DEPARTMENT OF THE NAVY

NAVAL FACILITIES ENGINEERING COMMAND
NORTHEAST IPT, ENVIRONMENTA DIVISION
9742 MARYLAND AVENUE
NORFOLK, VIRGINIA 23511-3095

RECEIVED
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Hazardous Waste Remediation
NYSDEC Region 1

IN REPLY REFER TO:
5090
OPNEEV4/SWC
20 Nov 07

Mr. Steven M. Scharf
New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Action Bureau A, 11th Floor
625 Broadway
Albany, New York 12233-7015

Subj: FINAL LETTER WORK PLAN FOR SOIL GAS INVESTIGATION AT SITE 1 – FORMER DRUM MARSHALLING AREA, SITE NO. 1-30-003B, NWIRP BETHPAGE, NEW YORK, NAVY RESPONSE TO NYSDEC COMMENTS, DATED 10 OCTOBER 2007

Encls: (1) Final Workplan for Soil Gas Investigation at Site 1, Former Drum Marshalling Area, NWIRP Bethpage, New York
(2) Comment Response Document

Dear Mr. Scharf:

1. As per enclosures (1) and (2), please find the Navy's Response to NYSDEC comments and our final Soil Gas Survey Workplan. This workplan has been revised in accordance with the NYSDEC comments and our discussions of those comments.

2. Our schedule for the performance of this work is included in the workplan. Should you have any questions concerning this matter, please contact me at (757) 444-4114.

Sincerely,

Susan W. Clarke

SUSAN W. CLARKE
Remedial Project Manager
By Direction of the
Commanding Officer

Subject: LETTER WORK PLAN, SOIL GAS INVESTIGATION AT SITE 1 – FORMER DRUM MARSHALLING AREA, AUGUST 2007, NWIRP BETHPAGE, NEW YORK

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New York State Department of Environmental Conservations Comments of the August 2007 Site No. 1-30-003B, Letter Work Plan, Soil Vapor Investigation Site 1, for the Naval Weapons Industrial Reserve Plant (NWIRP) Site, dated October 10, 2007

General Comments:

1.0 **Comment:** The TTNUS Work Plan needs to reference the New York State Department of Health (NYSDOH) Soil Vapor Intrusion (SVI) Guidance. All data should be measured in micrograms per cubic meter ($\mu g/m^3$) and detection limits should be less than or equal to 1.0 $\mu g/m^3$.

Response: Agreed, the following will be added to the Introduction Section. "This work is being conducted in accordance with New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH 2006). Analytical parameters and anticipated detection limits will be attached to the work plan.

2.0 **Comment:** If volatile organic compounds (VOCs) are detected at the property line during the SVI investigation, the Navy will need to conduct additional SVI investigations to determine the extent of potential impacts by site-related VOCs.

Response: If site-related VOCs are detected at the fence line at concentrations that could represent a threat to human health, the Navy will discuss the results with New York State Department of Environmental Conservation and determine appropriate actions.

3.0 **Comment:** All analysis should be performed using the complete TO-15 method, not the abbreviated TO-15A. However, if TO-15A is to be used please justify why this method was chosen over method TO-15.

Response: Agreed. The soil gas samples will be analyzed using TO-15.

4.0 **Comment:** The volatile organic compound (VOC) analyte list for soil gas and groundwater should be provided in an additional table in the work plan. Also, tentatively identified compounds, or TICs, if present, should be qualified with estimated values.

Response: The TO-15 list of analytes will be attached to the work plan. TICs will be reported as indicated.

5.0 **Comment:** The generic NYSDEC/NYSDOH community air monitoring should be referenced in the work plan.

Response: As discussed, the existing plans for the site are adequate to meet these needs.

6.0 **Comment:** The sampling report should detail previous vapor, soil and water samples.

Response: Post-treatment data for Site 1 is discussed in Section 1.2 of the work plan, with data presented in the attachments. Since that time, site contaminants continue to attenuate and are currently expected to be lower.

7.0 **Comment:** Section 1.2 indicates that Preliminary Remediation Goals (PRGs) were used to screen VOCs in soil boring samples. More detail should be provided regarding the PRGs used in this screening analysis as they are not provided in either Section 1.2 or in Attachment A.

Response: The soil PRGs are presented in the 1995 Soils Record of Decision for the site and consist of trichloroethene at 0.010 mg/kg, tetrachloroethene at 0.027 mg/kg, and 1,1,1-trichloroethane at 0.010 mg/kg. These PRGs were developed to be protective of groundwater and, as such can not be used for evaluation of interactions between soil and soil gas.

8.0 **Comment:** The sampling report should evaluate the potential extent of soil gas along the border of the NWIRP site and 11th Street. Based on this review, any additional sampling should be expanded as appropriate to encompass the extent of the soil gas plume.

Response: The objective of this study is to determine whether residual VOCs in soil vapors at Site 1 are migrating east beyond the Navy fence line. This study is being conducted because although the Navy successfully remediated site VOCs to be protective of groundwater, the issue of residual VOCs in soil vapor and potential migration of contaminated soil vapor from Site 1 to the east was not defined. If site-related VOCs are detected at the fence line of Site 1 at concentrations that could represent a threat to human health, the Navy will discuss the results with New York State Department of Environmental Conservation and determine appropriate actions. An additional soil gas point will be installed to the northeast of Site 1 during this round.

Specific Comments

1.0a **Comment:** Page 4, Section 2: Planned soil gas sampling locations are referenced on figure 3. Several sample locations should be added along the fence line with the north end of 11th street to the fence line with the former Grumman Plant 24.

Response: The objective of this study is to determine whether residual VOCs in soil vapors at Site 1 are migrating east beyond the Navy fence line. This study is being conducted because although the Navy successfully remediated site VOCs to be protective of groundwater, the issue of residual VOCs in soil vapor and potential migration of contaminated soil vapor from Site 1 to the east was not defined. One sample point (BPS1-SG1005) is located at the north end of 11th Street. An additional soil gas point will be installed to the northeast of Site 1 during this round. This point will be located approximately half way between the northeast corner of Site 1 and the fence line near Grumman Plant 24.

1.0b. **Comment:** It is not clear how the steel drive rod boring will be sealed. Packing should use hydrated bentonite or other similar material to prevent potential short-circuiting of vapor to the surface.

Response: The boring seal in the field will be evaluated both visually and with a tracer test. If needed, bentonite or other sealant will be applied.

1.0c. **Comment:** Select proposed soil gas sampling locations should be advanced to the water table (approximately 55 ft bls) and a groundwater sample should be collected from the water table for VOC analysis. Comparison of groundwater to soil gas VOC concentrations can assist in the evaluation as to the processes governing soil gas migration (i.e., vertical off-gassing from VOCs in groundwater and/or lateral diffusion).

Response: This study is being conducted to determine whether residual VOCs in soil vapor and potential migration of contaminated soil vapor from Site 1 to the east is potential concern. As a result no groundwater samples will be collected.

2.0 **Comment:** Page 5, Bullet 2: The post-run tubing (PRT) system is not mentioned in the sample collection section. It is assumed that the PRT system will be employed to ensure that soil gas samples are collected from the annular space created by retracting the drive rods. Please add detail and clarify this section.

Response: An expanded description of the PRT system will be provided as an attachment.

3.0 **Comment:** Page 6, Bullet 8, Methods Section: Sample collection times are not indicated. Collecting a 6-liter SUMMA canister at 200 mL/min will fill the canister in 30 minutes depending on site conditions.

Response: Summa canisters will be filled at an approximate rate of 200 to 300 milliliters per minute. Therefore for a 6-liter canister, the sample will be collected in approximately 30 minutes.

4.0 **Page 7, Second Paragraph:** The number of ambient air samples that will be collected and length of time for which samples will be collected is not discussed. The text of the Work Plan states that samples will be collected over an 8 hour period while Table 1 states that air samples will be collected for 2 hours. Please clarify and revise both sections.

Response: On a daily basis, work area air samples will be collected during the duration of the soil gas collection. Table 1 will be revised to indicate that the work area summa canister will be collected over an estimated 4- to 8-hour period.

5.0 ***Table 2:*** *Ambient* air samples are not included in Table 2.

Response: Ambient air samples are included in Table 2. They are identified as field blanks.

6.0 **Comment:** A project schedule table needs to be added to the work plan.

Response: Assuming NYSDEC approval of the work plan by November 16, 2007, the following schedule for conducting the project is anticipated.

Activity	Schedule
Field Activities	12-15-07 to 01-30-08
Draft Results Report	04-30-08

This schedule assumes that adverse weather conditions are not encountered in late December 2007 through January 2008.

LETTER WORK PLAN

SITE 1 - SOIL VAPOR INVESTIGATION

NAVAL WEAPONS INDUSTRIAL RESERVE PLANT

BETHPAGE, NEW YORK

1.0 INTRODUCTION

This Work Plan has been prepared to describe Soil Vapor Investigation activities at the Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage, Long Island, New York (Figures 1 and 2) . The soil vapor investigation results will be used to determine whether there are contaminated soil vapors at the fence line that may adversely affect the nearby residences. Site 1 was identified as having been impacted by historic releases of chlorinated solvents and was remediated via an air sparging/soil vapor extraction (AS/SVE) system between 1998 and 2002. Natural attenuation of solvents continues.

The program will consist of the installation of 18 soil gas points in six locations and at depths of 8 feet, 20 feet and 50 feet below ground surface (bgs). In addition, macro core samples to a depth of 55 feet bgs will be taken first in each location to identify the lithology. Soil gas samples will be analyzed for TO-15 volatile organic compounds (VOCs). This Work Plan is being conducted in accordance with New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH 2006).

1.1 SITE HISTORY

The NWIRP was established in 1933. Since its inception, the plant's primary mission has been the research prototyping, testing, design engineering, fabrication, and primary assembly of military aircraft. The facilities at NWIRP included four plants used for assembly and prototype testing; a group of quality control laboratories, two warehouses complexes (north and south), a salvage storage area, water recharge basins, the Industrial Wastewater Treatment Plant, and several smaller support buildings. In 1998, operations ended at the facilities.

1.2 BACKGROUND

In 1985, an Initial Assessment Study (IAS) conducted at the NWIRP Bethpage, NY, identified materials stored at Site 1 the Former Drum Marshaling Area to include waste halogenated and non-halogenated solvents (Rogers, Golden & Halpern, 1986). Cadmium and cyanide were also stored in Area 2 within Site 1 from the early 1950s through 1974. Reportedly, 200 to 300 drums were stored at each area at any one time within Site 1. Reportedly, there was no direct evidence of hazardous waste spills at Site 1. An abandoned septic drainage system almost completely underlies the entire area of Site 1.

This site is located in the middle third of the NWIRP Bethpage facility and is east of Plant No. 3, see Figure 2. Site 1 occupies approximately four acres, and contains a concrete storage pad and an abandoned cesspool leach field. Historically, this site was also used as a storage area for various types of equipment and heavy materials, including transformers. Site 1 is enclosed by a six-foot high, chain-link fence. The site is relatively flat, with the eastern portion covered with sandy soils, gravel, grass, and one concrete pad. The western portion of the site is predominantly covered with concrete. A vegetated wind row (pine) and wood fence are present along the eastern edge of the site to reduce community visibility. Hazardous waste management practices for Northrop Grumman facilities included the staging of drummed wastes on the NWIRP-Bethpage property. This storage first took place on a gravel surface over the cesspool field, east of Plant No. 3. In 1978, the collection and marshaling point was moved a few yards south of the original site, to an area on a concrete pad. In 1982, drummed waste storage was relocated to another Drum Marshaling facility located in the Salvage Storage Area, which is not at Site 1.

An AS/SVE system was constructed in 1998 to address VOCs in site soils. The primary volatile compounds of concern, based on distribution and maximum detected concentrations, included trichloroethene (TCE), tetrachlorethene (PCE), 1,1,1- trichloroethane (1,1,1-TCA), 1,2-dichloroethane (1,2-DCA), 1,2-dichloroethene (1,2- DCE), and 1,1-dichloroethene (1,1-DCE). The preliminary remediation goals (PRGs) were established in the Record of Decision (ROD) prepared in May 1995 (NDNFEC/NYSDEC, 1995). There goals were established to control continuing releases of VOCs to groundwater.

The AS/SVE system ran continuously from August 1998 to March 2002, except during winter months. A total of 4,516.06 pounds of VOCs were removed from the groundwater during the duration of the system.

In 2002, Post Operational sampling was performed in order to close-out the AS/SVE system at Site 1.

In 2001, VOC concentrations in the extracted vapor were measured to estimate the efficiency of the extraction process. Vapor samples were analyzed via TO-14. Attachment A presents a summary of the analytical results for the extracted vapor samples.

In 2001, post treatment groundwater sampling was conducted. The analytical results above practical quantity limits (PQL) limits included chloroform in one location at 1.2 micrograms per liter (µg/L); 1,1,1- TCA in two locations and PCE at two locations. Attachment A includes the post-operational groundwater sampling results. Based upon historical groundwater data since 1998, the concentrations of VOCs in groundwater decreased since the inception of the project.

To further determine the effectiveness of the AS/SVE treatment system on VOCs in the subsurface and to delineate the current levels of polychlorinated biphenyls (PCBs) and metals in soil, another post operational soil boring program was conducted in 2002. During the post-operational soil-boring program, 41 soil borings were advanced to the top of the water table, which was approximately 65 feet bgs. The soil samples were analyzed for target compound list (TCL) VOCs, PCBs, and target analyte list (TAL) metals. Analysis of the soil samples indicates that VOCs were not detected in the majority of soil boring locations. VOCs greater than the PRGs were present in six of the soil boring locations. These VOCs were present at depths ranging from 10 to 64 feet. Six soil boring locations showed VOCs above the PRGs at depths that would have been affected by the AS/SVE system. The presence of VOCs at shallow depths indicated the difficulty of vapor extraction wells to efficiently remove more surficial VOCs. Additionally, the clay layers in the subsurface soil resulted in the potential for inefficiencies at the surface intervals. Four soil boring locations showed VOCs above the PRGs at depths that would not have been affected by the AS/SVE. The existence of VOCs at increasing depths could be due to the groundwater contamination at the site, particularly in light of the depressed water table due to the ongoing drought conditions (Foster Wheeler Environmental, Corp., 2003). Soil VOC results are included as Attachment A.

1.3 OBJECTIVE

The objective of the soil gas investigation is to determine evidence of continuous soil vapors from Site 1 migrating east beyond the Navy fence line.

1.4 SAMPLING APPROACH

The location addressed by this Work Plan is the center edge of Site 1. Soil gas borings are to be temporarily installed along the fence line running from the southeast corner of the property to the northeast corner of the site, separating the Navy property from the residential neighborhood. In addition, one soil gas boring will be installed northeast of Site 1.

Six temporary individual soil gas locations are depicted on Figure 3. In addition, soil vapor pressure monitoring (SVPM) points 11, 11S, 12 and 12S will also be sampled. The SVPM points were installed as part of the AS/SVE system for evaluating capture of injected air. For each sample location, first, a macro core will be installed to approximately 55 feet bgs and the lithology will be characterized in the field. Then each new soil gas location will be installed 2 to 3 feet away using direct-push technology (DPT) at depths of 8, 20 and 50 feet 2 to 3 feet away from each location never drilling in the same area at different depths (Table 1). There will be no survey of the temporary wells. Field measurements will be taken to define the soil gas locations.

Exact depth may be modified in the field to avoid silt/clay units. Each sample will be analyzed according to United States Environmental Protection Agency (USEPA) Method TO-15 VOCs by an Environmental Laboratory Approval Program (ELAP) certified laboratory (USEPA, 1999) (Table 2). One field blank will be taken per day to be analyzed for TO-15 VOCs. A list and anticipated detection limits are presented in Attachment B. Tentatively identified compounds will be reported.

Sample labeling information for the sampling event at Site 1 is provided in Table 2 of this Work Plan. All sample containers will be labeled with a unique sample identifier. The sample identification code will consist of up to 12 characters, as described below. Any other pertinent information regarding sample identification will be recorded in the field logbooks or on sample log sheets. These identification codes may be updated in the field based on the procedures outlined in this section.

- The first four characters indicate the site from which the sample is to be collected:
  BPS1 (Bethpage Site 1)
- The next two characters indicate the matrix:
  BPS1-SG (Soil Gas)
- The next four characters indicate the sampling location:
  BPS1-SG1001 (Location 1)
- The next two characters indicate the depth of the sample
  BPS1-SG1001-08 (8 feet bgs)

2.0 FIELD ACTIVITIES

The scope of work consists of drilling 18 temporary separate soil gas wells at six locations, 3 at each location at depths of 8, 20 and 50 feet. In addition, a macro core will be drilled to 55 feet at each of the six soil gas locations. The specific activities are as follows:

1. Identify planned and potential drilling locations.
2. Drill macro cores at six locations at depths to 55 feet bgs.
3. Define lithology of macro cores.
4. Install 18 soil gas wells at six locations.
5. Sample for TO-15 VOCs at 8, 20 and 50 feet at each of the 6 locations.

