DEPARTMENT OF THE NAVY
ENGINEERING FIELD ACTIVITY, NORTHEAST
NAVAL FACILITIES ENGINEERING COMMAND
10 INDUSTRIAL HIGHWAY
MAIL STOP, #82
LESTER, PA 19113-2090

100.02.01.0009

IN REPLY REFER TO
5090
Code EV21/JLC

08 MAR 2002

Mr. Gerard Burke
Project Engineer
New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, New York 12233-7015

Dear Gerard:

Subj: Final Workplan for Post-AS/SVE Operational Sampling; Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage, New York

The Navy is submitting a Final version of the Post-Operational Sampling and Analysis Workplan for your files. Appropriate changes to the Draft workplan have been incorporated into this Final version as a result of comments submitted by your agency in a letter dated January 29, 2002. The Navy's responses to those comments have also been attached to this letter. No other comments were received.

The Navy plans to commence with the implementation of the subject workplan on 1 April 2002.

If you have any questions regarding the enclosed Final Sampling and Analysis Workplan, please give me a call at (610) 595-0567, extension 163.

Sincerely,

JAMES L. COLTER
Remedial Project Manager
By direction of the
Commanding Officer

Enclosures: (1) Final Post-Operational Sampling and Analysis Workplan
(2) Navy Responses to NYSDEC Comments

Distribution:

NYSDEC (Albany), Steve Scharf
NYSDEC (Stony Brook), Stan Farkas
NYSDOH, Bill Gilday
USEPA Region II, Rachael Chaput
USEPA Region II, Carla Struble
Nassau County DOH, Bruce Mackay
Nassau County DPW, Tim Kelly
J.A. Jones, Al Taormina (2 copies)
Community Co-Chair, Jim McBride (5 copies)

COMMENT RESPONSES FROM
ENGINEERING FIELD ACTIVITY, NORTHEAST
NAVAL FACILITIES ENGINEERING COMMAND
REGARDING
DRAFT POST AS/SVE OPERATIONAL SAMPLING AND ANALYSIS WORKPLAN
NWIRP BETHPAGE, NEW YORK

COMMENTS FROM NEW YORK STATE DEC DATED JANUARY 29, 2002:

COMMENT 1: The Site Location map (Figure 1) should provide more detail than the whole of Long Island.

RESPONSE: Two figures will be added to the document. The new Figure 1 is an aerial view of the vicinity of the NWIRP Bethpage with a map index showing it's location on Long Island. Figure 1a has been added that is a close-up of the Navy's property.

COMMENT 2: The AS/SVE system should be turned off at least one week prior to samples being collected.

RESPONSE: The system will be turned off at least one week prior to sampling. Shutdown of the system is scheduled for the week of February 25, 2002. Sampling will commence upon approval of this Sampling and Analysis Plan.

COMMENT 3a: Page 4, Section 4, Leachate Pits - Are the soil borings through the middle, or adjacent to the former leachate pits? It is recommended that all leachate pit samples be taken through the middle of these former substructures.

RESPONSE: It is our intent to install approximately 15 soil borings in the middle of former leachate pits, where possible. However, we anticipate that there could be field issues such as voids directly below the pits or structures above pits that require the boring to be installed adjacent to the pit. Every effort will be made to collect samples as close to pits as possible. The Foster Wheeler site geologist will be responsible for determining the actual location of the soil borings based on field conditions.

COMMENT 3b: Page 4, Section 4, Leachate Pits - Soil samples for Polychlorinated Biphenyls (PCBs) around Drywell 20-08, just outside the perimeter of Area 1 to the northwest, had some substantial hits for Volatile Organic Compounds (VOCs) on the PID. However, no soil samples for VOCs were taken at that time with the understanding that samples for these parameters would be taken at a later date. Several soil borings in this area need to be added for VOCs.

RESPONSE: The scope of Foster Wheeler's work is limited to installation of soil borings to determine the effectiveness of the AS/SVE system and does not include additional fieldwork in the vicinity of Drywell 20-08. In addition, the Navy's fiscal year 2002 budget can not support the additional costs associated with installation of several additional borings in and around Drywell 20-08.

Also note that according to the OU 1 ROD for soils, dated July 1995, residual VOCs are expected to remain in the vadose zone even after completion of soil excavation for PCB- and inorganic-contaminated soils. In addition, the ROD also stipulated that a permeable cover would be placed atop Site 1 after excavation to allow for the continued natural biodegradation of residual VOCs as well as to promote flushing due to precipitation of residual VOCs into the groundwater where they would eventually be treated by the groundwater remedy located downgradient. It was calculated that the flushing and biodegradation processes would allow for the achievement of remedial action goals for VOCs in soils in roughly the same timeframe as it would take to achieve the remedial goals for groundwater. In the interim, a deed restriction will be placed on Site 1 to preclude disturbance of these soils due to the presence of residual VOCs.

COMMENT 4: Page 5, Section 4, Perimeter Locations - Several soil borings for all contaminants of concern should be added south of the Area 1 perimeter fence.
RESPONSE: The area south of the perimeter fence was determined to be of no environmental concern due to the lack of documented disposal activity in this area and as such, is not considered to be a part of the IR Site.

The design of the AS/SVE system was for the remediation of soils in the area north of the IR Site 1 perimeter fence. The purpose of the post-operational SAP is to determine if the remedial goals have been achieved in this area.

In addition, two previous rounds of soil samples were taken from borings located along the southern boundary of IR Site 1. These samples were analyzed for all contaminants of concern and the results were "non-detect" for all parameters. For information, one of the rounds was from Geoprobe samples taken prior to installation of groundwater monitoring wells MW1, MW2, and MW3 located along the southern boundary. Due to the lack of soil contamination at these locations, it is unlikely that soil contamination exists further south.

COMMENT 5: Table 1 - This table should be modified to include the inorganic and PCB remedial goals.

RESPONSE: A list of the remedial goals for inorganics and PCBs can be found in the Navy's ROD for OU 1 dated July 1995.

