampler should be inserted deep enough as to ensure the sample collected will contain only groundwater and no surface water. Typically, this depth is at least 8 inches. Once this has been accomplished, remove the strengthening rod from the pore water sampler and connect pore water sampler to peristaltic pump using appropriate tubing described in section 4.0 of this SOP. Turn pump on and purge water until it is free of particulate. If sample is not visually free of sediment, it should be documented in field notes (see SOP DR#013: Documentation of Field Notes and Development of a Sampling Event Trip Report).

If sampling for metals, it is recommended that turbidity be measured. If turbidity is above 30 NTUs, it is recommended that an additional sample be collected that has been filtered through a 0.2-0.45 μm inline particulate filter.

After water has been sufficiently purged, decrease pumping rate and begin collecting sample. Pumping rate should be low enough to ensure that surface water is not drawn down into the sample. Low flow purging and sampling protocol is

not required, but if desired, refer to SOP DR#003 - Groundwater Sampling Using Low Flow Purging and Sampling Protocol. Course sediment and sediments with a high percentage of organic matter are the most transmissive; with experience, samplers can actually "feel" the type of sediment as the pore water sampler is advanced. If the formation intercepted by the screen is not transmissive enough for collection of sample, gently advance and/or pull back the sampler in an attempt to find a more transmissive zone. If formation does not allow adequate transmission of water, it may require a change in sampling location. This change is made at the discretion of the sampler and should be documented in field notes (see SOP DR#013: Documentation of Field Notes and Development of a Sampling Event Trip Report).

Once a satisfactory flow rate has been achieved, collect pore water sample in appropriate containers provided by the laboratory as specified in the SOP for that particular analysis.

Once sample has been taken, turn off pump, disconnect all tubing and remove pore water sampler from river/streambed. Neither the tubing nor the pore water sampler should be reused at subsequent sampling locations without prior decontamination. Do not put strengthening rod back in pore water sampler once sample has been collected, as sediment in the sampler must be flushed out first. Rather, place both pieces separately into plastic sheath.

Repeat the above process at all sampling locations.

6.0 DECONTAMINATION PROCEDURE

Decontamination procedures generally follow SOP DR#017: Decontamination Procedures Protocol. However, specific decontamination procedures are as follows.

In the course of sampling, sediment will build up in sampler that must be carefully flushed out. For this reason, it is best if decontamination is conducted with a large amount of water available for continuous flushing. If possible, bring as many pore water samplers as there are sampling locations, as onsite decontamination can be difficult.

7.0 QUALITY ASSURANCE/QUALITY CONTROL

The sampling plan of QAPP (MEDEP DR#014) and DR#016) should outline the data quality needs for the event.

7.1 Deviations from SOPs

All deviations from the procedures outlined in this or in any other SOP followed for groundwater sampling using a pore water sampler must be documented in field notes.

8.0 DOCUMENTATION

Documentation is the most important aspect of any sampling event. Documentation should be completed with the idea that someone not present during the actual event may need to repeat the event exactly as it was conducted originally. During the sampling event or immediately upon the completion of the event, diagram a map of the area and locate sampling points (and corresponding sample container numbers) on the map. Also, record observational data concerning the groundwater, such as the approximate depth of the screen when the sample was collected, any detection of odor or contamination, color and turbidity. Make sure to record in your personal field book any and all information that is pertinent to the sample. Refer to the MEDEP/DR SOP DR#013 - Documentation of Field Notes and Development of a Sampling Event Trip Report. It is very important that all information regarding a sampling event (or any events/activities) be accurately recorded. Record all information obtained while sampling such as sample numbers, measurements taken, observations made and other comments. A trip report package should also be completed for the event, as outlined in MEDEP/DR SOP DR#013.

When checking in samples at the laboratory for analysis, a Chain of Custody (COC) form must be completed. Refer to MEDEP/DR SOP DR#012 - Chain of Custody Documentation for requirements for COC protocol.

9.0 HEALTH AND SAFETY

As part of the overall work plan at a hazardous substance site, a site specific health and safety plan (HASP) must be developed and adhered to by all personnel working at the site. Refer to MEDEP/DR SOP DR3014 - Development of a Sampling and Analysis Plan.

All personnel must understand that if a sample cannot be obtained safely, the sample should not be taken at all. If a sample cannot be obtained due to safety considerations it should be documented in the sampler's field book.

All personnel should be aware of the potential dangers associated with this particular sampling method. These dangers include, but are not limited to, strong water currents, slippery substrate, roots or sharp objects beneath the water's surface that may cause a fall or other personal injury. If sampling in water that is greater than three feet deep, all DEP personnel are required to wear life jackets. All necessary precautionary measures should be heeded when performing this sampling technique.

SOP: DR#023

Date: July 13, 2004

Page 1 of 8