Planned soil gas locations are presented on Figure 3. Field activities by boring are presented in Table 1. Sample nomenclature and analysis are presented in Table 2. Field activities are detailed in Attachment C and summarized as follows.

1. Using a DPT drill rig advance an assembly consisting of interconnected lengths of decontaminated steel drive rods.
2. When the desired sample depth is reached, retract the sampling assembly.
3. Insert tubing into steel drive rod.
4. Proceed with soil gas sample collection.

The following methodology will be followed for preparation of SUMMA®-Type canister and initiation of the collection of the sample:

1. The field sampling team should maintain a sample log sheet summarizing the following:

   a. sample identification.
   b. date and time of sample collection.
   c. sampling depth.
   d. identity of samplers.
   e. sampling methods and devices.
   f. purge volumes.
   g. volume of soil vapor extracted.
   h. the vacuum before and after samples are collected.
   i. apparent moisture content (dry, moist, saturated, etc.) of the sampling zone.
   j. Wind speed and direction.
   k. Ambient temperature.
   l. Barometric pressure.
   m. Relative humidity.
   n. Chain of custody (COC) protocols and records used to track samples from sampling point to analysis.

2. Connect a short piece of tubing to the sampling port using a Swagelok fitting.
3. Check the seal established around the soil gas probe by using a tracer gas (e.g., Helium or SF_6).
Once the seal in integrity has been verified, additional trace gas testing may not be conducted.

The tracer gas procedures are as follows:

a. Punch a small hole in sheeting to accept sample port. Hole should be tight around port.
b. Place plastic sheeting on ground surrounding sample port.
c. Place clean bucket (open side to ground) over sample port.
d. Check seal with plastic sheeting, should be tight.
e. Seal bucket to plastic sheeting with clay sealing material.
f. Insert incoming SF_6 OR Helium line into pre-drilled hole in bucket.
g. Pull sample collection tube through pre-drilled hole in bucket.
h. Fill bucket with SF_6 or Helium gas (use caution not to pressurize system, this may drive SF_6 or Helium gas down into gas point).

4. Connect a portable vacuum pump to the sample tubing. Purge 1 to 2 (target 1.5) volumes of air from the gas point and sampling line using a portable pump [purge volume = 1.5 πr2h] at a rate of approximately 100 milliliter per minute (mL/min).

a. after installation of the probes, one to three volumes (i.e., the volume of the sample probe and tube) must be purged prior to collecting the samples to ensure samples collected are representative.
b. flow rates for both purging and collecting must not exceed 0.2 liters per minute to minimize ambient air infiltration during sampling.
c. After purging 1.5 volumes of air from the gas point, collect some of purge air in Tedlar bag for SF_6 or Helium analysis.
d. Check purged air for SF_6 or Helium contamination with portable SF_6 or Helium detector.
e. Air purged from system must maintain < 10 % SF_6 or Helium.

5. If seal around sampling port appears adequate based on SF_6 or Helium test, remove the brass plug from the SUMMA® canister and connect the flow controller with in-line particulate filter and vacuum gauge to the SUMMA® canister. Do not open the valve on the SUMMA® canister yet. Record in the field notebook and the COC the flow controller number with the appropriate SUMMA® canister number.

a. If seal is not adequate, troubleshoot for leaks and re-test using SF_6 or Helium tracer gas.
b. Do not take sample until tracer gas requirements are met (< 10 % SF_6 or Helium in purged air).

6. Connect the clean Teflon® sample collection tubing to the flow controller and the SUMMA® canister valve. Record in the field notebook the time sampling began and the canister vacuum.

7. Connect the unoccupied end of the Teflon® tubing to the tubing protruding from subsurface sampling port.
8. Open the SUMMA® canister valve and collect sample.
9. Photograph the SUMMA® canister, capturing the sample ID if possible. Also photograph canister and surrounding area, capture any available landmarks for future use in photographic logs (e.g. buildings, roads, etc).

The following methodology should be followed for completion of SUMMA®-Type sampling:

1. Arrive at the SUMMA® canister location at least 10 to 15 minutes prior to the end of the required sampling interval (e.g., 30 to 60 minutes).
2. Record the final vacuum measurement. Close the valve on the SUMMA® canister to cease sample collection. The canister should have a minimum amount of vacuum (approximately 2 inches of Hg or slightly greater).
3. Record the date and local time (24-hour basis) of valve closing in the field notebook, Soil Gas Sample Collection Log and COC.
4. Remove the particulate filter and flow controller from the SUMMA® canister, re-install the brass plug on the canister fitting, and tighten with the appropriate wrench.
5. Package the canister and flow controller in the shipping container supplied by the laboratory for return shipment to the laboratory. The SUMMA® canister does not require preservation with ice or refrigeration during shipment. Apply custody seals.
6. Complete the appropriate forms and sample labels as directed by the laboratory.
7. Ship the container to the laboratory (via overnight carrier [e.g., Federal Express]) for analysis.

Once the soil gas sample has been collected, the temporary gas points will be abandoned by removing the drive rods, and filling the resulting hole with clean sand.

Ambient air samples will be collected simultaneously with a soil gas sample. The SUMMA sample container will be positioned at a location near the associated SVMP at a height of 4 ft above grade. The ambient air sample will be obtained over a four- to eight-hour period.

3.0 Reporting

A letter report will be submitted to include; field procedures, field activities, and sampling results. All samples that will be used to make decisions on appropriate actions to address exposures and environmental contamination will be analyzed from (name of lab) an ELAP certified laboratory. Reporting limits will be identified in conjunction with the sampling results. Reporting limits will be derived from the air guideline values derived by the New York State Department of Health (NYSDOH 2006).

REFERENCES

Foster Wheeler Environmental Corp., 2003. Final Close-Out Report, Construction of a Soil Vapor Extraction/Air Sparging System at the Naval Weapons Industrial Reserve Plant Bethpage, NY. December.

New York State Department of Health (NYSDOH), 2006. FINAL Guidance for Evaluating Soil Vapor Intrusion in the State of New York. October.

Northern Division Naval Facilities Engineering Command and New York State Department of Environmental Conservation (NDNFEC/NYSDEC), 1995. Record of Decision, Naval Weapons Industrial Reserve Plant, Bethpage, New York Sites 1, 2, 3 NYS Registry: 1-30-003B. May.

Rogers, Golden & Halpern, 1986. Initial Assessment Study of NWIRP Bethpage, NY and NWIRP Calverton, NY. December.

United States Environmental Protection Agency (USEPA), 1999. Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air Second Edition Compendium Method TO-15 Determination Of Volatile Organic Compounds (VOCs) In Air Collected In Specially-Prepared Canisters And Analyzed By Gas Chromatography/ Mass Spectrometry (GC/MS). January.

TABLE 1
PRE-DESIGN FIELD INVESTIGATION
FIELD ACTIVITIES
SOIL GAS SAMPLING
NWIRP BETHPAGE, NEW YORK

Boring Number	Drilling Method	Total Depth (feet)[1]	Depth (feet)	Soil Sample	Air Sample [2]
BPS1-SG1001	DPT	55	8	no	YES
			20	no	
			50	no	
			55 DPT	continuous	
BPS1-SG1002	DPT	55	8	no	YES
			20	no	
			50	no	
			55 DPT	continuous	
BPS1-SG1003	DPT	55	8	no	YES
			20	no	
			50	no	
			55 DPT	continuous	
BPS1-SG1004	DPT	55	8	no	YES
			20	no	
			50	no	
			55 DPT	continuous	
BPS1-SG1005	DPT	55	8	no	YES
			20	no	
			50	no	
			55 DPT	continuous	
BPS1-SG1006	DPT	55	8	no	YES
			20	no	
			50	no	
			55 DPT	continuous	

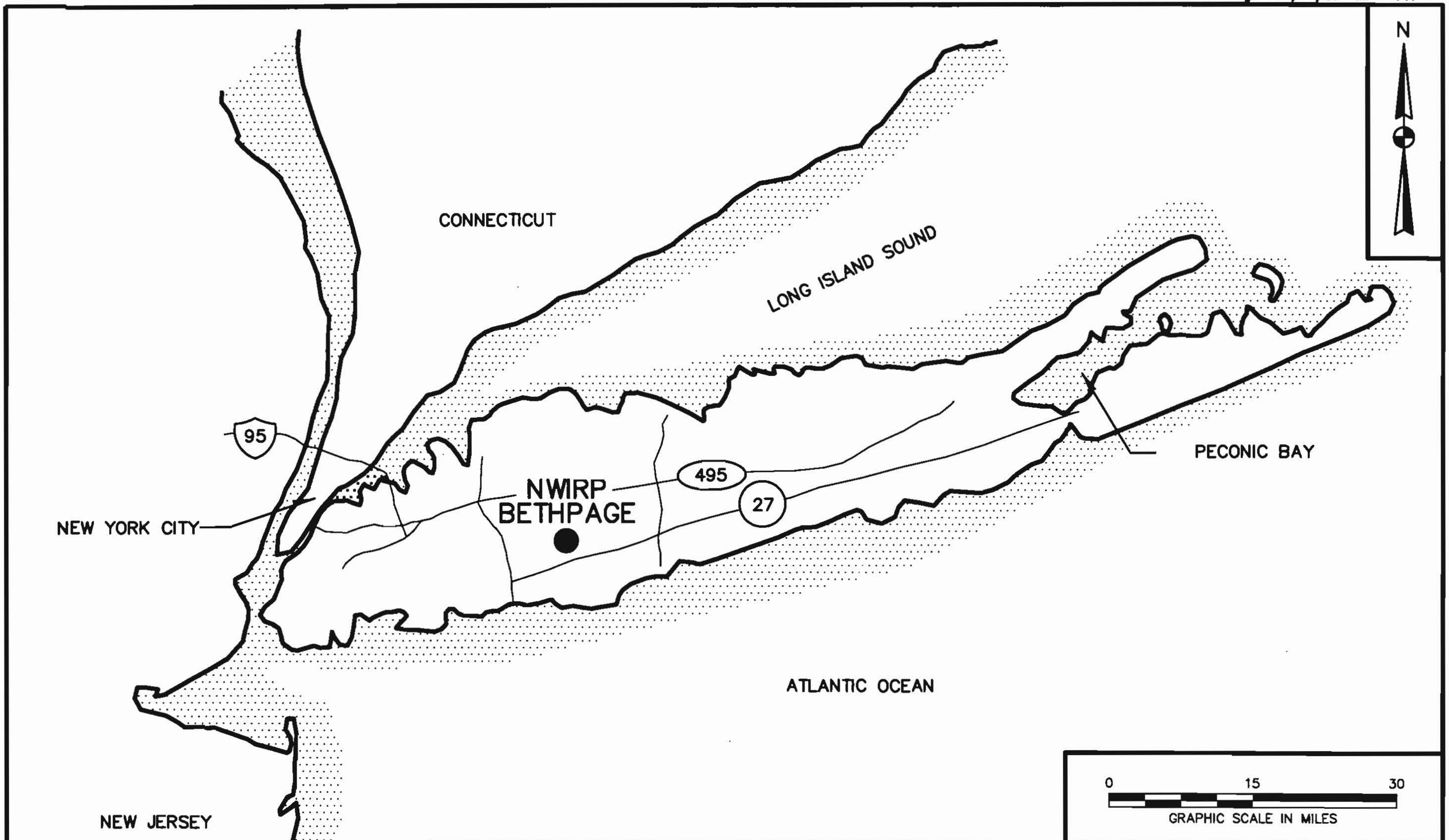
1. Depth below ground surface
2. Work area summa canister (4 to 8 hours).

DPT Direct push technology

TABLE 2
PRE-DESIGN FIELD INVESTIGATION
SAMPLE NOMENCLATURE AND ANALYTICAL METHOD
SOIL GAS SAMPLING
NWIRP BETHPAGE, NEW YORK

Location	Sample ID	Matrix	VOCs-TO15 [1]
SG1001	BPS1-SG1001-XX	Air	1
SG1001	BPS1-SG1001-XX	Air	1
SG1001	BPS1-SG1001-XX	Air	1
SG1002	BPS1-SG1002-XX	Air	1
SG1002	BPS1-SG1002-XX	Air	1
SG1002	BPS1-SG1002-XX	Air	1
SG1003	BPS1-SG1003-XX	Air	1
SG1003	BPS1-SG1003-XX	Air	1
SG1003	BPS1-SG1003-XX	Air	1
SG1004	BPS1-SG1004-XX	Air	1
SG1004	BPS1-SG1004-XX	Air	1
SG1004	BPS1-SG1004-XX	Air	1
SG1005	BPS1-SG1005-XX	Air	1
SG1005	BPS1-SG1005-XX	Air	1
SG1005	BPS1-SG1005-XX	Air	1
SG1006	BPS1-SG1006-XX	Air	1
SG1006	BPS1-SG1006-XX	Air	1
SG1006	BPS1-SG1006-XX	Air	1
SVPM 11	SVPM 11-50	Air	1
SVPM 11S	SVPM 11S-25	Air	1
SVPM 12	SVPM 12-50	Air	1
SVPM 12S	SVPM 12S-25	Air	1
Field Blank	BPS1-FB1001-XX	Air	1
Field Blank	BPS1-FB1002-XX	Air	1
Field Blank	BPS1-FB1003-XX	Air	1
Field Blank	BPS1-FB1004-XX	Air	1
Field Blank	BPS1-FB1005-XX	Air	1
Field Blank	BPS1-FB1006-XX	Air	1

VOCs: Volatile organic compounds.
XX: Bottom of sample interval in feet. For example, a soil gas sample collected at SG1001 at 20 feet below ground surface would be BPS1-SG1001-20.
1 21-Day results from Navy-approved laboratory via method TO-15.



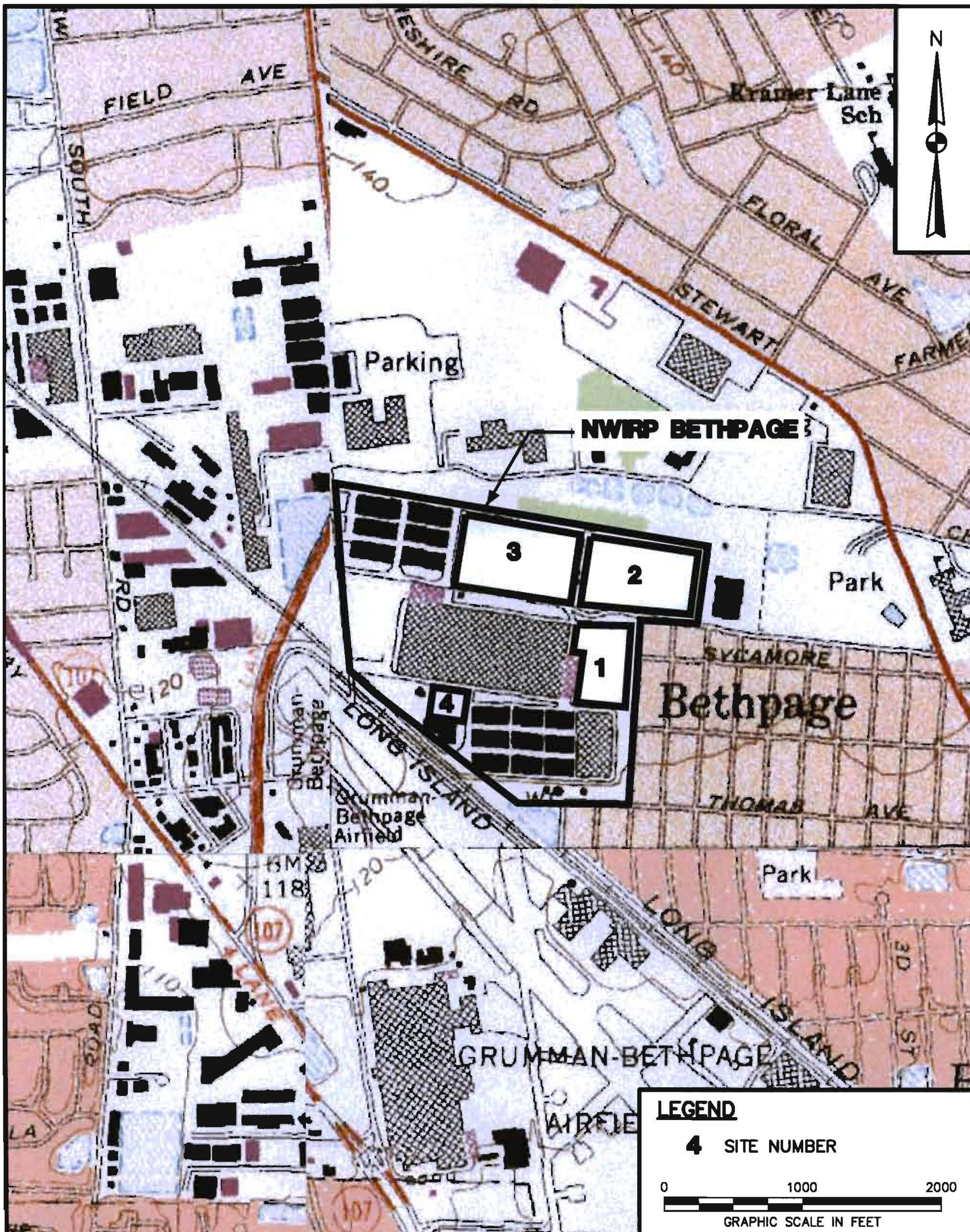
DRAWN BY MF	DATE 6/13/07
CHECKED BY	DATE
REVISED BY	DATE
SCALE AS NOTED	

Tetra Tech NUS, Inc.