The purpose of the AS/SVE system was to remediate VOCs in soil in accordance with the Navy's ROD. The AS/SVE was not expected to have any significant impact on inorganics or PCBs and a follow-on remedial action is expected to address inorganic and PCB contamination in site soils.

COMMENT 6: The data collected from this sampling event should be submitted as the **Remedial Design for Soil Excavation of the PCB, VOC and Metals Contaminated Soils for Area 1**. This Remedial Design document should incorporate previous sampling results from Area 1 of the site. Tables should be assembled and included in the Remedial Design for all the current soil VOC concentrations, and combined current and historic PCBs and TAL metals results. These tables should identify the VOC, TAL metals and PCB remedial clean-up objectives for Area 1.

Maps identifying the vertical and horizontal extent of soils that will need to be excavated and disposed off-site should be included in the Remedial Design. Estimated Quantities of soils that will be excavated should be part of this document.

RESPONSE: As stated earlier, the scope of work for Foster Wheeler is currently limited to the operation of the AS/SVE system, the post-operational sampling program and the Close-out report that will include the results from this latest round of sampling. While we expect this data to be useful in developing a future excavation plan for the site, the development and preparation of such a plan has not yet been funded. In addition, it is not appropriate to prepare the above Remedial Design Document until the Navy is certain that the AS/SVE system is no longer required since it's demolition will be required before the inorganic and PCB-contaminated soils can be addressed.

FOSTER WHEELER ENVIRONMENTAL CORPORATION

March 8, 2002
2282-0601-02-0041

Department of the Navy
Engineering Field Activity, Northeast
Naval Facilities Engineering Command
10 Industrial Highway, Mail Stop #82
Lester, PA 19113-2090
Attn: Code 18 (Mr. Colter)

SUBJECT: U.S. NAVY CONTRACT N62472-99-D-0032
CONTRACT TASK ORDER NO. 0060
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT
BETHPAGE, NEW YORK
FINAL POST-OPERATIONAL SAMPLING AND ANALYSIS PLAN

Dear Mr. Colter:

This letter and its attachments present the Sampling and Analysis Plan (SAP) for the Post-Operational sampling program to be performed by Foster Wheeler Environmental Corporation at the Naval Weapons Industrial Reserve Plant (NWIRP), Bethpage, New York. The information in this SAP is supplemental to the final Work Plan for this project, dated November 7, 2001.

This document defines the work to be conducted, provides the rationale for sample selection, and describes the procedures to be followed during subsurface investigation activities. The Site Location Map is provided as Figure 1. The Site Location Detail is provided in Figure 1a. The Site Plan is provided in Figure 2.

The soil vapor extraction/air sparging (SVE/AS) system was installed in 1998 at Site 1-Former Drum Marshaling Area of the NWIRP-Bethpage in response to the detected presence of a number of volatile organic compounds (VOCs) in the site soils. The primary volatile compounds of concern, based on distribution and maximum detected concentrations, include trichloroethene (TCE), tetrachlorethene (PCE), 1,1,1-trichloroethane (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 prepared in May 1995.

This SAP provides details on the post-operational sampling program that satisfies the general requirements of the New York State Department of Environmental Conservation (NYSDEC).

1.0 PURPOSE

The purpose of the post-operational sampling program is to evaluate the levels of VOCs remaining at the site after conclusion of the current operations and maintenance (O&M) period. The data will be compared to PRGs presented in Table 1 and to historical target compound list (TCL) VOC soil sampling results, presented on Figure 3. Historical TCL VOC soil data is summarized on Tables 2 through 5. Proposed sampling locations are provided in Figures 4 and 5.

Soil and groundwater samples will be collected and analyzed for TCL VOCs, polychlorinated biphenyls (PCBs) and Target Analyte List (TAL) metals. Laboratory analyses of the environmental samples will be conducted in accordance with NYSDEC Analytical Services Protocol-Contract Laboratory Program (ASP-CLP) or U.S. Environmental Protection Agency (EPA) SW-846 methodologies. Table 6 summarizes the field sampling and waste characterization sampling programs.

The newly collected data will then be compared to previous sampling results and PRGs, and will be used to perform the following:

- Identify trends with the previous sampling results;
- Monitor the effectiveness of the SVE/AS; and
- Compare concentrations in soil to PRGs.

This SAP presents the procedures to be followed during the soil and groundwater sampling activities. Specifically, the SAP addresses:

- Previous Investigations;
- Technical Approach;
- Sampling Program; and
- Quality Assurance/ Quality Control (QA/QC).

The existing site health and safety plan (SHSP), dated March 1997 and prepared under Delivery Order 04 of the previous Northern Division RAC Contract, will be used during the Post-Operational sampling program. Any intermediate operational or health and safety issues will be addressed in the daily health and safety meeting.

2.0 PREVIOUS INVESTIGATIONS

A discussion of investigations prior to April 2000 is provided in "The Report for The Additional Soil Investigation," prepared by Foster Wheeler Environmental and dated April 2000. Investigation activities performed since April 2000 at Site 1 are listed below, and have been documented in monthly progress reports.

Investigative activities performed as part of the O&M period between April 2000 and December 2000 include:

- Extraction well vapor sampling, and
- Quarterly groundwater sampling.

As prescribed in the contract modification dated July 25, 2001, the system was started in August 2001, and is expected to run until December 2001. Activities performed as part of the current O&M period to date include:

- Groundwater sampling in August 2001, and
- Extraction well vapor sampling in August 2001.

3.0 TECHNICAL APPROACH

Subsequent to the system shutdown in December 2001, Foster Wheeler Environmental will collect post-operational soil and groundwater samples. The post-operational groundwater sampling program is identical to the pre-operational groundwater sampling described in the Work Plan, dated November 7, 2001.

Post-operational sampling will also include a soil boring program that is estimated to require a total of 41 soil borings advanced to a depth of approximately 55 feet. Field observations; field screening results; the depth at which previous VOC contamination was identified in the immediate vicinity; the distance, vertically and horizontally to the nearest extraction well; and the potential for interference from air sparging wells will be considered during the selection of sample locations. The selection of additional soil boring locations will be based on the discretion of the field geologist. We have reviewed historical PCB and VOC data in order to locate soil borings.