GENERAL LOCATION MAP
NWIRP BETHPAGE
BETHPAGE, NEW YORK

CONTRACT NO. 0804	
OWNER NO.	
APPROVED BY	DATE
DRAWING NO. FIGURE 1	REV. 0

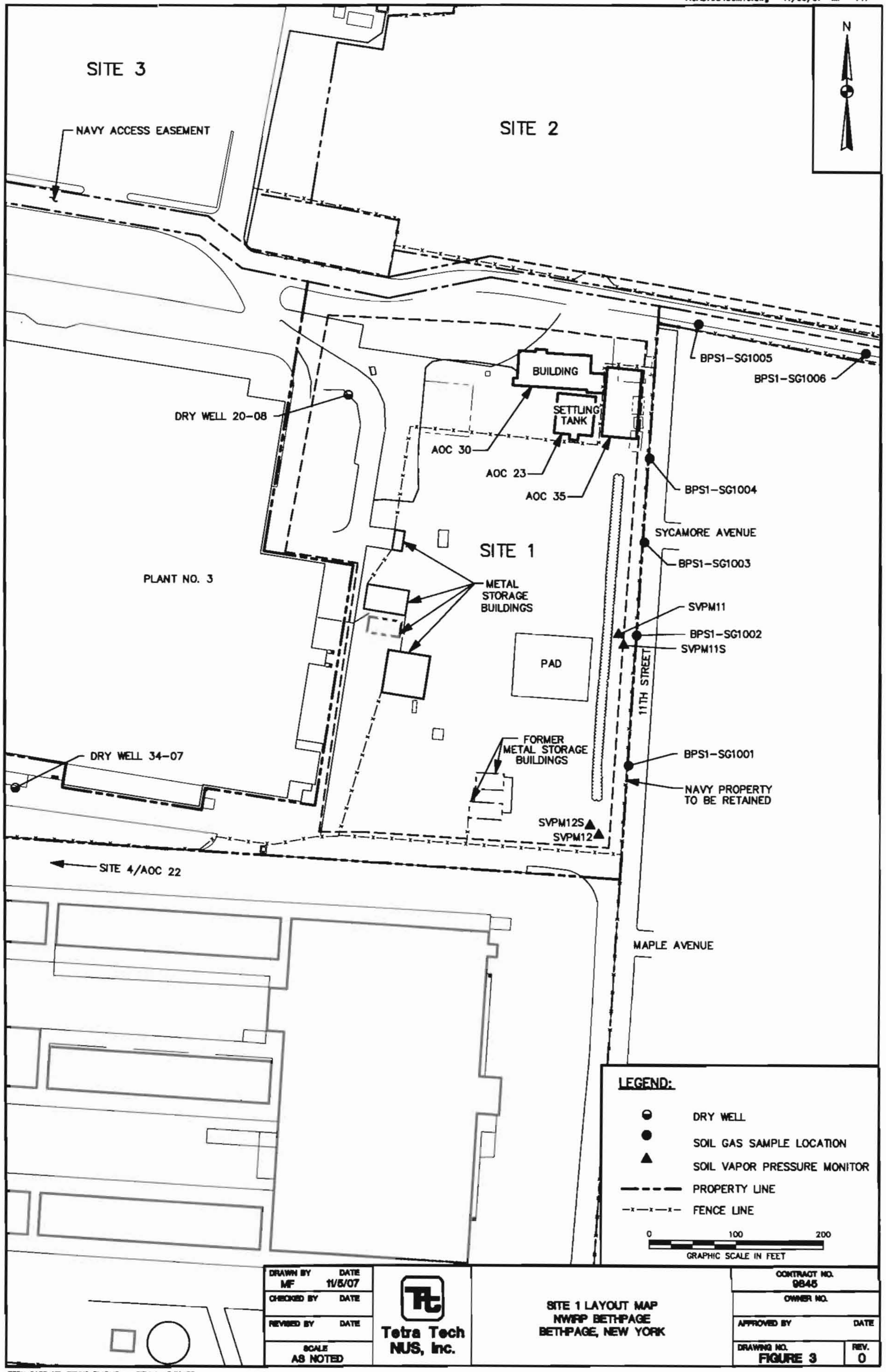
ACAD:0804CM02.dwg 06/13/07 MF PIT



DRAWN BY	DATE			CONTRACT NO.	
MF	6/13/07	Tetra Tech NUS, Inc.	SITE LOCATION MAP SITE 1 NWIRP BETHPAGE BETHPAGE, NEW YORK	0804	
CHECKED BY	DATE			OWNER NO.	
REVISED BY	DATE			APPROVED BY	DATE
SCALE AS NOTED				DRAWING NO. FIGURE 2	REV. 0

FORM CADD NO. TTNUS-AV.DWG - REV 1 -9/10/98

ACAD: 9845CM10.dwg 11/06/07 MF PIT



FORM CADD NO. TTNUS-BV.DVG - REV 1 -9/11/98

ATTACHMENT A

SOIL GAS, SOIL, AND GROUNDWATER RESULTS

Table A-1
NWIRP-BETHPAGE
Monthly Monitoring Data
System Operation

VOCs in Extracted Soil Vapor - August 2001 - NWIRP - Bethpage, NY

Parameter	08/29/2001	08/29/2001	08/29/2001	08/29/2001	08/29/2001	08/29/2001	08/29/2001	08/29/2001	08/29/2001	08/29/2001	08/29/2001	08/29/2001	08/29/2001	08/29/2001	08/29/2001
	EV01	EW01	EW02	EW03	EW04	EW05	EW06	EW07	EW08	EW08-Dup	EW09	EW10	EW11	EW12	EW13
Freon 12															
Freon 114															
Chloromethane															
Vinyl Chloride	33											390			
Bromomethane															
Chloroethane															
Freon 11										9					
1,1-Dichloroethene										5.8	4.9	12			
Freon 113	220							11	11	9.5	46	1000	150	8.4	
Methylene Chloride															
1,1-Dichloroethane	100	92	6.7				78	4.8	4.2	4.1	34	85			
cis-1,2-Dichloroethene	1100		8.5				140	13	13	4.2	170	250	19		
Chloroform										5.7					
1,1,1-Trichloroethane	910	2700	430				68	37	37	24	100	1600	100	12	
Carbon Tetrachloride															
Benzene															
1,2-Dichloroethane															
Trichloroethene	1,600	8,400	950				270	130	130	470	450	85	87		
1,2-Dichloropropane															
cis-1,3-Dichloropropene															
Toluene															
trans-1,3-Dichloropropene															
1,1,2-Trichloroethane												5.9			
Tetrachloroethene	3,400	170	110				900	1000	1000	930	660	950	1400	9	
Ethylene Dibromide															
Chlorobenzene															
Ethyl Benzene															
m+p-Xylene															
o-Xylene															
Styrene															
1,1,2,2-Tetrachloroethane															
1,3,5-Trimethylbenzene															
1,2,4-Trimethylbenzene															
1,3-Dichlorobenzene															
1,4-Dichlorobenzene															
Chlorotoluene															
1,2-Dichlorobenzene															
1,2,4-Trichlorobenzene															
Hexachlorobutadiene															
Propylene															
1,3-Butadiene															
Acetone								38	38						
Carbon Disulfide															
2-Propanol															
Trans-1,2-Dichloroethene															
Vinyl Acetate															
2-Butanone (Methyl Ethyl Ketone)						1800						43		29	
Hexane															
Tetrahydrofuran						2900	22							38	
Cyclohexane												68	16		
1,4-Dioxane															
Bromodichloromethane															
4-Methyl-2-pentanone															
2-Hexanone															
Dibromochloromethane															
Bromoform															
4-Ethyltoluene															
Ethanol															
Methyl tertiary butyl ether															
Heptane															
Total VOCs	7,363.0	11,362.0	1,505.2	0.0	0.0	4,700.0	1,478.0	1,233.8	1,233.2	7,462.3	1,464.9	4,488.9	1,772.0	96.4	0.0

Notes:

1) All results are expressed in parts per billion volume (ppbv).
2) A blank indicates that the compound was not detected.

VOCs in Extracted Soil Vapor - September 2001 - NWIRP - Bethpage, NY

Parameter	09/19/2001
	EV02
Freon 12	
Freon 114	
Chloromethane	
Vinyl Chloride	
Bromomethane	
Chloroethane	
Freon 11	
1,1-Dichloroethene	
Freon 113	120
Methylene Chloride	
1,1-Dichloroethane	45
cis-1,2-Dichloroethene	410
Chloroform	
1,1,1-Trichloroethane	420
Carbon Tetrachloride	
Benzene	
1,2-Dichloroethane	
Trichloroethene	1,000
1,2-Dichloropropane	
cis-1,3-Dichloropropene	
Toluene	
trans-1,3-Dichloropropene	
1,1,2-Trichloroethane	
Tetrachloroethene	2,400
Ethylene Dibromide	
Chlorobenzene	
Ethyl Benzene	
m+p-Xylene	
o-Xylene	
Styrene	
1,1,1,2-Tetrachloroethane	
1,3,5-Trimethylbenzene	
1,2,4-Trimethylbenzene	
1,3-Dichlorobenzene	
1,4-Dichlorobenzene	
Chlorotoluene	
1,2-Dichlorobenzene	
1,2,4-Trichlorobenzene	
Hexachlorobutadiene	
Propylene	
1,3-Butadiene	
Acetone	
Carbon Disulfide	
2-Propanol	
Trans-1,2-Dichloroethene	
Vinyl Acetate	
2-Butanone (Methyl Ethyl Ketone)	
Hexane	
Tetrahydrofuran	
Cyclohexane	
1,4-Dioxane	
Bromodichloromethane	
4-Methyl-2-pentanone	
2-Hexanone	
Dibromochloromethane	
Bromoform	
4-Ethyltoluene	
Ethanol	
Methyl tertiary butyl ether	
Heptane	
Total VOCs	4,395.0

Notes:
1) All results are expressed in parts per billion volume (ppbv).
2) A blank indicates that the compound was not detected.

VOCs in Extracted Soil Vapor - October 2001 - NWIRP - Bethpage, NY

Parameter	10/05/2001	10/27/2001	10/27/2001	10/27/2001	10/27/2001	10/27/2001	10/27/2001	10/27/2001	10/27/2001	10/27/2001	10/27/2001	10/27/2001	10/27/2001	10/27/2001	10/27/2001	10/27/2001	10/27/2001
	Sample Location																
	EV03	EV04	EW01	EW02	EW03	EW03 Dup	EW04	EW05	EW06	EW07	EW08	EW09	EW10	EW11	EW12	EW12 Dup	EW13
Freon 12																	
Freon 114																	
Chloromethane		11										3.4					
Vinyl Chloride																	
Bromomethane																	
Chloroethane																	
Freon 11																	
1,1-Dichloroethene						4.9											
Freon 113	100	76			76	70					23				5.6	5.7	21
Methylene Chloride			31						18								
1,1-Dichloroethane	33	18	35		36	32					6.2	4.6			42	38	11
cis-1,2-Dichloroethene	310	180	31		230	210			18	10	69	23			47	47	23
Chloroform																	
1,1,1-Trichloroethane	340	230	1600		750	690		7.1	5.9		30	6.9		7.9	41	40	140
Carbon Tetrachloride																	
Benzene																	
1,2-Dichloroethane																	
Trichloroethene	720	440	4800	20	2100	1800		16	93	6.1	54	44		20	280	270	210
1,2-Dichloropropane																	
cis-1,3-Dichloropropene																	
Toluene																	
trans-1,3-Dichloropropene																	
1,1,2-Trichloroethane																	
Tetrachloroethene	1,300	700	89		930	830		27	190	30	270	89		8.6	150.	150	45
Ethylene Dibromide																	
Chlorobenzene																	
Ethyl Benzene																	
m+p-Xylene																	
o-Xylene																	
Styrene																	
1,1,1,2-Tetrachloroethane																	
1,3,5-Trimethylbenzene																	
1,2,4-Trimethylbenzene					9.5	8.7											
1,3-Dichlorobenzene																	
1,4-Dichlorobenzene																	
Chlorotoluene																	
1,2-Dichlorobenzene																	
1,2,4-Trichlorobenzene																	
Hexachlorobutadiene																	
Propylene																	
1,3-Butadiene																	
Acetone												18					
Carbon Disulfide																	
2-Propanol																	
Trans-1,2-Dichloroethene																	
Vinyl Acetate																	
2-Butanone (MEK)		580					17				31						
Hexane																	
Tetrahydrofuran		540					19	29									
Cyclohexane																	
1,4-Dioxane																	
Bromodichloromethane																	
4-Methyl-2-pentanone																	
2-Hexanone																	
Dibromochloromethane																	
Bromoform																	
4-Ethyltoluene																	
Ethanol	16																
Methyl tertiary butyl ether																	
Heptane																	
Total VOCs	2,819.0	2,775.0	6,586.0	20.0	4,131.5	3,645.6	36.0	79.1	324.9	46.1	483.2	190.9	0.0	36.5	565.6	550.7	450.0

Notes:
1) All results are expressed in parts per billion volume (ppbv).
2) A blank indicates that the compound was not detected.

VOCs in Extracted Soil Vapor - November 2001 - NWIRP - Bethpage, NY

Parameter	11/11/2001	11/26/2001
	EV-05	EV-06
Freon 12		
Freon 114		
Chloromethane		
Vinyl Chloride		
Bromomethane		
Chloroethane		
Freon 11		
1,1-Dichloroethene		
Freon 113	100	120
Methylene Chloride		
1,1-Dichloroethane	29	29
cis-1,2-Dichloroethene	280	310
Chloroform		
1,1,1-Trichloroethane	340	460
Carbon Tetrachloride		
Benzene		
1,2-Dichloroethane		
Trichloroethene	550	600
1,2-Dichloropropane		
cis-1,3-Dichloropropene		
Toluene		
trans-1,3-Dichloropropene		
1,1,2-Trichloroethane		
Tetrachloroethene	980	1,800
Ethylene Dibromide		
Chlorobenzene		
Ethyl Benzene		
m+p-Xylene		
o-Xylene		
Styrene		
1,1,1,2-Tetrachloroethane		
1,3,5-Trimethylbenzene		
1,2,4-Trimethylbenzene		
1,3-Dichlorobenzene		
1,4-Dichlorobenzene		
Chlorotoluene		
1,2-Dichlorobenzene		
1,2,4-Trichlorobenzene		
Hexachlorobutadiene		
Propylene		
1,3-Butadiene		
Acetone		
Carbon Disulfide		
2-Propanol		
Trans-1,2-Dichloroethene		
Vinyl Acetate		
2-Butanone (MEK)		
Hexane		
Tetrahydrofuran		
Cyclohexane		
1,4-Dioxane		
Bromodichloromethane		
4-Methyl-2-pentanone		
2-Hexanone		
Dibromochloromethane		
Bromoform		
4-Ethyltoluene		
Ethanol		
Methyl tertiary butyl ether		
Heptane		
Total VOCs	2,279.0	3,319.0

Notes:
1) All results are expressed in parts per billion volume (ppbv).
2) A blank indicates that the compound was not detected.

VOCs in Extracted Soil Vapor - December 2001 - NWIRP - Bethpage, NY

Parameter	12/07/2001	12/28/2001
	EV-07	EV-08
Freon 12		
Freon 114		
Chloromethane		
Vinyl Chloride		
Bromomethane		
Chloroethane		
Freon 11		
1,1-Dichloroethene	5	4.1
Freon 113	94	60
Methylene Chloride		
1,1-Dichloroethane	30	24
cis-1,2-Dichloroethene	330	280
Chloroform		
1,1,1-Trichloroethane	470	400
Carbon Tetrachloride		
Benzene		
1,2-Dichloroethane		
Trichloroethene	700	620
1,2-Dichloropropane		
cis-1,3-Dichloropropene		
Toluene		
trans-1,3-Dichloropropene		
1,1,2-Trichloroethane		
Tetrachloroethene	1,300	1,200
Ethylene Dibromide		
Chlorobenzene		
Ethyl Benzene		
m+p-Xylene		
o-Xylene		
Styrene		
1,1,1,2-Tetrachloroethane		
1,3,5-Trimethylbenzene		
1,2,4-Trimethylbenzene		
1,3-Dichlorobenzene		
1,4-Dichlorobenzene		
Chlorotoluene		
1,2-Dichlorobenzene		
1,2,4-Trichlorobenzene		
Hexachlorobutadiene		
Propylene		
1,3-Butadiene		
Acetone		
Carbon Disulfide		
2-Propanol		
Trans-1,2-Dichloroethene		
Vinyl Acetate		
2-Butanone (MEK)		
Hexane		
Tetrahydrofuran		
Cyclohexane		
1,4-Dioxane		25
Bromodichloromethane		
4-Methyl-2-pentanone		
2-Hexanone		
Dibromochloromethane		
Bromoform		
4-Ethyltoluene		
Ethanol		
Methyl tertiary butyl ether		
Heptane		
Total VOCs	2,929.0	2,613.1

Notes:
1) All results are expressed in parts per billion volume (ppbv).
2) A blank indicates that the compound was not detected.

VOCs in Extracted Soil Vapor - January 2002 - NWIRP - Bethpage, NY

Parameter	01/09/2002 EV-09	01/23/2002 EV-10
Freon 12		
Freon 114		
Chloromethane		
Vinyl Chloride		
Bromomethane		
Chloroethane		
Freon 11		
1,1-Dichloroethene		
Freon 113	66	73
Methylene Chloride		
1,1-Dichloroethane	22	21
cis-1,2-Dichloroethene	260	270
Chloroform		
1,1,1-Trichloroethane	370	350
Carbon Tetrachloride		
Benzene		
1,2-Dichloroethane		
Trichloroethene	620	550
1,2-Dichloropropane		
cis-1,3-Dichloropropene		
Toluene		
trans-1,3-Dichloropropene		
1,1,2-Trichloroethane		
Tetrachloroethene	1,000	1,100
Ethylene Dibromide		
Chlorobenzene		
Ethyl Benzene		
m+p-Xylene		
o-Xylene		
Styrene		
1,1,1,2-Tetrachloroethane		
1,3,5-Trimethylbenzene		
1,2,4-Trimethylbenzene		
1,3-Dichlorobenzene		
1,4-Dichlorobenzene		
Chlorotoluene		
1,2-Dichlorobenzene		
1,2,4-Trichlorobenzene		
Hexachlorobutadiene		
Propylene		
1,3-Butadiene		
Acetone		
Carbon Disulfide		
2-Propanol		
Trans-1,2-Dichloroethene		
Vinyl Acetate		
2-Butanone (MEK)		
Hexane		
Tetrahydrofuran		
Cyclohexane		
1,4-Dioxane		
Bromodichloromethane		
4-Methyl-2-pentanone		
2-Hexanone		
Dibromochloromethane		
Bromoform		
4-Ethyltoluene		
Ethanol		
Methyl tertiary butyl ether		
Heptane		
Total VOCs	2,338.0	2,364.0

Notes:
1) All results are expressed in parts per billion volume (ppbv).
2) A blank indicates that the compound was not detected.

VOCs in Extracted Soil Vapor - February 2002 - NWIRP - Bethpage, NY

Parameter	02/08/2002 EV-11	03/01/2002 EV-12
Freon 12		
Freon 114		
Chloromethane		
Vinyl Chloride		
Bromomethane		
Chloroethane		
Freon 11		
1,1-Dichloroethene		
Freon 113	54	59
Methylene Chloride		
1,1-Dichloroethane	19	17
cis-1,2-Dichloroethene	260	200
Chloroform		
1,1,1-Trichloroethane	360	270
Carbon Tetrachloride		
Benzene		
1,2-Dichloroethane		
Trichloroethene	610	450
1,2-Dichloropropane		
cis-1,3-Dichloropropene		
Toluene		
trans-1,3-Dichloropropene		
1,1,2-Trichloroethane		
Tetrachloroethene	1,300	860
Ethylene Dibromide		
Chlorobenzene		
Ethyl Benzene		
m+p-Xylene		
o-Xylene		
Styrene		
1,1,1,2-Tetrachloroethane		
1,3,5-Trimethylbenzene		
1,2,4-Trimethylbenzene		
1,3-Dichlorobenzene		
1,4-Dichlorobenzene		
Chlorotoluene		
1,2-Dichlorobenzene		
1,2,4-Trichlorobenzene		
Hexachlorobutadiene		
Propylene		
1,3-Butadiene		
Acetone		
Carbon Disulfide		
2-Propanol		
Trans-1,2-Dichloroethene		
Vinyl Acetate		
2-Butanone (MEK)		
Hexane		
Tetrahydrofuran		
Cyclohexane		
1,4-Dioxane		
Bromodichloromethane		
4-Methyl-2-pentanone		
2-Hexanone		
Dibromochloromethane		
Bromoform		
4-Ethyltoluene		
Ethanol		
Methyl tertiary butyl ether		
Heptane		
Total VOCs	2,603.0	1,856.0

Notes:
1) All results are expressed in parts per billion volume (ppbv).
2) A blank indicates that the compound was not detected.

Table B-2 Post-Operational Groundwater Analytical Results

Client Sample ID	MW-103-032602			POSB-09-HP-6667			BPPOSB-20-HP6263			POSB-24-HP-6768			POSB-SEHP-6868			POSB-SWHP-6668			POSB-SWHP-6668D		
Lab Sample ID	P1954-01			P2184-03			P2156-01			P2184-01			P2199-01			P2199-03			P2199-04		
Sample Collection Date		03/26/2002			04/12/2002			04/12/2002			04/12/2002			04/15/2002			04/15/2002			04/15/2002	
Sample Matrix		WATER			WATER			WATER			WATER			WATER			WATER			WATER	
Units		ug/L			ug/L			ug/L			ug/L			ug/L			ug/L			ug/L	
	PQL	CONC	Q	PQL	CONC	Q	MDL	CONC	Q	PQL	CONC	Q	PQL	CONC	Q	PQL	CONC	Q	PQL	CONC	Q
Chloromethane	2.8	ND		5	ND		5	ND		5	ND		1.7	ND		1.7	ND		1.7	ND	
Vinyl Chloride	1.8	ND		5	ND		5	ND		5	ND		2	ND		2	ND		2	ND	
Bromomethane	1.9	ND		5	ND		5	ND		5	ND		2.1	ND		2.1	ND		2.1	ND	
Chloroethane	2.3	ND		5	ND		5	ND		5	ND		2.9	ND		2.9	ND		2.9	ND	
1,1-Dichloroethene	1.6	ND		5	ND		5	ND		5	ND		1.3	ND		1.5	ND		1.1	ND	
Acetone	5.8	ND		5	ND		5	ND		5	ND		2.3	13		2.3	9.7		2.3	9.2	
Carbon Disulfide	1	ND		5	ND		5	ND		5	ND		2.2	ND		2.2	ND		2.2	ND	
Methylene Chloride	1.1	ND		5	ND		5	1.9	JB	5	ND		2.2	ND		2.2	ND		2.2	ND	
trans-1,2-Dichloroethene	1.7	ND		5	ND		5	ND		5	ND		2.4	ND		2.4	ND		2.4	ND	
1,1-Dichloroethane	1	ND		5	ND		5	ND		5	4.9	J	2.2	ND		2.2	ND		2.2	ND	
2-Butanone	5.6	ND		5	ND		5	ND		5	ND		1.6	1.8	J	1.6	ND		1.6	ND	
cis-1,2-Dichloroethene	1.8	0.9	J	5	ND		5	ND		5	2.5	J	2.4	ND		2.4	ND		2.4	ND	
Chloroform	1	1.2		5	ND		5	ND		5	ND		2.7	ND		2.7	ND		2.7	ND	
1,1,1-Trichloroethane	1.5	ND		5	48		5	ND		5	5.2		2.5	4.4	J	2.5	ND		2.5	ND	
Carbon Tetrachloride	1	ND		5	ND		5	ND		5	ND		2.4	ND		2.4	3.4	J	2.4	3.5	J
Benzene	1	ND		5	ND		5	ND		5	ND		1.6	ND		1.8	ND		1.8	ND	
1,2-Dichloroethane	2.5	ND		5	ND		5	ND		5	ND		2.6	ND		2.6	ND		2.6	ND	
Trichloroethene	2.8	29		5	ND		5	1.4	J	5	1.7	J	2.6	ND		2.6	ND		2.6	ND	
1,2-Dichloropropane	3.6	ND		5	ND		5	ND		5	ND		1.9	ND		1.9	ND		1.9	ND	
Bromodichloromethane	1	ND		5	ND		5	ND		5	ND		2.5	ND		2.5	2.7	J	2.5	2.6	J
4-Methyl-2-Pentanone	3	ND		5	ND		5	ND		5	ND		2.2	ND		2.2	ND		2.2	ND	
Toluene	1.2	ND		5	ND		5	1.4	J	5	ND		1.7	ND		1.7	ND		1.7	ND	
t-1,3-Dichloropropene	1.7	ND		5	ND		5	ND		5	ND		2.5	ND		2.5	ND		2.5	ND	
cis-1,3-Dichloropropene	1	ND		5	ND		5	ND		5	ND		2.2	ND		2.2	ND		2.2	ND	
1,1,2-Trichloroethane	1.1	ND		5	ND		5	ND		5	ND		1.7	ND		1.7	ND		1.7	ND	
2-Hexanone	12	ND		5	ND		5	ND		5	ND		2.5	ND		2.6	ND		2.5	ND	
Dibromochloromethane	1	ND		5	ND		5	ND		5	ND		2.1	ND		2.1	ND		2.1	ND	
Tetrachloroethene	1.6	18		5	1.7	J	5	2.6	J	5	21		2	2.8	J	1.6	ND		1.5	ND	
Chlorobenzene	1	ND		5	ND		5	ND		5	ND		2.8	ND		2.8	ND		2.8	ND	
Ethyl Benzene	1.5	ND		5	ND		5	ND		5	ND		2.5	ND		2.6	ND		2.5	ND	
m/p-Xylenes	1.5	ND		5	ND		5	ND		5	ND		1.8	ND		1.8	ND		1.8	ND	
o-Xylene	1.7	ND		5	ND		5	ND		5	ND		1.9	ND		1.9	ND		1.9	ND	
Styrene	1	ND		5	ND		5	ND		5	ND		1.6	ND		1.6	ND		1.6	ND	
Bromoform	1	ND		5	ND		5	ND		5	ND		3.9	ND		3.9	ND		3.9	ND	
1,1,2,2-Tetrachloroethane	2.2	ND		5	ND		5	ND		5	ND		1.8	ND		1.8	ND		1.8	ND	

Table C-1 Volatile Organic Compounds
NWIRP Bethpage Post Operational Sampling

Client Sample ID	POSB-1-1012			POSB-1-1062			POSB-1-2224			POSB-2-1012			POSB-2-2022			POSB-2-5254			POSB-3-1012		
Lab Sample ID	P2337-01			P2337-06			P2337-02			P2337-03			P2337-04			P2337-05			P2126-03		
Sample Collection Date	04/23/2002			04/23/2002			04/23/2002			04/23/2002			04/23/2002			04/23/2002			04/09/2002		
Sample Receipt Date	04/24/2002			04/24/2002			04/24/2002			04/24/2002			04/24/2002			04/24/2002			04/10/2002		
Sample Matrix	SOIL			SOIL			SOIL			SOIL			SOIL			SOIL			SOIL		
Units	ug/Kg			ug/Kg			ug/Kg			ug/Kg			ug/Kg			ug/Kg			ug/Kg		
	PQL	CONC	Q	PQL	CONC	Q	PQL	CONC	Q	PQL	CONC	Q	PQL	CONC	Q	PQL	CONC	Q	PQL	CONC	Q
Chloromethane	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		3.4	ND	
Vinyl Chloride	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		2.2	ND	
Bromomethane	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		2.4	ND	
Chloroethane	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		2.7	ND	
1,1-Dichloroethene	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		2	ND	
Acetone	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		7	ND	
Carbon Disulfide	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		1.2	ND	
Methylene Chloride	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		1.2	1.5	B
trans-1,2-Dichloroethene	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		2.1	ND	
1,1-Dichloroethane	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		1.2	ND	
2-Butanone	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		6.8	ND	
cis-1,2-Dichloroethene	6	ND		6.7	ND		5.1	ND		5.6	4.9	J	5.3	1.2	J	660	ND		2.2	ND	
Chloroform	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		1.2	ND	
1,1,1-Trichloroethane	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	1.3	J	660	12000		1.8	ND	
Carbon Tetrachloride	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		1.2	ND	
Benzene	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		1.2	ND	
1,2-Dichloroethane	5	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		3	ND	
Trichloroethene	6	2.6	J	6.7	ND		5.1	ND		5.6	4.4	J	5.3	ND		660	ND		3.4	ND	
1,2-Dichloropropane	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		4.4	ND	
Bromodichloromethane	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		1.2	ND	
4-Methyl-2-Pentanone	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		3.7	ND	
Toluene	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	1500		1.5	ND	
t-1,3-Dichloropropene	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		2	ND	
cis-1,3-Dichloropropene	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		1.2	ND	
1,1,2-Trichloroethane	6	ND		6.7	ND		6.1	ND		5.6	ND		5.3	ND		660	ND		1.3	ND	
2-Hexanone	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		15	ND	
Dibromochloromethane	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		1.2	ND	
Tetrachloroethene	6	3	J	6.7	ND		6.1	ND		5.6	1.5	J	5.3	13		660	220	J	2	ND	
Chlorobenzene	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		1.2	ND	
Ethyl Benzene	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	270	J	1.8	ND	
m/p-Xylenes	6	ND		6.7	ND		6.1	ND		5.6	ND		5.3	ND		660	1600		1.9	ND	
o-Xylene	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	1900		2	ND	
Styrene	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		1.2	ND	
Bromoform	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		1.2	ND	
1,1,2,2-Tetrachloroethane	6	ND		6.7	ND		6.1	ND		5.6	ND		5.3	ND		660	ND		2.7	ND	

PQL - Practical Quantitation Limit
ND - Non detect
J - Estimated concentration
B - Also within associated blank
D - Concentration from secondary dilution

ATTACHMENT B

TO-15 ANALYTE LIST

Air Toxics LTD.
180 Blue Ravine Road, Suite B Folsom, CA 95630

Method: Modified TO-15-LL (Sp)/SpRLs-NYSDOH (2007)

Compound	Rpt.Limit(ppbv)
1,1,1-Trichloroethane	0.050
Carbon Tetrachloride	0.050
Trichloroethene	0.050
Bromodichloromethane	0.050
1,1,2-Trichloroethane	0.050
Tetrachloroethene	0.050
Dibromochloromethane	0.050
1,2-Dibromoethane (EDB)	0.050
1,1,2,2-Tetrachloroethane	0.050
1,3-Dichlorobenzene	0.050
1,4-Dichlorobenzene	0.050
1,2-Dichlorobenzene	0.050
Freon 12	0.050
Freon 114	0.050
Freon 11	0.050
Freon 113	0.050
Bromoform	0.050
Vinyl Chloride	0.10
1,1-Dichloroethene	0.10
1,1-Dichloroethane	0.10
cis-1,2-Dichloroethene	0.10
Benzene	0.10
1,2-Dichloroethane	0.10
Toluene	0.10
Ethyl Benzene	0.10
m,p-Xylene	0.10
o-Xylene	0.10
trans-1,2-Dichloroethene	0.10
Methyl tert-butyl ether	0.10
Chloromethane	0.10
Bromomethane	0.10
Chloroethane	0.10
Hexane	0.10
2-Butanone (Methyl Ethyl Ketone)	0.10
Chloroform	0.10
Cyclohexane	0.10
1,2-Dichloropropane	0.10
1,4-Dioxane	0.10
cis-1,3-Dichloropropene	0.10
4-Methyl-2-pentanone	0.10
trans-1,3-Dichloropropene	0.10

Reporting limits cited do not take into account sample dilution due to canister pressurization.

Toll Free: 1-800-985-5955 Phone: 1-916-985-1000 Fax: 1-916-985-1020 email: atl@airtoxics.com www.airtoxics.com

Air Toxics LTD.
180 Blue Ravine Road, Suite B Folsom, CA 95630

Method: Modified TO-15-LL (Sp)/SpRLs-NYSDOH (2007)

Chlorobenzene	0.10
Styrene	0.10
1,3,5-Trimethylbenzene	0.10
1,2,4-Trimethylbenzene	0.10
alpha-Chlorotoluene	0.10
2,2,4-Trimethylpentane	0.10
tert-Butyl alcohol	0.50
Methylene Chloride	0.50
Hexachlorobutadiene	0.50
Ethanol	0.50
1,2,4-Trichlorobenzene	0.50

Surrogate	Method Limits
4-Bromofluorobenzene	70-130
1,2-Dichloroethane-d4	70-130
Toluene-d8	70-130

Reporting limits cited do not take into account sample dilution due to canister pressurization.