The soil boring program has been designed based on historical soil data collected to date, combined with data collected in the field during O&M, and real-time results that will be obtained during implementation of this program. The soil samples will be analyzed for TCL VOCs, PCBs, and TAL metals. The analytical data collected will be used to support a potential excavation. Soil boring locations are shown on Figure 5.

4.0 SAMPLING PROGRAM

Soil sample locations and depths will be determined based on the results of previous investigations, lithology and photoionization detector (PID) screening results obtained during the installation of the soil borings.

Soil samples collected during the post-operational investigation will be obtained at various depths in the following areas:

- Leachate pits previously exhibiting elevated VOC concentrations of constituents of concern;

- Intermediate locations between impacted leachate pits and extraction wells. Soil boring locations will be biased towards soil boring locations that previously exhibited elevated VOC concentrations; and

- Confirmation of the presence or absence of constituents of concern around the edges of the effective radii of influence.

Leachate Pits

The site leachate pits were sampled during the 1996 Pre-Excavation Study. Selected pits were re-sampled during the 1999 SVE/AS Additional Soil Investigation. Since these pits are believed to be the primary source of VOCs in the site soils, pits previously showing detectable VOCs concentrations will be re-sampled. A total of 15 soil borings will be installed in the following leachate pits: 5, 19, 20, 24, 38, 39, 40, 49, 71, 72, 74, 75, 79, 80, and 102. Soil borings will be installed in the middle of the leachate pits, when possible. If field constraints, such as voids below the pits or surface structures prevent the location of the boring in the leachate pit, the borings will be located as close to the pit as possible. The Foster Wheeler site geologist will be responsible for determining the actual location of the soil boring based on field conditions. Analytical results will be compared to earlier concentrations to evaluate the change over time resulting from operation of the SVE/AS system.

Samples from each soil boring location will be collected from 10 to 12 feet below ground surface (bgs) (the approximate depth of the bottom of each leachate pit), approximately 20 to 24 feet, and from a depth at or below 30 feet bgs, but not to exceed a depth just above the water table at an approximate depth of 55 feet bgs. The lower soil sampling intervals will be selected at the discretion of the field geologist. Leachate pit sample locations are shown on Figure 5.

Intermediate Locations

Locations selected between impacted leachate pits and extraction wells will be sampled to confirm absence of VOCs in these intermediate areas. Locations showing no detectable concentrations of VOCs during previous investigations at Site 1 will not be re-sampled. A total of 8 soil borings will be installed between leachate pits 5, 38, 39, 49, 74, 75, and 87 and existing extraction wells EW-6, EW-10, and EW-12. In addition, sample locations will be biased away from extraction wells EW-3, EW-4, and EW-13 that did not exhibit VOC concentrations during the vapor sampling performed on August 29, 2001.

Samples from each soil boring location will be collected from 10 to 12 feet bgs, approximately 20 to 24 feet, and from a depth at or below 30 feet bgs but not to exceed a depth just above the water table at an approximate depth of 55 feet bgs. The lower soil sampling intervals will be selected at the discretion of the field geologist. Intermediate boring locations are shown on Figure 5.

Perimeter Locations

Locations surrounding the known area of detectable soil VOCs will be sampled. Locations showing no detectable concentrations of VOCs during the previous studies will not be re-sampled. Perimeter boring locations are shown on Figure 5.

Samples from each boring location will be collected at approximately 10 to 12 feet bgs, approximately 20 to 24 feet, and from a depth at or below 30 feet bgs but not to exceed a depth just above the water table at an approximate depth of 55 feet bgs. The lower soil sampling intervals will be selected at the discretion of the field geologist.

Groundwater Sampling

A total of 16 groundwater samples will be collected as part of the Post-Operational sampling program to monitor the effectiveness of the air sparging component of the system. Groundwater from each of the 13 extraction wells, EW-01 to EW-13, and the 3 groundwater monitoring wells (BPMW01, BPMW02 and BPMW03) will be sampled and analyzed for TCL VOCs. These results will be compared to the baseline round of samples collected prior to start-up in August 2001, and presented in the Annual Operating Report. Groundwater sampling locations are presented in Figure 4.

Sample Procedures and Equipment

The following sections provide the sampling procedures and equipment required to conduct the necessary field activities.

- Mobilization and demobilization
- Subsurface soil sampling
- Groundwater sampling
- Air monitoring

Mobilization and Demobilization

This subtask consists of field personnel orientation, equipment mobilization, and the staking of sampling locations. Each field team member will attend an on-site orientation meeting to become familiar with the history of the site, health and safety requirements, and field investigation procedures. The Foster Wheeler Environmental corporate procedure for mobilization and demobilization is presented in Attachment A.

Subsurface Soil Sampling

Drilling will be performed with a truck-mounted hollow-stem auger drill rig to perform standard split-spoon sampling. Approximately 123 subsurface soil samples will be collected as part of the Post-Operational sampling program to compare analytical results to data from previous investigations. Environmental samples will be collected from throughout the area of VOC contaminated soils. The majority of these soil borings will be collected from beneath leaching pits. Soil borings will be installed using a drill rig in accordance with the Foster Wheeler Environmental corporate procedure presented in Attachment A.

Air Monitoring

During drilling operations, soil sample screening using a PID will be performed on a continuous basis. All screening readings and the depth within each boring at which the sample was collected will be recorded in the field logbook. In addition, soil headspace analysis will be performed on each split-spoon sample collected from each borehole. It is anticipated that approximately 18 split-spoons will be collected from each soil boring location. Air monitoring and headspace analysis samples will be collected in accordance with the respective procedures presented in Attachment A.

Groundwater Sampling

A total of 16 groundwater samples will be collected using low flow groundwater sampling procedures. Groundwater samples will be collected in accordance with the procedures presented in Attachment A.

Waste Characterization Soil Sampling

One composite soil sample of drill cuttings will be collected and submitted for analysis. The sample will be analyzed for TCLP, pesticides/herbicides, PCBs, ignitability, corrosivity, and reactivity as shown in Table 6.

Decontamination Water Sampling

Decontamination water will be containerized in 55-gallon drums for on-site storage. One composite sample will be collected from the drums and analyzed for TCL VOCs, TCL SVOCs, TAL Metals and PCBs as shown in Table 6.

QA/QC Samples

In addition to the environmental samples collected, quality assurance/quality control (QA/QC) samples will also be collected during the Post-Operational sampling program.

Duplicate samples will be collected to provide an evaluation of the laboratory's performance by comparing analytical results of two samples from the same location. Duplicate samples will be collected at a rate of one for every 20 samples for each matrix and will be submitted to the analytical laboratory as a "blind" duplicate, i.e., not marked as a duplicate sample.

Field blanks will be collected to provide an evaluation of field decontamination procedures and laboratory supplied water. A total of 5 field blank samples are estimated for collection during the Post-Operational sampling program.

Trip blanks will be submitted to the laboratory for TCL VOC analysis during the groundwater sampling. Trip blanks are reagent water samples, generated at the laboratory, and used to determine volatile organic analytes. Trip blanks are carried to the sampling site, through sampling conditions, without being opened, and shipped to the laboratory with other samples. The trip blank results are used to identify VOC artifacts arising from bottle preparation and sample handling activities.

Sample Preservation and Analytical Methods

Representative sampling of environmental matrices for chemical analysis depends on proper collection, preservation, shipping, custody, and preparation techniques. Improper preservation and/or shipping may jeopardize sample integrity and reduce data quality. The following sections provide information on the types and sizes of the sample containers, the preservation requirements, and the analytical methods to be used in this investigation.

Sample Containers and Preservation Requirements

Pre-cleaned sample containers will be provided and certified clean by the laboratory performing the analyses. Trip blanks will be used to evaluate the cleanliness of sample containers and the potential for contamination during transport of the field samples. A summary of container sizes, preservation requirements, and holding times for the Post-Operational sampling program is provided in Table 6.

Analytical Methods

All analyses will be performed using standard USEPA and NYSDEC approved methods. Any modification to the standard methods will be identified and documented and the reason for the modification will be explained. All analyses will meet the requirements of the specific analytical method, including percent recoveries and method detection limit. At a minimum, the laboratory will have to achieve the quantitation limits for organic compounds. The methods to be used to analyze the samples collected are presented in Table 6.

5.0 QUALITY ASSURANCE/ QUALITY CONTROL

Representative samples of environmental matrices for chemical analyses depend on proper collection, preservation, shipping, custody, and preparation techniques. Soil sampling is described in the Sampling Program section of this document, including the rationale, sampling locations, sampling procedures, and equipment.

Field Documentation

Field activities, including all sample handling activities, will be documented in the field logbook and chain-of-custody forms. All pertinent field activities performed, or observations made, will be recorded in bound field logbooks with sequentially numbered pages using waterproof ink. The documentation in the field logbooks will be sufficient to reconstruct the field activity. Information recorded in the logbook will include all aspects of sample collection, field measurements taken, site personnel, health and safety documentation, and selected aspects of field management.

Sample Identification

Proper sample documentation is important. All samples will be identified with a sample label before leaving the site. The sample label will be a white label with black lettering and waterproof adhesive backing. A sample label will be attached to each sample container. The label will be completed in waterproof ink using a Sharpie pen or similar marking device. Each sample will be designated by an alpha-numeric code that will identify the site, and contain a sequential sample number. The following information will be included on the sample labels:

- Site name;
- Field identification or sample station number;
- Date and time of collection;
- Name/signature of sampler; and
- General type of analysis to be performed.

Sample Designation

A sample numbering system will be used to identify each sample, provide a tracking procedure to allow retrieval of information about a particular sample, and assure that each sample is uniquely numbered. The sample identification will consist of four components as described below. Duplicate samples will be designated with the next consecutive sample number. Identification that this is a duplicate sample will be made in the field logbook.

- <u>Site Identification</u> - The first component consists of a two letter designation which identifies the site. For this investigation, the designation "BP" will be used as the identification for Bethpage.

- <u>Sample Type</u> - The second, which identifies the sample type, will consist of a four letter/digit code which identifies the sampling location as follows:

- SB01 - Subsurface Soil Sample
- GW01 - Groundwater Sample
- WC 01– Waste Classification Sample

- Sample Location - The third component identifies the sample interval, or identifies if the sample is a trip blank or field blank. A four digit number will be used to identify each sampling location. TB will be used to identify a trip blank and FB will be used to identify a field blank.

An example of sample designation is: BP-SB-1012, which represents the subsurface soil sample collected from 10 to 12 feet bgs from soil boring 1 at Bethpage Site 1 facility.

Quality Assurance Samples

Quality control procedures will be employed to ensure that sampling and transport activities do not bias sample chemical quality. Trip blanks, field blanks, and duplicate samples will provide a quantitative basis for evaluation and validation of the data reported.

Sample Custody

The objectives of sample custody, identification, and control are:

- All samples scheduled for collection are uniquely identified;
- The correct samples are tested and are traceable to their records;
- Important sample characteristics are preserved;
- Samples are protected from loss or damage; and
- A record of sample integrity is established.

Each sample collected and shipped to an analytical laboratory will be listed on a chain-of-custody (COC) record. The purpose of the COC is to document possession of the samples from collection through analysis. The following information will be supplied to complete the COC record:

- Project name;
- Signature of sampler;
- Sampling location, date and time of collection;
- Signature of individual involved in sample transfer (i.e., relinquishing or accepting samples). Individual receiving samples will sign, date, and note the time that they receive the samples on the form; and
- Particular analyses requested for each sample.

COC forms will become permanent records of all sampling, handling, and shipping. Following sample collection and documentation, all sample containers will be prepared for shipment to the laboratory.

Schedule

This plan will be initiated subsequent to the end of O&M. The system was shut down on March 1, 2002. Field work is scheduled to begin in April 2002 and will occur over a six-week duration. Analytical data will be received over the standard turnaround time. The results of this sampling program will be included in the Annual Operating/Project Close-out Report.