Toll Free: 1-800-985-5955 Phone: 1-916-985-1000 Fax: 1-916-985-1020 email: atl@airtoxics.com www.airtoxics.com

ATTACHMENT C

SOIL GAS SAMPLING PROCEDURES

5.8 Soil Gas Sampling

Due to the highly sensitive nature of soil vapor sampling, strict precautions have been incorporated into the sampling procedure and are specified in this section. Many of these activities are universally applicable in environmental sample collection as part of safe work practices (see HASP) and quality assurance best work practices (see QAPP), such precautions are re-stated herein. Precautions are as follows:

- Sampling personnel should not handle hazardous substances (e.g., gasoline), permanent marking pens, or smoke before and/or during the sampling event.
- Sampling crew should also wear nitrile gloves when handling tubing, connectors or SUMMA® canisters to avoid potential cross-contamination.
- Care should also be taken to ensure that the flow controller is pre-calibrated by the supplying laboratory to the proper sample collection time (confirm with laboratory). Sample integrity is maintained if the sampling event is shorter than the target duration, sample integrity can be compromised if the event is extended to the point that the canister reaches atmospheric pressure. Sampling personnel should record vacuum pre and post sampling, post sampling vacuum should not reach zero vacuum (2 inches of Hg is target).
- Care must be taken to maintain integrity of sampling tubing. Tubing exposed to contaminants can yield false-positive VOC concentrations (due to the low detection limits required). Consequently, do not store tubing near sources of possible contamination including fuels, solvents, exhaust, smoke, etc. Use new lengths of tubing for each sample and replace between samples.
- During helium gas tracer testing, use caution not to pressurize system, this may drive helium vapor down into SGP.
- Equipment used for sampling and tracer gas testing should also be kept clean and stored in a manner to maintain fitness for use.
- If samples from multiple depths are to be collected at a given location, separate boreholes should be advanced for each sample to be collected. Continuous coring (see RI/FS Work Plan Table 1) will be performed, as needed, to prevent smearing of the borehole walls. The shallowest sample will collected first to determine the sampling sequence. Sample boreholes should be separated by a minimum of 5 feet (field conditions may warrant slight modifications in borehole locations).

5.8.1 Soil Gas Sampling

If a semi-permanent SGP is selected (i.e., more than one round of sampling is needed), then the following methodology should be followed:

1. Advance an assembly consisting of interconnected lengths of decontaminated 1.25-inch-diameter steel drive rods, affixed with an expendable PRT system point holder and expendable PRT system point at the downhole end, to the desired sampling interval.

2. When the desired sample depth is reached, attach the stainless steel sampling implant to the appropriate tubing. Pre-cut tubing and leave approximately 4 feet of extra tubing. Plug the open end of the tubing to avoid contamination.
3. Remove pull cap from probe rod and lower sample tubing down inside of probe rod until the implant hits the drive point.
4. Rotate tubing counterclockwise while exerting a gentle downward force to engage PRT threads. When threads are fully seated, pull up gently on tubing to test proper thread engagement. Retract probe rods (12 inches) while pushing down on the Teflon® tubing.
5. When retracted 12 inches, use funnel to pour Morie #1 filter pack sand down inside of probe rod to surround outside of Teflon® tubing. Use tubing to stir and settle sand into SGP. Approximately 150 mL of sand should fill space around implant.
6. Retract probe rods an additional 18 to 24 inches and pour in bentonite seal material. Chasing the bentonite with distilled water may be necessary.
7. Continue retracting probe rods and begin to fill in gas point with Sacrete or other concrete mix. Retract probe rod 18 to 24 inches at a time and add concrete mix after each retraction as previous step.
8. Finish sample gas point installation by securing PVC valve on exposed Teflon® tubing; installing flush cap and marking location.
9. Neatly coil extra Teflon® tubing inside of well cap and cover gas point.
10. Proceed with soil gas collection.

If a temporary SGP with PRT system is to be installed the following procedure should be followed:

1. Advance an assembly consisting of interconnected lengths of decontaminated 1.25-inch-diameter steel drive rods, affixed with an expendable PRT system point holder and expendable PRT system point at the downhole end, to the bottom of the desired sampling interval.
2. When the desired sample depth is reached, retract the sampling assembly approximately 6 inches (or greater if necessary), allowing the expendable point to fall off, and creating a void in the subsurface for soil gas sample collection. Remove pull cap of probe rod and position direct-push rig to allow collection of sample.
3. Fit PRT tubing with PRT adaptor, secure connection with Parafilm (film does not contact sample) and fit PRT adaptor with O-ring.
4. Insert PRT tubing into steel drive rod. Work tubing to bottom of drive rod until contact with expendable point holder is made. Cut PRT tubing, leaving two feet of extra tubing outside of probe rod.
5. Grasp PRT tubing and apply downward pressure while rotating counterclockwise to engage threads with point holder. When threads are fully seated, pull up gently on tubing to test proper thread engagement.
6. Proceed with soil gas sample collection (With PRT system no bentonite sealing material is required; the system is airtight).

The following methodology should be followed for preparation of SUMMA®-Type canister and initiation of the collection of the sample:

1. Record the following information from the site; if necessary (contact the local airport or other suitable information source to obtain the information):
   a. Wind speed and direction;
   b. Ambient temperature;
   c. Barometric pressure; and
   d. Relative humidity.
2. Connect a short piece of tubing to the sampling port using a Swagelok fitting.
3. Check the seal established around the soil gas probe by using a tracer gas (e.g., helium). Once the seal in integrity has been verified, additional trace gas testing may not be conducted.

The tracer gas procedures are as follows:

   a. Punch a small hole in sheeting to accept sample port. Hole should be tight around port.
   b. Place plastic sheeting on ground surrounding sample port.
   c. Place clean bucket (open side to ground) over sample port.
   d. Check seal with plastic sheeting, should be tight.
   e. Seal bucket to plastic sheeting with clay sealing material.
   f. Insert incoming helium line into pre-drilled hole in bucket.
   g. Pull sample collection tube through pre-drilled hole in bucket.
   h. Fill bucket with helium gas (use caution not to pressurize system, this may drive helium gas down into gas point)
4. Connect a portable vacuum pump to the sample tubing. Purge 1 to 2 (target 1.5) volumes of air from the gas point and sampling line using a portable pump [purge volume = $1.5\ \pi r^2 h$] at a rate of approximately 100 mL/min.
   a. After purging 1.5 volumes of air from the gas point, collect some of purge air in Tedlar bag for helium analysis.
   b. Check purged air for helium contamination with portable helium detector.
   c. Air purged from system must maintain < 10 % helium.
5. If seal around sampling port appears adequate based on helium test, remove the brass plug from the SUMMA® canister and connect the flow controller with in-line particulate filter and vacuum gauge to the SUMMA® canister. Do not open the valve on the SUMMA® canister yet. Record in the field notebook and the COC the flow controller number with the appropriate SUMMA® canister number.
   a. If seal is not adequate, troubleshoot for leaks and re-test using helium tracer gas.
   b. Do not take sample until tracer gas requirements are met (< 10 % helium in purged air).

6. Connect the clean Teflon® sample collection tubing to the flow controller and the SUMMA® canister valve. Record in the field notebook the time sampling began and the canister vacuum.
7. If required, collect duplicate sample by attaching second SUMMA® canister with stainless steel "T" fitting.
8. Connect the unoccupied end of the Teflon® tubing to the tubing protruding from subsurface sampling port.
9. Open the SUMMA® canister valve and collect sample.
10. Photograph the SUMMA® canister, capturing the sample ID if possible. Also photograph canister and surrounding area, capture any available landmarks for future use in photographic logs (e.g. buildings, roads, etc).

The following methodology should be followed for completion of SUMMA®-Type sampling:

1. Arrive at the SUMMA® canister location at least 10 to 15 minutes prior to the end of the required sampling interval (e.g., 30 to 60 minutes).
2. Record the final vacuum measurement. Close the valve on the SUMMA® canister to cease sample collection. The canister should have a minimum amount of vacuum (approximately 2 inches of Hg or slightly greater).
3. Record the date and local time (24-hour basis) of valve closing in the field notebook, Soil Gas Sample Collection Log, and COC (see forms in QAPP).
4. Remove the particulate filter and flow controller from the SUMMA® canister, re-install the brass plug on the canister fitting, and tighten with the appropriate wrench.
5. Package the canister and flow controller in the shipping container supplied by the laboratory for return shipment to the laboratory. The SUMMA® canister does not require preservation with ice or refrigeration during shipment. Apply custody seals if required by field sampling plan.
6. Complete the appropriate forms and sample labels as directed by the laboratory.
7. Ship the container to the laboratory (via overnight carrier [e.g., Federal Express]) for analysis.

Once the soil gas sample has been collected, the temporary gas points will be abandoned by removing the drive rods, and filling the resulting hole with clean sand. If sampling semi-permanent SGP, affix PVC valve on Teflon® tubing, replace flush mount cap, and mark location of SGP with flag or white spray paint.

Ambient air samples will be collected simultaneously with a soil gas sample (see Table 1 of the RI/FS Work Plan). The SUMMA sample container will be positioned at a location near the associated SGP at a height of 4 ft above grade. The ambient air sample will be obtained over an eight-hour period.

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND, MID-ATLANTIC
9742 MARYLAND AVENUE
NORFOLK, VA 23511-3095

IN REPLY REFER TO:

5090
OPNEEV4/SWC
September 5, 2007

Mr. Steven M. Scharf
New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Action Bureau A, 11th Floor
625 Broadway
Albany, New York 12233-7015

Subject: LETTER WORK PLAN, SOIL GAS INVESTIGATION AT SITE 1 – FORMER DRUM MARSHALLING AREA, AUGUST 2007, NWIRP BETHPAGE, NEW YORK

Dear Mr. Scharf:

The Navy is forwarding two copies of the enclosed "Letter Work Plan, Soil Gas Investigation at Site 1 – Former Drum Marshalling Area, August 2007, NWIRP Bethpage, New York" for your use. This report discusses the Navy's Soil Gas Investigation Activities at NWIRP Bethpage that are planned in the near future.

This report will be reviewed at the September 17, 2007 meeting at your offices in Albany. Please contact me if you have any questions.

Sincerely,

Susan W. Clarke

SUSAN W. CLARKE
Remedial Project Manager
By Direction of the
Commanding Officer

Subject: LETTER WORK PLAN, SOIL GAS INVESTIGATION AT SITE 1 – FORMER DRUM MARSHALLING AREA, AUGUST 2007, NWIRP BETHPAGE, NEW YORK

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LETTER WORK PLAN
SOIL VAPOR INVESTIGATION
SITE 1
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT
BETHPAGE, NEW YORK

1.0 INTRODUCTION

This Work Plan has been prepared to describe Soil Vapor Investigation activities at the Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage, Long Island, New York (Figures 1 and 2) . The soil vapor investigation results will be used to determine whether there are contaminated soil vapors at the fence line that may adversely affect the nearby residences. Site 1 was identified as having been impacted by historic releases of chlorinated solvents and was remediated via an air sparging/soil vapor extraction (AS/SVE) system in the late 1990's.

The program will consist of the installation of fifteen soil gas points in five locations and at depths of 8 feet, 20 feet and 50 feet below ground surface (bgs). In addition, macro core samples to a depth of 55 feet bgs will be taken first in each location to identify the lithology. Soil gas samples will be analyzed for TO-15A volatile organic compounds (VOCs).

1.1 SITE HISTORY

The NWIRP was established in 1933. Since its inception, the plant's primary mission has been the research prototyping, testing, design engineering, fabrication, and primary assembly of military aircraft. The facilities at NWIRP included four plants used for assembly and prototype testing; a group of quality control laboratories, two warehouses complexes (north and south), a salvage storage area, water recharge basins, the Industrial Wastewater Treatment Plant, and several smaller support buildings. In 1998, operations ended at the facilities.

1.2 BACKGROUND

In 1985, an Initial Assessment Study (IAS) conducted at the NWIRP Bethpage, NY, identified materials stored at Site 1 the Former Drum Marshaling Area to include waste halogenated and non-halogenated solvents (Rogers, Golden & Halpern, 1986). Cadmium and cyanide were also stored in Area 2 within Site 1 from the early 1950s through 1974. Reportedly, 200 to 300 drums were stored at each area at any one time within Site 1. Reportedly, there was no direct evidence of hazardous waste spills at Site 1. An abandoned septic drainage system almost completely underlies the entire area of Site 1.

This site is located in the middle third of the NWIRP Bethpage facility and is east of Plant No. 3, see Figure 2. Site 1 occupies approximately four acres, and contains a concrete storage pad and an abandoned cesspool leach field. Historically, this site was also used as a storage area for various types of equipment and heavy materials, including transformers. Site 1 is enclosed by a six-foot high, chain-link fence. The site is relatively flat, with the eastern portion covered with sandy soils, gravel, grass, and one concrete pad. The western portion of the site is predominantly covered with concrete. A vegetated wind row (pine) and wood fence are present along the eastern edge of the site to reduce community visibility. Hazardous waste management practices for Northrop Grumman facilities included the staging of drummed wastes on the NWIRP-Bethpage property. This storage first took place on a gravel surface over the cesspool field, east of Plant No. 3. In 1978, the collection and marshaling point was moved a few yards south of the original site, to an area on a concrete pad. In 1982, drummed waste storage was relocated to another Drum Marshaling facility located in the Salvage Storage Area, which is not at Site 1.

An AS/SVE system was constructed in 1998 to address VOCs in site soils. The primary volatile compounds of concern, based on distribution and maximum detected concentrations, included trichloroethene (TCE), tetrachlorethene (PCE), 1,1,1- trichloroethane (1,1,1-TCA), 1,2-dichloroethane (1,2-DCA), 1,2-dichloroethene (1,2- DCE), and 1,1-dichloroethene (1,1-DCE). The preliminary remediation goals (PRGs) were established in the Record of Decision (ROD) prepared in May 1995 (NDNFEC/NYSDEC, 1995). There goals were established to control continuing releases of VOCs to groundwater.

The AS/SVE system ran continuously from August 1998 to March 2002, except during winter months. A total of 4,516.06 pounds of VOCs were removed from the groundwater during the duration of the system.

In 2002, Post Operational sampling was performed in order to close-out the AS/SVE system at Site 1.

In 2001, VOC concentrations in the extracted vapor were measured to estimate the efficiency of the extraction process. Vapor samples were analyzed via TO-14. Attachment A presents a summary of the analytical results for the extracted vapor samples.

In 2001, post treatment groundwater sampling was conducted. The analytical results above practical quantity limits (PQL) limits included chloroform in one location at 1.2 micrograms per liter (µg/L); 1,1,1- TCA in two locations and PCE at two locations. Attachment A includes the post-operational groundwater sampling results. Based upon historical groundwater data since 1998, the concentrations of VOCs in groundwater decreased since the inception of the project.

To further determine the effectiveness of the AS/SVE treatment system on VOCs in the subsurface and to delineate the current levels of polychlorinated biphenyls (PCBs) and metals in soil, another post operational soil boring program was conducted in 2002. During the post-operational soil-boring program, 41 soil borings were advanced to the top of the water table, which was approximately 65 feet bgs. The soil samples were analyzed for target compound list (TCL) VOCs, PCBs, and target analyte list (TAL) metals. Analysis of the soil samples indicates that VOCs were not detected in the majority of soil boring locations. VOCs greater than the PRGs were present in six of the soil boring locations. These VOCs were present at depths ranging from 10 to 64 feet. Six soil boring locations showed VOCs above the PRGs at depths that would have been affected by the AS/SVE system. The presence of VOCs at shallow depths indicated the difficulty of vapor extraction wells to efficiently remove more surficial VOCs. Additionally, the clay layers in the subsurface soil resulted in the potential for inefficiencies at the surface intervals. Four soil boring locations showed VOCs above the PRGs at depths that would not have been affected by the AS/SVE. The existence of VOCs at increasing depths could be due to the groundwater contamination at the site, particularly in light of the depressed water table due to the ongoing drought conditions (Foster Wheeler Environmental, Corp., 2003). Soil VOC results are included as Attachment A.

1.3 OBJECTIVE

The objective of the soil gas investigation is to determine evidence of continuous soil vapors from Site 1 migrating east beyond the Navy fence line.

1.4 SAMPLING APPROACH

The location addressed by this Work Plan is the center edge of Site 1. Soil gas borings are to be temporarily installed along the fence line running from the southeast corner of the property to the northeast corner of the site, separating the navy property from the residential neighborhood.

Five temporary individual soil gas locations are depicted on Figure 3. The soil vapor pressure monitor (SVPMs) points will be installed near the AS/SVE system to characterize the number of captured injected air. In addition, SVPM 11, 11S, 12 and 12S will also be sampled. For each sample location, first, a macro core will be installed to approximately 55 feet bgs and the lithology will be characterized in the field. Then each new soil gas location will be installed 2 to 3 feet away using direct-push technology (DPT) at depths of 8, 20 and 50 feet 2 to 3 feet away from each location never drilling in the same area at different depths (Table 1). There will be no survey of the temporary wells. Field measurements will be taken to define the soil gas locations.

Exact depth may be modified in the field to avoid silt/clay units. Each sample will be analyzed according to United States Environmental Protection Agency (USEPA) Method TO-15A VOCs by an Environmental Laboratory Approval Program (ELAP) certified laboratory (USEPA, 1999) (Table 2). One field blank will be taken per day to be analyzed for TO-15 VOCs.

Sample labeling information for the sampling event at Site 1 is provided in Table 2 of this Work Plan. All sample containers will be labeled with a unique sample identifier. The sample identification code will consist of up to 12 characters, as described below. Any other pertinent information regarding sample identification will be recorded in the field logbooks or on sample log sheets. These identification codes may be updated in the field based on the procedures outlined in this section.