If you have any questions or comments, please do not hesitate to contact me at (973) 630-8413.

Sincerely,

Marlene Lindhardt, CHMM
Project Manager

cc: C. Davis (EFA-NE)
R. Ingram (EFA-NE)
D. Brayack (TTNUS)
G. Burke (NYSDEC)
S. Scharf (NYSDEC)
C. Tippman (FWENC)

Tables

TABLE 1

PRELIMINARY REMEDIAL GOALS
VOLATILE ORGANIC COMPOUNDS

Chemical Constituent	Preliminary Remediation Goal
	mg/kg
TCE	0.01
PCE	0.027
1,2-DCA	NA[1]
1,2-DCE	NA[1]
1,1-DCE	NA[1]
1,1-TCA	0.01

NOTES:

NA[1] indicates no standard has yet been developed

TABLE 2

COMPARISON OF TOTAL VOCs IN LEACHATE PIT SAMPLES

Manhole	TCL Sample Collected September/ October 1999 (mg/kg)	Sample Depth (feet bgs)	TCL Sample Collected November 1995 (mg/kg)	Sample Depth (feet bgs)	TCL Sample Collected May 1992 (mg/kg)	Sample Depth (feet bgs)
MH-5			4.12	6-8 ft*		
MH-25			0.016	2-4 ft.*		
MH-38					5.078	3 ft.
MH-49	0.0066	50 ft.				
MH-71	0.0329	20 ft.			0.018	3 ft.
MH-74	559. 230	14 ft.	0.0119	10-12ft.*		
MH-80	0.0068	20 ft.				
MH-87			0.1138	2-4 ft.*	0.002	3 ft.
MH-88					0.003	19 ft.

* - Boring installed within five feet of the manhole.
Note: Depth of samples determined by sample ID in data tables.
TCL indicates Target Compound List.
mg/kg indicates micrograms per kilogram.
bgs indicates below ground surface.

TABLE 3

ANALYTICAL RESULTS FOR VOLATILE ORGANIC COMPOUNDS

ADDITIONAL SOIL INVESTIGATION

BETHPAGE, NEW YORK

OCTOBER, 1999

SAMPLE DESIGNATION	SB02-30-0999	SB06-03-0999	SB06-10-0999	SB06-50-0999	SB08-50-0999	SB10-50-0999
Acetone		13	18	62	15	
Methylene Chloride						6.6
1,1,1-Trichloroethane				17		
Trichloroethene		18				
Tetrachloroethene		120	89	260	22	
Methyl tertiary butyl ether	59					
Toluene						
sec-Butylbenzene						
p-Isopropyltoluene				100	5.7	
Ethylbenzene	8		7.4			
o-Xylene	12			82		
m+p-Xylene	28		30			
Naphthalene		6				
n-Butylbenzene		5.1		19		
n-Propylbenzene			6.2	6.6		
cis-1,2-Dichloroethene						
1,2,3-Trichlorobenzene						
1,2,4-Trichlorobenzene						
1,2,4-Trimethylbenzene		8.2	28	190	5	
1,3,5-Trimethylbenzene		5.4	9.3	24		

NOTES:

1. All results are expressed in micrograms per kilogram (ug/kg).

2. Blank indicates compound was not detected.

TABLE 3 (continued)

ANALYTICAL RESULTS FOR VOLATILE ORGANIC COMPOUNDS

ADDITIONAL SOIL INVESTIGATION

BETHPAGE, NEW YORK

OCTOBER, 1999

SAMPLE DESIGNATION							
COMPOUND	SB12-20-1099	SB14-20-1099	SB17-50-1099	SB24-14-0999	SB24-20-0999	SB24-30-0999	SB24-50-0999
Acetone				1400			
Methylene Chloride							
1,1,1-Trichloroethane				4400			
Trichloroethene				73000			
Tetrachloroethene		6.8	2200	460000	88		7.2
Methyl tertiary butyl ether						150	
Toluene				8900			
sec-Butylbenzene			140				
p-Isopropyltoluene			89				
Ethylbenzene				980			
o-Xylene				1100			
m+p-Xylene				3100			
Naphthalene				2500			
n-Butylbenzene							
n-Propylbenzene							
cis-1,2-Dichloroethene				650			
1,2,3-Trichlorobenzene	9.9						
1,2,4-Trichlorobenzene	23		58				
1,2,4-Trimethylbenzene				2100			
1,3,5-Trimethylbenzene			69	1100	5.5		

NOTES:

1. All results are expressed in micrograms per kilogram (ug/kg).

2. Blank indicates compound was not detected.

TABLE 4

SOIL SAMPLING ANALYTICAL RESULTS
FOR PCBs AND PESTICIDES
BETHPAGE, NEW YORK
OCTOBER, 1999

COMPOUND	Chlordane	Aroclor-1016	Aroclor-1242	Aroclor-1248
SB06-03-0999				190000
SB06-10-0999				140000
SB06-20-0999				330
SB06-50-0999			180000	72000
SB08-10-0999				12000
SB08-20-0999				740
SB08-50-0999				57000
SB10-24-0999				610
SB10-30-0999	100			
SB10-35-0999				3500
SB10-40-0999	130			
SB11-40-1099				1400
SB11-40D-1099 Duplicate				1400
SB12-20-1099				540000
SB12-30-1099				790000
SB12-30D-1099 Duplicate				820000
SB12-40-1099				950
SB12-50-1099				950
SB13-20-0999				48000
SB14-20-1099				560
SB14-30-1099				6100
SB15-10-1099				1600
SB16-10-1099	400			2600
SB16-20-1099	60			
SB17-50-1099		82000		
SB19-10-1099				260
SB19-20-1099				130
SB24-20-0999				860

NOTES:

1. All results expressed in micrograms per kilogram (ug/kg).
2. Blank indicates compound not detected.

TABLE 5

ANALYTICAL RESULTS
ADDITIONAL SOIL INVESTIGATION
BETHPAGE, NEW YORK
SEPTEMBER, 1999

COMPOUND	SB01-20-0999	SB01-30-0999	SB01-40-0999	SB01-48-0999	SB02-20-0999	SB02-30-0999	SB02-40-0999	SB02-48-0999	SB02-48D-0999 Duplicate	SB03-20-0999
Arsenic		8.7				32				
Barium										
Cadmium						1.8				
Chromium	7	13	6.8	2.9	6.1	42	2.6	2.3	2.8	5.6
Lead		3.4		3.3		9.3				
Mercury										
Selenium										
Silver										

COMPOUND	SB03-30-0999	SB03-40-0999	SB03-48-0999	SB04-30-0999	SB04-40-0999	SB04-50-0999	SB06-03-0999	SB06-10-0999	SB06-20-0999	SB06-30-0999
Arsenic	23			45			6.8			11
Barium					10		58	5	11	
Cadmium							16			
Chromium	35	3.1	1.7	47	6.8	2.9	100	7.5	6.4	12
Lead	7.5	3		12	5.1		98			3.2
Mercury							0.12			
Selenium										
Silver										

COMPOUND	SB06-40-0999	SB06-50-0999	SB07-10-0999	SB07-20-0999	SB07-30-0999	SB07-40-0999	SB07-50-0999	SB08-10-0999	SB08-20-0999
Arsenic	89				25	37			
Barium		2.5							
Cadmium		2.5			0.5				
Chromium	110	2.9	9.3	5.6	32	52	5.4	4	4.4
Lead	28				7	12			
Mercury									
Selenium									
Silver									

Notes:
1. All results expressed in micrograms per kilogram (mg/kg).
2. Blank indicates compound was not detected.

TABLE 5

ANALYTICAL RESULTS
ADDITIONAL SOIL INVESTIGATION
BETHPAGE, NEW YORK
SEPTEMBER, 1999

COMPOUND	SB08-40-0999	SB08-50-0999	SB09-20-0999	SB09-30-0999	SB09-40-0999	SB10-24-0999	SB10-30-0999	SB10-35-0999	SB10-40-0999	SB10-50-0999
Arsenic	33		7.1	15			44	6.6		
Barium						16	3.6	16	2.3	1.8
Cadmium					0.62	11		4		0.6
Chromium	71	3.2	7.7	22	3.7	14	52	13	1.2	2.4
Lead	9.4	8.2	3.5	5.3		7.6	15	24		
Mercury								0.15		
Selenium										
Silver						0.6				

COMPOUND	SB11-10-1099	SB11-20-1099	SB11-30-1099	SB11-40-1099	SB11-40D-1099 Duplicate	SB11-50-1099	SB12-20-1099	SB12-30-1099	SB12-30D-1099 Duplicate	SB12-40-1099
Arsenic			25					11	19	
Barium			4.2						7.4	
Cadmium			1.3			0.86		0.59		
Chromium	7.6	6.5	35	11	9.1	2.2	13	23	28	2.9
Lead	3.4		8.6	3.3	2.8		7.2	7.9	18	3.4
Mercury										
Selenium										
Silver							1.1			

COMPOUND	SB12-50-1099	SB13-20-1099	SB13-30-1099	SB13-40-1099	SB13-50-1099	SB14-20-1099	SB14-30-1099	SB14-40-1099	SB14-50-1099	SB15-10-1099
Arsenic			40	21			16	24		6.1
Barium		14	12							38
Cadmium	0.81	5.4				1.4				
Chromium	1.6	15	44	23	5.2	14	43	54	3	15
Lead		3.1	16	7.2	2.8	5.1	7.2	8.2		9.2
Mercury										
Selenium										
Silver										

Notes:
1. All results expressed in micrograms per kilogram (mg/kg).
2. Blank indicates compound was not detected.

TABLE 5

ANALYTICAL RESULTS
ADDITIONAL SOIL INVESTIGATION
BETHPAGE, NEW YORK
SEPTEMBER, 1999

COMPOUND	SB15-20-1099	SB15-40-1099	SB15-50-1099	SB16-10-1099	SB16-20-1099	SB16-30-1099	SB16-40-1099	SB16-50-1099	SB17-10-1099	SB17-20-1099
Arsenic		14				30				
Barium	6.9									
Cadmium										
Chromium	3.4	49	2.5	8.6	8.9	67	3	2.2	3.4	4.4
Lead	2.6	9.7	3.4	3.1		12	3.1			
Mercury										
Selenium										
Silver										

COMPOUND	SB17-30-1099	SB-17-40-1099	SB17-50-1099	SB18-10-1099	SB18-20-1099	SB18-30-1099	SB18-40-1099	SB18-50-1099	SB19-10-1099	SB19-20-1099
Arsenic	17					28				
Barium				11						
Cadmium			0.82					4.7		
Chromium	28	1.4	2	8.3	3.4	31	5.5	6.2	6.5	3
Lead	6.3					8.7	3.8	4		
Mercury										
Selenium										
Silver										

COMPOUND	SB19-30-1099	SB19-40-1099	SB19-50-1099	SB20-10-1099	SB20-20-1099	SB20-30-1099	SB20-40-1099	SB20-50-1099	SB21-10-1099	SB21-20-1099
Arsenic	57	9.7								
Barium			13			17				
Cadmium										
Chromium	58	8	4.7	6.6	6.4	27	2.9	7	5	3.5
Lead	18		5.3			5.9		5.4		
Mercury										
Selenium										
Silver		0.77								

Notes:

1. All results expressed in micrograms per kilogram (mg/kg).
2. Blank indicates compound was not detected.

TABLE 5

ANALYTICAL RESULTS
ADDITIONAL SOIL INVESTIGATION
BETHPAGE, NEW YORK
SEPTEMBER, 1999

COMPOUND	SB21-30-1099	SB21-40-1099	SB21-40D-1099 Duplicate	SB21-50-1099	SB22-10-1099	SB22-20-1099	SB22-30-1099	SB22-40-1099	SB22-50-1099	SB23-10-1099
Arsenic	55						22		10	
Barium										
Cadmium	0.78			1						
Chromium	130	5.4	2.9	5.3	21	2.8	40	3.2	10	3.5
Lead	12						8.1		3.8	
Mercury										
Selenium										
Silver										

COMPOUND	SB23-20-1099	SB23-30-1099	SB23-40-1099	SB23-50-1099	SB24-14-0999	SB24-20-0999	SB24-30-0999	SB24-40-0999	SB24-50-0999	SB25-10-1099
Arsenic		7.3			27	17	14			9.9
Barium					30	11	6.2		15	10
Cadmium					120	2.5	5			0.53
Chromium	4.4	31	3.1	2.5	91	27	38	3.7	2.6	8.9
Lead		5.2	3.1		60	10	7.9	3.3	6.6	3.4
Mercury					0.95				0.17	
Selenium										
Silver			2.1		3.8					

Notes:
1. All results expressed in micrograms per kilogram (mg/kg).
2. Blank indicates compound was not detected.

TABLE 5

ANALYTICAL RESULTS
ADDITIONAL SOIL INVESTIGATION
BETHPAGE, NEW YORK
SEPTEMBER, 1999

COMPOUND	SB25-20-1099	SB25-30-1099	SB25-40-1099	SB25-50-1099	SB26-10-0999	SB26-20-0999	SB26-30-0999	SB26-40-0999	SB26-50-0999	SB27-10-1099
Arsenic		15					19	6.2		
Barium				99					28	
Cadmium										
Chromium	5.6	38	4.3	21	5.4	8.9	22	12	6	4.8
Lead		6.5	3.4	12			5.3	3.4	8.6	3.2
Mercury										
Selenium										
Silver										

COMPOUND	SB27-20-1099	SB27-30-1099	SB27-40-1099	SB27-50-1099
Arsenic		21		
Barium				10
Cadmium	1.2			
Chromium	9.8	53	2	3.1
Lead	4.7	10	4.5	5.8
Mercury				
Selenium				
Silver				

Notes:

1. All results expressed in micrograms per kilogram (mg/kg).
2. Blank indicates compound was not detected.

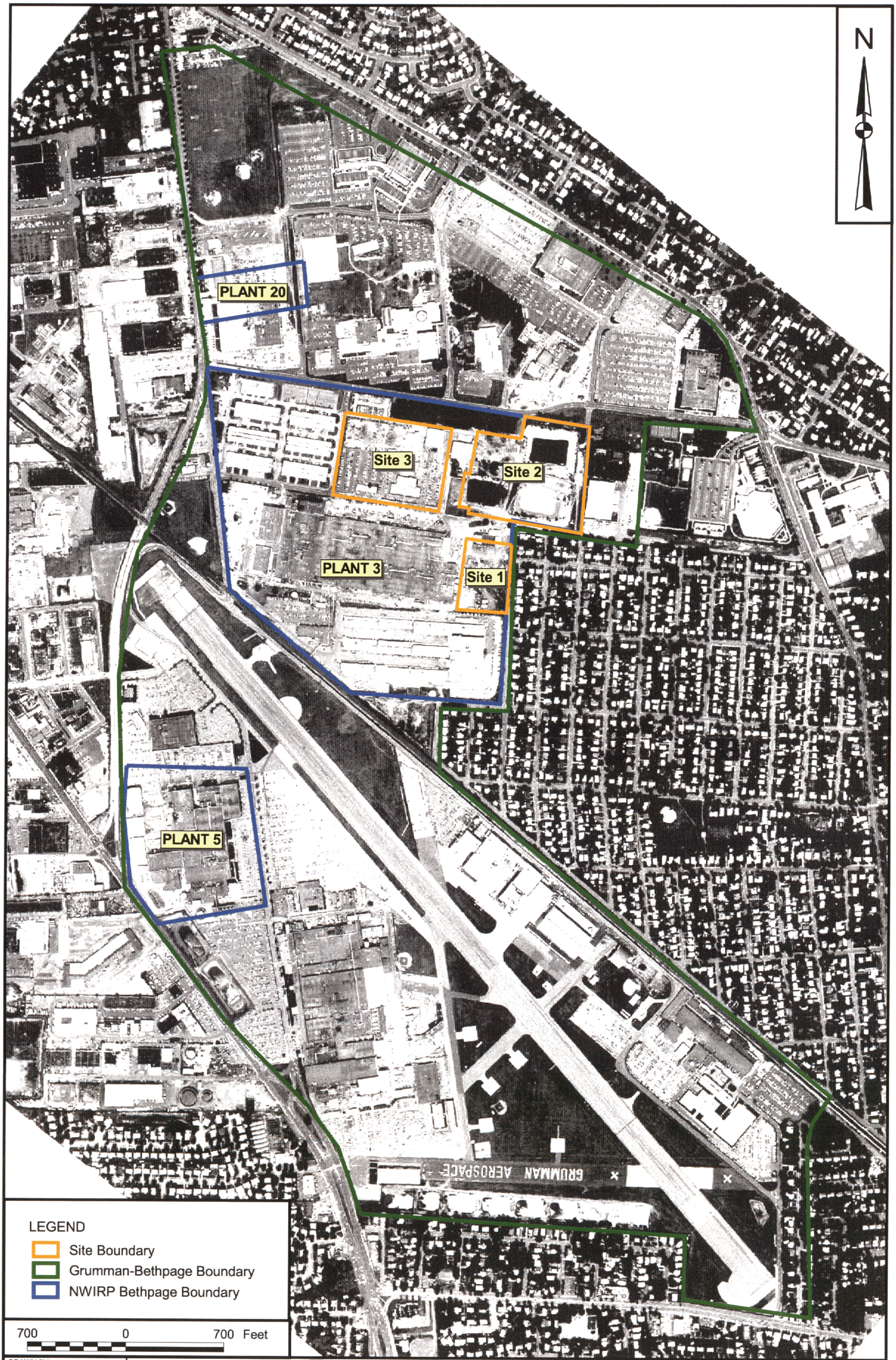
Table 6

Summary of Analytical Parameters, Test Methods, Containers, Preservation, and Holding Times for Samples