- The first four characters indicate the site from which the sample is to be collected: BPS1 (Bethpage Site 1)
- The next two characters indicate the matrix: BPS1-SG (Soil Gas)
- The next four characters indicate the sampling location: BPS1-SG1001 (Location 1)
- The next two characters indicate the depth of the sample BPS1-SG1001-08 (8 feet bgs)

2.0 FIELD ACTIVITIES

The scope of work consists of drilling 15 temporary separate soil gas wells at five locations, 3 at each location at depths of 8, 20 and 50 feet. In addition, a macro core will be drilled to 55 feet at each of the five soil gas locations. The specific activities are as follows:

1. Identify planned and potential drilling locations.
2. Drill macro cores at five locations at depths to 55 feet bgs.
3. Define lithology of macro cores.
4. Install 15 soil gas wells at five locations.
5. Sample for TO-15 VOCs at 8, 20 and 50 feet at each of the 5 locations.

Planned soil gas locations are presented on Figure 3. Field activities by boring are presented in Table 1. Sample nomenclature and analysis are presented in Table 2. Field activities will be as follows.

1. Using a DPT drill rig advance an assembly consisting of interconnected lengths of decontaminated steel drive rods.

2. When the desired sample depth is reached, retract the sampling assembly.
3. Insert tubing into steel drive rod.
4. Proceed with soil gas sample collection.

The following methodology will be followed for preparation of SUMMA®-Type canister and initiation of the collection of the sample:

1. The field sampling team should maintain a sample log sheet summarizing the following:

    a. sample identification.
    b. date and time of sample collection.
    c. sampling depth.
    d. identity of samplers.
    e. sampling methods and devices.
    f. purge volumes.
    g. volume of soil vapor extracted.
    h. the vacuum before and after samples are collected.
    i. apparent moisture content (dry, moist, saturated, etc.) of the sampling zone.
    j. Wind speed and direction.
    k. Ambient temperature.
    l. Barometric pressure.
    m. Relative humidity.
    n. Chain of custody (COC) protocols and records used to track samples from sampling point to analysis.

2. Connect a short piece of tubing to the sampling port using a Swagelok fitting.
3. Check the seal established around the soil gas probe by using a tracer gas (e.g., Helium or SF_6).
Once the seal in integrity has been verified, additional trace gas testing may not be conducted.

The tracer gas procedures are as follows:

    a. Punch a small hole in sheeting to accept sample port. Hole should be tight around port.
    b. Place plastic sheeting on ground surrounding sample port.
    c. Place clean bucket (open side to ground) over sample port.
    d. Check seal with plastic sheeting, should be tight.
    e. Seal bucket to plastic sheeting with clay sealing material.
    f. Insert incoming SF_6 OR Helium line into pre-drilled hole in bucket.

g. Pull sample collection tube through pre-drilled hole in bucket.

h. Fill bucket with SF_6 or Helium gas (use caution not to pressurize system, this may drive SF_6 or Helium gas down into gas point).

4. Connect a portable vacuum pump to the sample tubing. Purge 1 to 2 (target 1.5) volumes of air from the gas point and sampling line using a portable pump [purge volume = 1.5 πr2h] at rate of approximately 100 milliliter per minute (mL/min).

a. after installation of the probes, one to three volumes (i.e., the volume of the sample probe and tube) must be purged prior to collecting the samples to ensure samples collected are representative.

b. flow rates for both purging and collecting must not exceed 0.2 liters per minute to minimize ambient air infiltration during sampling.

c. After purging 1.5 volumes of air from the gas point, collect some of purge air in Tedlar bag for SF_6 or Helium analysis.

d. Check purged air for SF_6 or Helium contamination with portable SF_6 or Helium detector.

e. Air purged from system must maintain $< 10\%$ SF_6 or Helium.

5. If seal around sampling port appears adequate based on SF_6 or Helium test, remove the brass plug from the SUMMA® canister and connect the flow controller with in-line particulate filter and vacuum gauge to the SUMMA® canister. Do not open the valve on the SUMMA® canister yet. Record in the field notebook and the COC the flow controller number with the appropriate SUMMA® canister number.

a. If seal is not adequate, troubleshoot for leaks and re-test using SF_6 or Helium tracer gas.

b. Do not take sample until tracer gas requirements are met ($< 10\%$ SF_6 or Helium in purged air).

6. Connect the clean Teflon® sample collection tubing to the flow controller and the SUMMA® canister valve. Record in the field notebook the time sampling began and the canister vacuum.

7. Connect the unoccupied end of the Teflon® tubing to the tubing protruding from subsurface sampling port.

8. Open the SUMMA® canister valve and collect sample.

9. Photograph the SUMMA® canister, capturing the sample ID if possible. Also photograph canister and surrounding area, capture any available landmarks for future use in photographic logs (e.g. buildings, roads, etc).

The following methodology should be followed for completion of SUMMA®-Type sampling:

1. Arrive at the SUMMA® canister location at least 10 to 15 minutes prior to the end of the required sampling interval (e.g., 30 to 60 minutes).
2. Record the final vacuum measurement. Close the valve on the SUMMA® canister to cease sample collection. The canister should have a minimum amount of vacuum (approximately 2 inches of Hg or slightly greater).
3. Record the date and local time (24-hour basis) of valve closing in the field notebook, Soil Gas Sample Collection Log and COC.
4. Remove the particulate filter and flow controller from the SUMMA® canister, re-install the brass plug on the canister fitting, and tighten with the appropriate wrench.
5. Package the canister and flow controller in the shipping container supplied by the laboratory for return shipment to the laboratory. The SUMMA® canister does not require preservation with ice or refrigeration during shipment. Apply custody seals.
6. Complete the appropriate forms and sample labels as directed by the laboratory.
7. Ship the container to the laboratory (via overnight carrier [e.g., Federal Express]) for analysis.

Once the soil gas sample has been collected, the temporary gas points will be abandoned by removing the drive rods, and filling the resulting hole with clean sand.

Ambient air samples will be collected simultaneously with a soil gas sample. The SUMMA sample container will be positioned at a location near the associated SVMP at a height of 4 ft above grade. The ambient air sample will be obtained over an eight-hour period.

3.0 Reporting

A letter report will be submitted to include; field procedures, field activities, and sampling results. All samples that will be used to make decisions on appropriate actions to address exposures and environmental contamination will be analyzed from (name of lab) an ELAP certified laboratory. Reporting limits will be identified in conjunction with the sampling results. Reporting limits will be derived from the air guideline values derived by the New York State Department of Health (NYSDOH, 2006).

ACRONYMS

1, 1, 1-TCA	1, 1, 1-trichloroethene
1, 1-DCE	1, 1-dichloroethene
1, 2-DCA	1, 2-dichloroethane
1, 2-DCE	1, 2-dichloroethene
AS/SVE	air sparging/soil vapor extraction
bgs	below ground surface
COC	chain of custody
DPT	direct-push technology
ELAP	Environmental Laboratory Approval Program
IAS	Initial Assessment Study
ml/min	milliliters per minute
NWIRP	Naval Weapons Industrial Reserve Plant
NYSDOH	New York State Department of Health
PCB	polychlorinated biphenyl
PCE	tetrachloroethane
PQL	practical quantity limits
PRG	preliminary remediation goals
ROD	Record of Decision
SVPM	Soil Vapor Pressure Monitor
TAL	Target analyte list
TCE	trichloroethene
TCL	Target compound list
VOC	Volatile organic compound
USEPA	United States Environmental Protection Agency
µg/L	micrograms per liter

REFERENCES

Foster Wheeler Environmental Corp., 2003. Final Close-Out Report, Construction of a Soil Vapor Extraction/Air Sparging System at the Naval Weapons Industrial Reserve Plant Bethpage, NY. December.

New York State Department of Health (NYSDOH), 2006. FINAL Guidance for Evaluating Soil Vapor Intrusion in the State of New York. October.

Northern Division Naval Facilities Engineering Command and New York State Department of Environmental Conservation (NDNFEC/NYSDEC), 1995. Record of Decision, Naval Weapons Industrial Reserve Plant, Bethpage, New York Sites 1, 2, 3 NYS Registry: 1-30-003B. May.

Rogers, Golden & Halpern, 1986. Initial Assessment Study of NWIRP Bethpage, NY and NWIRP Calverton, NY. December.

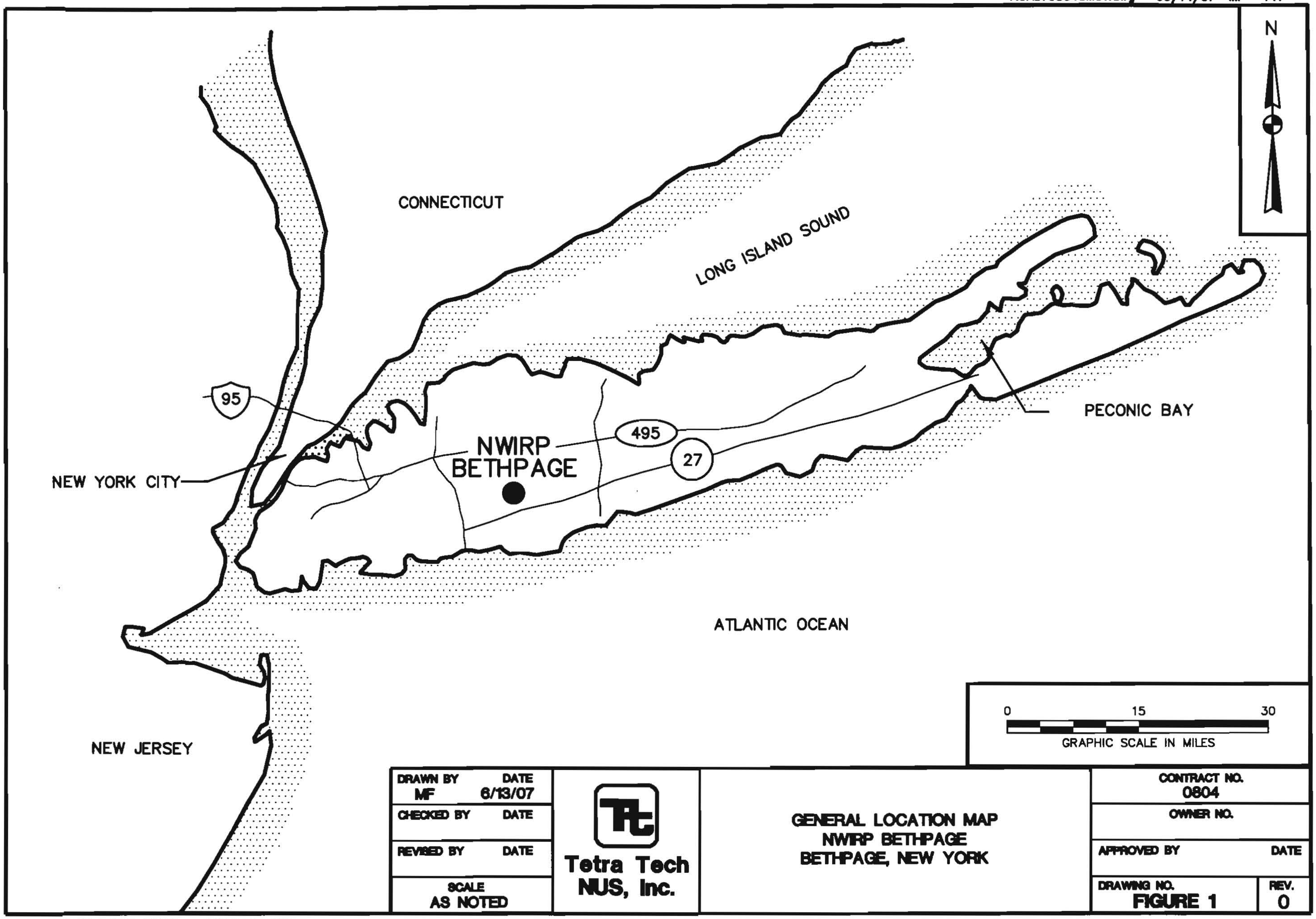
United States Environmental Protection Agency (USEPA), 1999. Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air Second Edition Compendium Method TO-15 Determination Of Volatile Organic Compounds (VOCs) In Air Collected In Specially-Prepared Canisters And Analyzed By Gas Chromatography/ Mass Spectrometry (GC/MS). January.

TABLE 1
PRE-DESIGN FIELD INVESTIGATION
FIELD ACTIVITIES
SOIL GAS SAMPLING
NWIRP BETHPAGE, NEW YORK

Boring Number	Drilling Method	Total Depth (feet)[1]	Depth (feet)	Soil Sample	Air Sample [2]
BPS1-SG1001	DPT	55	8	no	YES
			20	no	
			50	no	
			55 DPT	continuous	
BPS1-SG1002	DPT	55	8	no	YES
			20	no	
			50	no	
			55 DPT	continuous	
BPS1-SG1003	DPT	55	8	no	YES
			20	no	
			50	no	
			55 DPT	continuous	
BPS1-SG1004	DPT	55	8	no	YES
			20	no	
			50	no	
			55 DPT	continuous	
BPS1-SG1005	DPT	55	8	no	YES
			20	no	
			50	no	
			55 DPT	continuous	

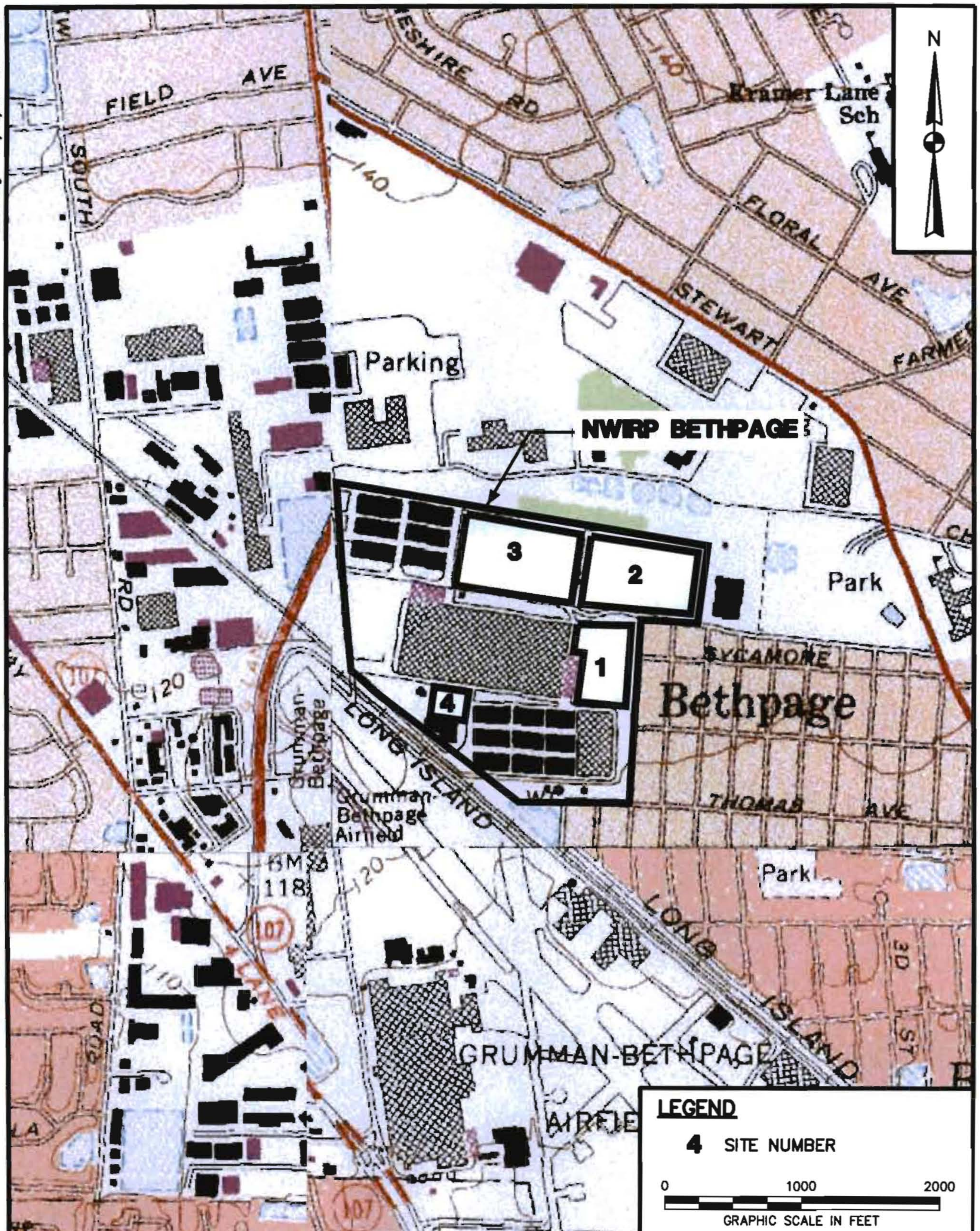
1.
2. Work area summa canister (2 hours).
DPT-Direct push technology

ACAD: 0804CM01.dwg 06/14/07 MF PIT



FORM CADD NO. TTNUS-AH.DWG - REV 1 -9/10/98

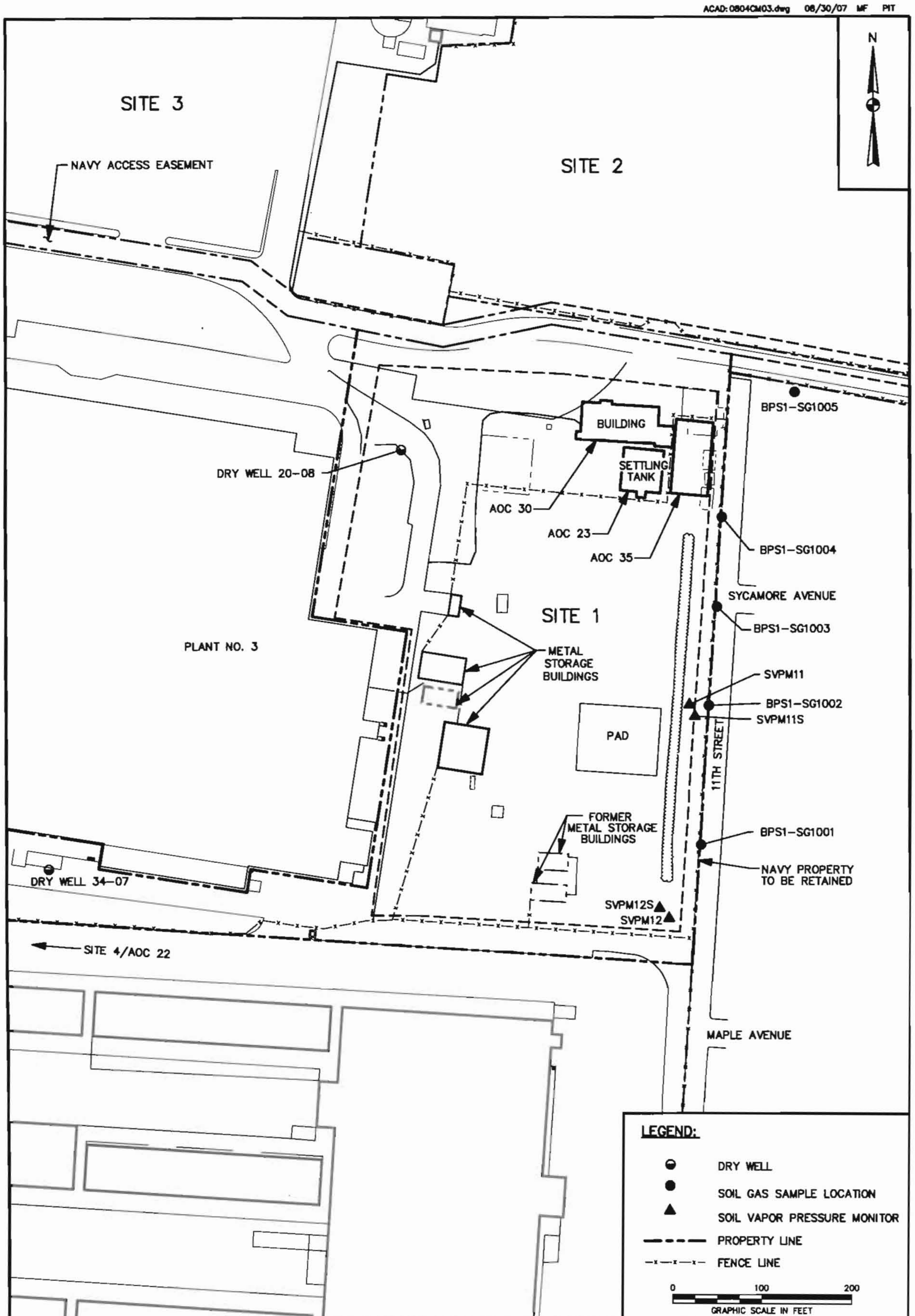
ACAD:0804CM02.dwg 06/13/07 MF PIT



DRAWN BY / DATE			CONTRACT NO.
MF 6/13/07	Tetra Tech NUS, Inc.	SITE LOCATION MAP SITE 1 NWIRP BETHPAGE BETHPAGE, NEW YORK	0804
CHECKED BY / DATE			OWNER NO.
REVISED BY / DATE			APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2 / REV. 0

FORM CADD NO. TTNUS-AV.DWG - REV 1 -9/10/98

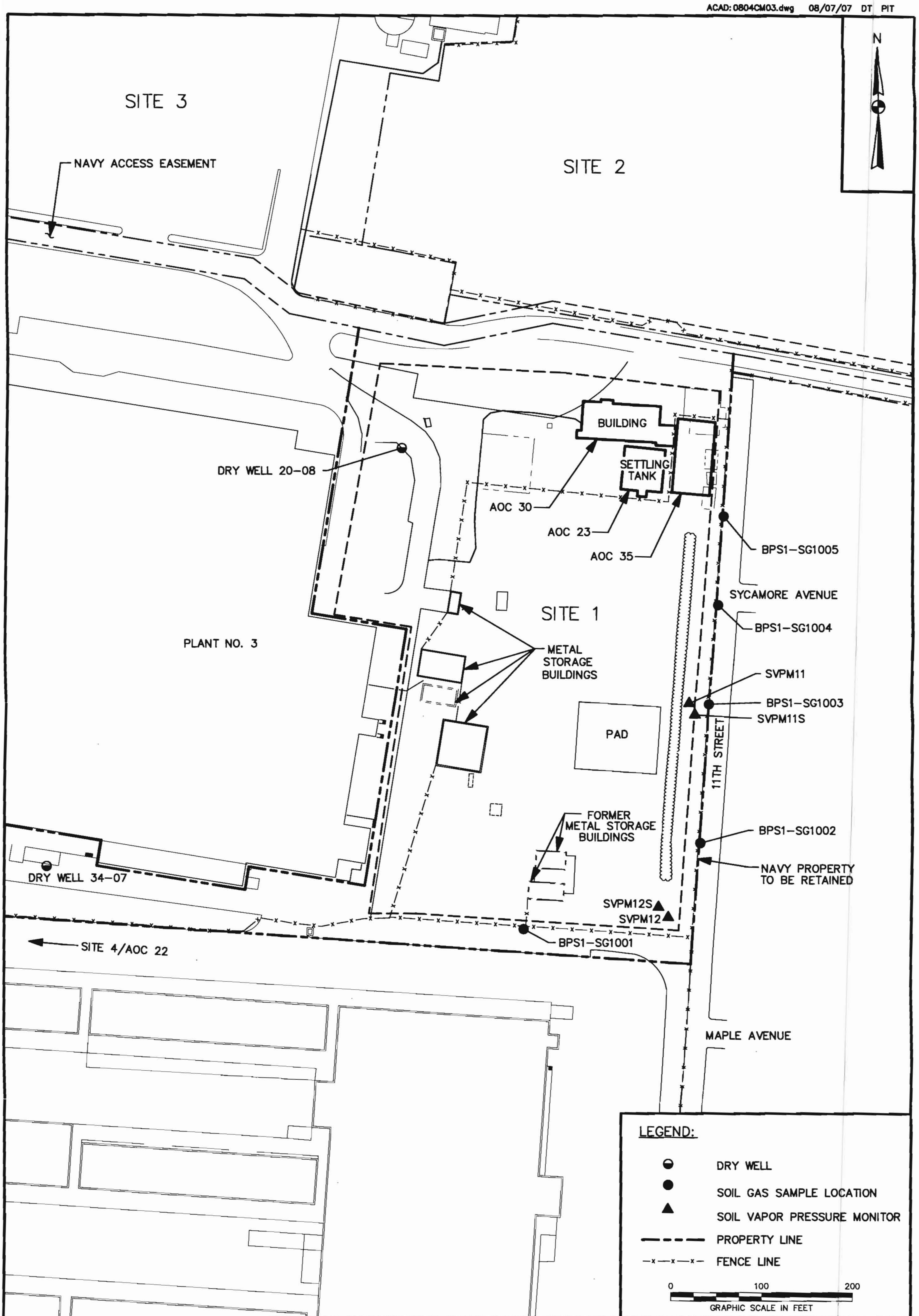
ACAD: 0804CM03.dwg 08/30/07 MF PIT



DRAWN BY MF / DATE 6/13/07	Tetra Tech NUS, Inc.	SITE 1 LAYOUT MAP NWIRP BETHPAGE BETHPAGE, NEW YORK	CONTRACT NO. 0804
CHECKED BY / DATE			OWNER NO.
REVISED BY / DATE			APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 3 / REV. 0

CADD NO. TTNUS-BV.DWG - REV 1 -9/11/98

ACAD: 0804CM03.dwg 08/07/07 DT PIT



DRAWN BY MF	DATE 6/13/07	Tetra Tech NUS, Inc.	SITE 1 LAYOUT MAP NWIRP BETHPAGE BETHPAGE, NEW YORK	CONTRACT NO. 0804	
CHECKED BY	DATE			OWNER NO.	
REVISED BY	DATE			APPROVED BY	DATE
SCALE AS NOTED				DRAWING NO. FIGURE 3	REV. 0

FORM CADD NO. TTNUS-BV.DWG - REV 1 -9/11/98

Table A-1
NWIRP-BETHPAGE
Monthly Monitoring Data
System Operation

VOCs in Extracted Soil Vapor - August 2001 - NWIRP - Bethpage, NY

Parameter	08/29/2001	08/29/2001	08/29/2001	08/29/2001	08/29/2001	08/29/2001	08/29/2001	08/29/2001	08/29/2001	08/29/2001	08/29/2001	08/29/2001	08/29/2001	08/29/2001	08/29/2001
	EV01	EW01	EW02	EW03	EW04	EW05	EW06	EW07	EW08	EW08-Dup	EW09	EW10	EW11	EW12	EW13
Freon 12															
Freon 114															
Chloromethane															
Vinyl Chloride	33											390			
Bromomethane															
Chloroethane															
Freon 11										9					
1,1-Dichloroethene										5.8	4.9	12			
Freon 113	220							11	11	9.5	46	1000	150	8.4	
Methylene Chloride															
1,1-Dichloroethane	100	92	6.7				78	4.8	4.2	4.1	34	85			
cis-1,2-Dichloroethene	1100		8.5				140	13	13	4.2	170	250	19		
Chloroform										5.7					
1,1,1-Trichloroethane	910	2700	430				68	37	37	24	100	1600	100	12	
Carbon Tetrachloride															
Benzene															
1,2-Dichloroethane															
Trichloroethene	1,600	8,400	950				270	130	130	470	450	85	87		
1,2-Dichloropropane															
cis-1,3-Dichloropropene															
Toluene															
trans-1,3-Dichloropropene															
1,1,2-Trichloroethane												5.9			
Tetrachloroethene	3,400	170	110				900	1000	1000	930	660	950	1400	9	
Ethylene Dibromide															
Chlorobenzene															
Ethyl Benzene															
m+p-Xylene															
o-Xylene															
Styrene															
1,1,2,2-Tetrachloroethane															
1,3,5-Trimethylbenzene															
1,2,4-Trimethylbenzene															
1,3-Dichlorobenzene															
1,4-Dichlorobenzene															
Chlorotoluene															
1,2-Dichlorobenzene															
1,2,4-Trichlorobenzene															
Hexachlorobutadiene															
Propylene															
1,3-Butadiene															
Acetone								38	38						
Carbon Disulfide															
2-Propanol															
Trans-1,2-Dichloroethene															
Vinyl Acetate															
2-Butanone (Methyl Ethyl Ketone)						1800						43		29	
Hexane															
Tetrahydrofuran						2900	22							38	
Cyclohexane												68	16		
1,4-Dioxane															
Bromodichloromethane															
4-Methyl-2-pentanone															
2-Hexanone															
Dibromochloromethane															
Bromoform															
4-Ethyltoluene															
Ethanol															
Methyl tertiary butyl ether															
Heptane															
Total VOCs	7,363.0	11,362.0	1,505.2	0.0	0.0	4,700.0	1,478.0	1,233.8	1,233.2	1,462.3	1,464.9	4,488.9	1,772.0	96.4	0.0

Notes:

1) All results are expressed in parts per billion volume (ppbv).

2) A blank indicates that the compound was not detected.

VOCs in Extracted Soil Vapor - September 2001 - NWIRP - Bethpage, NY

Parameter	09/19/2001
	EV02
Freon 12	
Freon 114	
Chloromethane	
Vinyl Chloride	
Bromomethane	
Chloroethane	
Freon 11	
1,1-Dichloroethene	
Freon 113	120
Methylene Chloride	
1,1-Dichloroethane	45
cis-1,2-Dichloroethene	410
Chloroform	
1,1,1-Trichloroethane	420
Carbon Tetrachloride	
Benzene	
1,2-Dichloroethane	
Trichloroethene	1,000
1,2-Dichloropropane	
cis-1,3-Dichloropropene	
Toluene	
trans-1,3-Dichloropropene	
1,1,2-Trichloroethane	
Tetrachloroethene	2,400
Ethylene Dibromide	
Chlorobenzene	
Ethyl Benzene	
m+p-Xylene	
o-Xylene	
Styrene	
1,1,1,2-Tetrachloroethane	
1,3,5-Trimethylbenzene	
1,2,4-Trimethylbenzene	
1,3-Dichlorobenzene	
1,4-Dichlorobenzene	
Chlorotoluene	
1,2-Dichlorobenzene	
1,2,4-Trichlorobenzene	
Hexachlorobutadiene	
Propylene	
1,3-Butadiene	
Acetone	
Carbon Disulfide	
2-Propanol	
Trans-1,2-Dichloroethene	
Vinyl Acetate	
2-Butanone (Methyl Ethyl Ketone)	
Hexane	
Tetrahydrofuran	
Cyclohexane	
1,4-Dioxane	
Bromodichloromethane	
4-Methyl-2-pentanone	
2-Hexanone	
Dibromochloromethane	
Bromoform	
4-Ethyltoluene	
Ethanol	
Methyl tertiary butyl ether	
Heptane	
Total VOCs	4,395.0

Notes:
1) All results are expressed in parts per billion volume (ppbv).
2) A blank indicates that the compound was not detected.

VOCs in Extracted Soil Vapor - October 2001 - NWIRP - Bethpage, NY

Parameter	10/05/2001	10/27/2001	10/27/2001	10/27/2001	10/27/2001	10/27/2001	10/27/2001	10/27/2001	10/27/2001	10/27/2001	10/27/2001	10/27/2001	10/27/2001	10/27/2001	10/27/2001	10/27/2001	10/27/2001
	Sample Location																
	EV03	EV04	EW01	EW02	EW03	EW03 Dup	EW04	EW05	EW06	EW07	EW08	EW09	EW10	EW11	EW12	EW12 Dup	EW13
Freon 12																	
Freon 114																	
Chloromethane		11										5.4					
Vinyl Chloride																	
Bromomethane																	
Chloroethane																	
Freon 11																	
1,1-Dichloroethene						4.9											
Freon 113	100	76			76	70					23				5.6	5.7	21
Methylene Chloride			31						18								
1,1-Dichloroethane	33	18	35		36	32					6.2	4.6			42	38	11
cis-1,2-Dichloroethene	310	180	31		230	210			18	10	69	23			47	47	23
Chloroform																	
1,1,1-Trichloroethane	340	230	1600		750	690		7.1	5.9		30	6.9		7.9	41	40	140
Carbon Tetrachloride																	
Benzene																	
1,2-Dichloroethane																	
Trichloroethene	720	440	4800	20	2100	1800		16	93	6.1	54	44		20	280	270	210
1,2-Dichloropropane																	
cis-1,3-Dichloropropene																	
Toluene																	
trans-1,3-Dichloropropene																	
1,1,2-Trichloroethane																	
Tetrachloroethene	1,300	700	89		930	830		27	190	30	270	89		8.6	150	150	45
Ethylene Dibromide																	
Chlorobenzene																	
Ethyl Benzene																	
m+p-Xylene																	
o-Xylene																	
Styrene																	
1,1,1,2-Tetrachloroethane																	
1,3,5-Trimethylbenzene																	
1,2,4-Trimethylbenzene					9.5	8.7											
1,3-Dichlorobenzene																	
1,4-Dichlorobenzene																	
Chlorotoluene																	
1,2-Dichlorobenzene																	
1,2,4-Trichlorobenzene																	
Hexachlorobutadiene																	
Propylene																	
1,3-Butadiene																	
Acetone												18					
Carbon Disulfide																	
2-Propanol																	
Trans-1,2-Dichloroethene																	
Vinyl Acetate																	
2-Butanone (MEK)		580					17				31						
Hexane																	
Tetrahydrofuran		540					19	29									
Cyclohexane																	
1,4-Dioxane																	
Bromodichloromethane																	
4-Methyl-2-pentanone																	
2-Hexanone																	
Dibromochloromethane																	
Bromoform																	
4-Ethyltoluene																	
Ethanol	16																
Methyl tertiary butyl ether																	
Heptane																	
Total VOCs	2,819.0	2,775.0	6,586.0	20.0	4,131.5	3,645.6	36.0	79.1	324.9	46.1	483.2	190.9	0.0	36.5	565.6	550.7	450.0

Notes:
1) All results are expressed in parts per billion volume (ppbv).
2) A blank indicates that the compound was not detected.

VOCs in Extracted Soil Vapor - November 2001 - NWIRP - Bethpage, NY

Parameter	11/11/2001	11/26/2001
	EV-05	EV-06
Freon 12		
Freon 114		
Chloromethane		
Vinyl Chloride		
Bromomethane		
Chloroethane		
Freon 11		
1,1-Dichloroethene		
Freon 113	100	120
Methylene Chloride		
1,1-Dichloroethane	29	29
cis-1,2-Dichloroethene	280	310
Chloroform		
1,1,1-Trichloroethane	340	460
Carbon Tetrachloride		
Benzene		
1,2-Dichloroethane		
Trichloroethene	550	600
1,2-Dichloropropane		
cis-1,3-Dichloropropene		
Toluene		
trans-1,3-Dichloropropene		
1,1,2-Trichloroethane		
Tetrachloroethene	980	1,800
Ethylene Dibromide		
Chlorobenzene		
Ethyl Benzene		
m+p-Xylene		
o-Xylene		
Styrene		
1,1,1,2-Tetrachloroethane		
1,3,5-Trimethylbenzene		
1,2,4-Trimethylbenzene		
1,3-Dichlorobenzene		
1,4-Dichlorobenzene		
Chlorotoluene		
1,2-Dichlorobenzene		
1,2,4-Trichlorobenzene		
Hexachlorobutadiene		
Propylene		
1,3-Butadiene		
Acetone		
Carbon Disulfide		
2-Propanol		
Trans-1,2-Dichloroethene		
Vinyl Acetate		
2-Butanone (MEK)		
Hexane		
Tetrahydrofuran		
Cyclohexane		
1,4-Dioxane		
Bromodichloromethane		
4-Methyl-2-pentanone		
2-Hexanone		
Dibromochloromethane		
Bromoform		
4-Ethyltoluene		
Ethanol		
Methyl tertiary butyl ether		
Heptane		
Total VOCs	2,279.0	3,319.0

Notes:
1) All results are expressed in parts per billion volume (ppbv).
2) A blank indicates that the compound was not detected.

VOCs in Extracted Soil Vapor - December 2001 - NWIRP - Bethpage, NY

Parameter	12/07/2001 EV-07	12/28/2001 EV-08
Freon 12		
Freon 114		
Chloromethane		
Vinyl Chloride		
Bromomethane		
Chloroethane		
Freon 11		
1,1-Dichloroethene	5	4.1
Freon 113	94	60
Methylene Chloride		
1,1-Dichloroethane	30	24
cis-1,2-Dichloroethene	330	280
Chloroform		
1,1,1-Trichloroethane	470	400
Carbon Tetrachloride		
Benzene		
1,2-Dichloroethane		
Trichloroethene	700	620
1,2-Dichloropropane		
cis-1,3-Dichloropropene		
Toluene		
trans-1,3-Dichloropropene		
1,1,2-Trichloroethane		
Tetrachloroethene	1,300	1,200
Ethylene Dibromide		
Chlorobenzene		
Ethyl Benzene		
m+p-Xylene		
o-Xylene		
Styrene		
1,1,1,2-Tetrachloroethane		
1,3,5-Trimethylbenzene		
1,2,4-Trimethylbenzene		
1,3-Dichlorobenzene		
1,4-Dichlorobenzene		
Chlorotoluene		
1,2-Dichlorobenzene		
1,2,4-Trichlorobenzene		
Hexachlorobutadiene		
Propylene		
1,3-Butadiene		
Acetone		
Carbon Disulfide		
2-Propanol		
Trans-1,2-Dichloroethene		
Vinyl Acetate		
2-Butanone (MEK)		
Hexane		
Tetrahydrofuran		
Cyclohexane		
1,4-Dioxane		25
Bromodichloromethane		
4-Methyl-2-pentanone		
2-Hexanone		
Dibromochloromethane		
Bromoform		
4-Ethyltoluene		
Ethanol		
Methyl tertiary butyl ether		
Heptane		
Total VOCs	2,929.0	2,613.1

Notes:
1) All results are expressed in parts per billion volume (ppbv).
2) A blank indicates that the compound was not detected.

VOCs in Extracted Soil Vapor - January 2002 - NWIRP - Bethpage, NY

Parameter	01/09/2002	01/23/2002
	EV-09	EV-10
Freon 12		
Freon 114		
Chloromethane		
Vinyl Chloride		
Bromomethane		
Chloroethane		
Freon 11		
1,1-Dichloroethene		
Freon 113	66	73
Methylene Chloride		
1,1-Dichloroethane	22	21
cis-1,2-Dichloroethene	260	270
Chloroform		
1,1,1-Trichloroethane	370	350
Carbon Tetrachloride		
Benzene		
1,2-Dichloroethane		
Trichloroethene	620	550
1,2-Dichloropropane		
cis-1,3-Dichloropropene		
Toluene		
trans-1,3-Dichloropropene		
1,1,2-Trichloroethane		
Tetrachloroethene	1,000	1,100
Ethylene Dibromide		
Chlorobenzene		
Ethyl Benzene		
m+p-Xylene		
o-Xylene		
Styrene		
1,1,1,2-Tetrachloroethane		
1,3,5-Trimethylbenzene		
1,2,4-Trimethylbenzene		
1,3-Dichlorobenzene		
1,4-Dichlorobenzene		
Chlorotoluene		
1,2-Dichlorobenzene		
1,2,4-Trichlorobenzene		
Hexachlorobutadiene		
Propylene		
1,3-Butadiene		
Acetone		
Carbon Disulfide		
2-Propanol		
Trans-1,2-Dichloroethene		
Vinyl Acetate		
2-Butanone (MEK)		
Hexane		
Tetrahydrofuran		
Cyclohexane		
1,4-Dioxane		
Bromodichloromethane		
4-Methyl-2-pentanone		
2-Hexanone		
Dibromochloromethane		
Bromoform		
4-Ethyltoluene		
Ethanol		
Methyl tertiary butyl ether		
Heptane		
Total VOCs	2,338.0	2,364.0

Notes:
1) All results are expressed in parts per billion volume (ppbv).
2) A blank indicates that the compound was not detected.

VOCs in Extracted Soil Vapor - February 2002 - NWIRP - Bethpage, NY

Parameter	02/08/2002	03/01/2002
	EV-11	EV-12
Freon 12		
Freon 114		
Chloromethane		
Vinyl Chloride		
Bromomethane		
Chloroethane		
Freon 11		
1,1-Dichloroethene		
Freon 113	54	59
Methylene Chloride		
1,1-Dichloroethane	19	17
cis-1,2-Dichloroethene	260	200
Chloroform		
1,1,1-Trichloroethane	360	270
Carbon Tetrachloride		
Benzene		
1,2-Dichloroethane		
Trichloroethene	610	450
1,2-Dichloropropane		
cis-1,3-Dichloropropene		
Toluene		
trans-1,3-Dichloropropene		
1,1,2-Trichloroethane		
Tetrachloroethene	1,300	860
Ethylene Dibromide		
Chlorobenzene		
Ethyl Benzene		
m+p-Xylene		
o-Xylene		
Styrene		
1,1,1,2-Tetrachloroethane		
1,3,5-Trimethylbenzene		
1,2,4-Trimethylbenzene		
1,3-Dichlorobenzene		
1,4-Dichlorobenzene		
Chlorotoluene		
1,2-Dichlorobenzene		
1,2,4-Trichlorobenzene		
Hexachlorobutadiene		
Propylene		
1,3-Butadiene		
Acetone		
Carbon Disulfide		
2-Propanol		
Trans-1,2-Dichloroethene		
Vinyl Acetate		
2-Butanone (MEK)		
Hexane		
Tetrahydrofuran		
Cyclohexane		
1,4-Dioxane		
Bromodichloromethane		
4-Methyl-2-pentanone		
2-Hexanone		
Dibromochloromethane		
Bromoform		
4-Ethyltoluene		
Ethanol		
Methyl tertiary butyl ether		
Heptane		
Total VOCs	2,603.0	1,856.0

Notes:
1) All results are expressed in parts per billion volume (ppbv).
2) A blank indicates that the compound was not detected.

Table B-2 Post-Operational Groundwater Analytical Results

Client Sample ID	MW-103-032602			POSB-09-HP-6667			BPPOSB-20-HP6263			POSB-24-HP-6768			POSB-SEHP-6668			POSB-SWHP-6668			POSB-SWHP-6668D		
Lab Sample ID		P1954-01			P2184-03			P2156-01			P2184-01			P2199-01			P2199-03			P2199-04	
Sample Collection Date		03/26/2002			04/12/2002			04/12/2002			04/12/2002			04/15/2002			04/15/2002			04/15/2002	
Sample Matrix		WATER			WATER			WATER			WATER			WATER			WATER			WATER	
Units		ug/L			ug/L			ug/L			ug/L			ug/L			ug/L			ug/L	
	PQL	CONC	Q	PQL	CONC	Q	MDL	CONC	Q	PQL	CONC	Q	PQL	CONC	Q	PQL	CONC	Q	PQL	CONC	Q
Chloromethane	2.8	ND		5	ND		5	ND		5	ND		1.7	ND		1.7	ND		1.7	ND	
Vinyl Chloride	1.8	ND		5	ND		5	ND		5	ND		2	ND		2	ND		2	ND	
Bromomethane	1.9	ND		5	ND		5	ND		5	ND		2.1	ND		2.1	ND		2.1	ND	
Chloroethane	2.3	ND		5	ND		5	ND		5	ND		2.9	ND		2.9	ND		2.9	ND	
1,1-Dichloroethene	1.6	ND		5	ND		5	ND		5	ND		1.3	ND		1.5	ND		1.1	ND	
Acetone	5.8	ND		5	ND		5	ND		5	ND		2.3	13		2.3	9.7		2.3	9.2	
Carbon Disulfide	1	ND		5	ND		5	ND		5	ND		2.2	ND		2.2	ND		2.2	ND	
Methylene Chloride	1.1	ND		5	ND		5	1.9	JB	5	ND		2.2	ND		2.2	ND		2.2	ND	
trans-1,2-Dichloroethene	1.7	ND		5	ND		5	ND		5	ND		2.4	ND		2.4	ND		2.4	ND	
1,1-Dichloroethane	1	ND		5	ND		5	ND		5	4.9	J	2.2	ND		2.2	ND		2.2	ND	
2-Butanone	5.6	ND		5	ND		5	ND		5	ND		1.6	1.8	J	1.6	ND		1.6	ND	
cis-1,2-Dichloroethene	1.8	0.9	J	5	ND		5	ND		5	2.5	J	2.4	ND		2.4	ND		2.4	ND	
Chloroform	1	1.2		5	ND		5	ND		5	ND		2.7	ND		2.7	ND		2.7	ND	
1,1,1-Trichloroethane	1.5	ND		5	48		5	ND		5	5.2		2.5	4.4	J	2.5	ND		2.5	ND	
Carbon Tetrachloride	1	ND		5	ND		5	ND		5	ND		2.4	ND		2.4	3.4	J	2.4	3.5	J
Benzene	1	ND		5	ND		5	ND		5	ND		1.8	ND		1.8	ND		1.8	ND	
1,2-Dichloroethane	2.5	ND		5	ND		5	ND		5	ND		2.6	ND		2.6	ND		2.6	ND	
Trichloroethene	2.8	29		5	ND		5	1.4	J	5	1.7	J	2.6	ND		2.6	ND		2.6	ND	
1,2-Dichloropropane	3.6	ND		5	ND		5	ND		5	ND		1.9	ND		1.9	ND		1.9	ND	
Bromodichloromethane	1	ND		5	ND		5	ND		5	ND		2.5	ND		2.5	2.7	J	2.5	2.5	J
4-Methyl-2-Pentanone	3	ND		5	ND		5	ND		5	ND		2.2	ND		2.2	ND		2.2	ND	
Toluene	1.2	ND		5	ND		5	1.4	J	5	ND		1.7	ND		1.7	ND		1.7	ND	
t-1,3-Dichloropropene	1.7	ND		5	ND		5	ND		5	ND		2.5	ND		2.5	ND		2.5	ND	
cis-1,3-Dichloropropene	1	ND		5	ND		5	ND		5	ND		2.2	ND		2.2	ND		2.2	ND	
1,1,2-Trichloroethane	1.1	ND		5	ND		5	ND		5	ND		1.7	ND		1.7	ND		1.7	ND	
2-Hexanone	12	ND		5	ND		5	ND		5	ND		2.5	ND		2.5	ND		2.5	ND	
Dibromochloromethane	1	ND		5	ND		5	ND		5	ND		2.1	ND		2.1	ND		2.1	ND	
Tetrachloroethene	1.6	18		5	1.7	J	5	2.6	J	5	21		2	2.8	J	1.6	ND		1.5	ND	
Chlorobenzene	1	ND		5	ND		5	ND		5	ND		2.8	ND		2.8	ND		2.8	ND	
Ethyl Benzene	1.5	ND		5	ND		5	ND		5	ND		2.5	ND		2.5	ND		2.5	ND	
m/p-Xylenes	1.5	ND		5	ND		5	ND		5	ND		1.8	ND		1.8	ND		1.8	ND	
o-Xylene	1.7	ND		5	ND		5	ND		5	ND		1.9	ND		1.9	ND		1.9	ND	
Styrene	1	ND		5	ND		5	ND		5	ND		1.6	ND		1.6	ND		1.6	ND	
Bromoform	1	ND		5	ND		5	ND		5	ND		3.9	ND		3.9	ND		3.9	ND	
1,1,2,2-Tetrachloroethane	2.2	ND		5	ND		5	ND		5	ND		1.8	ND		1.8	ND		1.8	ND	

Table C-1 Volatile Organic Compounds
NWIRP Bethpage Post Operational Sampling

Client Sample ID		POSB-1-1012			POSB-1-1062			POSB-1-2224			POSB-2-1012			POSB-2-2022			POSB-2-5254			POSB-3-1012	
Lab Sample ID		P2337-01			P2337-06			P2337-02			P2337-03			P2337-04			P2337-05			P2126-03	
Sample Collection Date		04/23/2002			04/23/2002			04/23/2002			04/23/2002			04/23/2002			04/23/2002			04/09/2002	
Sample Receipt Date		04/24/2002			04/24/2002			04/24/2002			04/24/2002			04/24/2002			04/24/2002			04/10/2002	
Sample Matrix		SOIL			SOIL			SOIL			SOIL			SOIL			SOIL			SOIL	
Units		ug/Kg			ug/Kg			ug/Kg			ug/Kg			ug/Kg			ug/Kg			ug/Kg	
	PQL	CONC	Q	PQL	CONC	Q	PQL	CONC	Q	PQL	CONC	Q	PQL	CONC	Q	PQL	CONC	Q	PQL	CONC	Q
Chloromethane	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		3.4	ND	
Vinyl Chloride	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		2.2	ND	
Bromomethane	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		2.4	ND	
Chloroethane	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		2.7	ND	
1,1-Dichloroethene	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		2	ND	
Acetone	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		7	ND	
Carbon Disulfide	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		1.2	ND	
Methylene Chloride	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		1.2	1.5	B
trans-1,2-Dichloroethene	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		2.1	ND	
1,1-Dichloroethane	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		1.2	ND	
2-Butanone	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		6.8	ND	
cis-1,2-Dichloroethene	6	ND		6.7	ND		5.1	ND		5.6	4.9	J	5.3	1.2	J	660	ND		2.2	ND	
Chloroform	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		1.2	ND	
1,1,1-Trichloroethane	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	1.3	J	660	12000		1.8	ND	
Carbon Tetrachloride	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		1.2	ND	
Benzene	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		1.2	ND	
1,2-Dichloroethane	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		3	ND	
Trichloroethene	6	2.6	J	6.7	ND		5.1	ND		5.6	4.4	J	5.3	ND		660	ND		3.4	ND	
1,2-Dichloropropane	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		4.4	ND	
Bromodichloromethane	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		1.2	ND	
4-Methyl-2-Pentanone	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		3.7	ND	
Toluene	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	1500		1.5	ND	
t-1,3-Dichloropropene	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		2	ND	
cis-1,3-Dichloropropene	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		1.2	ND	
1,1,2-Trichloroethane	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		1.3	ND	
2-Hexanone	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		15	ND	
Dibromochloromethane	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		1.2	ND	
Tetrachloroethene	6	3	J	6.7	ND		5.1	ND		5.6	1.5	J	5.3	13		660	220	J	2	ND	
Chlorobenzene	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		1.2	ND	
Ethyl Benzene	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	270	J	1.8	ND	
m/p-Xylenes	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	1600		1.9	ND	
o-Xylene	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	1900		2	ND	
Styrene	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		1.2	ND	
Bromoform	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		1.2	ND	
1,1,2,2-Tetrachloroethane	6	ND		6.7	ND		5.1	ND		5.6	ND		5.3	ND		660	ND		2.7	ND	

PQL - Practical Quantitation Limit
ND - Non detect
J - Estimated concentration
B - Also within associated blank
D - Concentration from secondary dilution