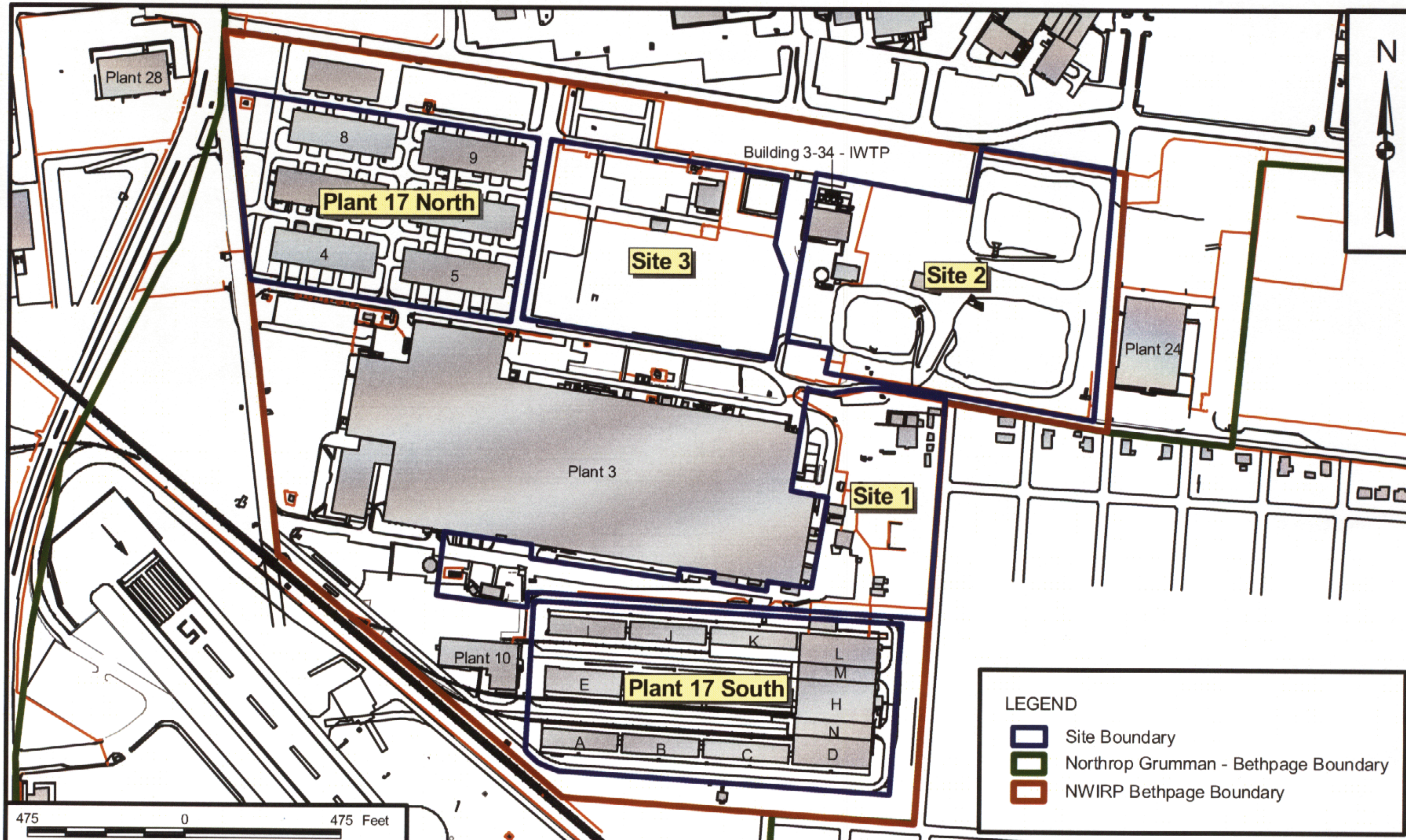
Matrix	Parameter	Proposed Test Method	Container	Preservation	Holding Time
Water (Decontamination water, Purge water)	TCL VOCs	8260B	(2) 40 ml glass vials w/ Teflon-lined septum; No headspace	Ice to 4°C	7 Days
	TCL SVOCs	8270C	(2) 1-liter amber glass w/ Teflon-lined cap	Ice to 4°C	7 Days to Extract; 40 Days to Analyze
	TAL Metals	200 Series	(1) 1-liter polyethylene	Nitric Acid to pH <2; Ice to 4°C	6 Months; (Hg – 28 days)
	PCBs	8082	(1) 1-L amber glass w/ Teflon-lined cap	Ice to 4°C	7 Days to Extract; 40 Days to Analyze
Solids (Soil)	TCLP VOCs	1311/8260B	(1) 8 oz glass w/Teflon-lined cap	Ice to 4°C	14 Days to TCLP Extract; 14 Days to Analyze
	TCLP SVOCs/ PEST/HERB	1311/8270C 8081/8151A	(1) 8 oz glass w/Teflon-lined cap	Ice to 4°C	14 Days to TCLP Extract; 7 Days to Preparatory Extract; 40 Days to Analyze
	TCLP Metals	1311/6010A/7471A	(1) 8 oz glass w/Teflon-lined cap	Ice to 4°C	6 Months to TCLP Extract; 6 Months to Analyze (Hg - 28 Days)
	PCBs	8082	(1) 8 oz glass w/ Teflon-lined cap	Ice to 4°C	14 Days to Extract; 40 Days to Analyze
	Ignitability	Method 1030	(1) 8 oz glass w/Teflon-lined cap	Ice to 4°C	N/A
	Reactivity	SW-846; Chap. 7.3	(1) 8 oz glass w/Teflon-lined cap	Ice to 4°C	N/A
	Corrosivity	Method 1110	(1) 8 oz glass w/Teflon-lined cap	Ice to 4°C	N/A

NOTES:
VOCs indicates Volatile Organic Compounds
TCL indicates Target Compound List
SVOCs indicate Semi-Volatile-Organic Compounds
TCLP indicates Toxicity Characteristic Leaching Procedure
PCBs indicates polychlorinated biphenyls
TAL indicates Target Analyte List
Pest/Herb indicates pesticides/herbicides

Figures

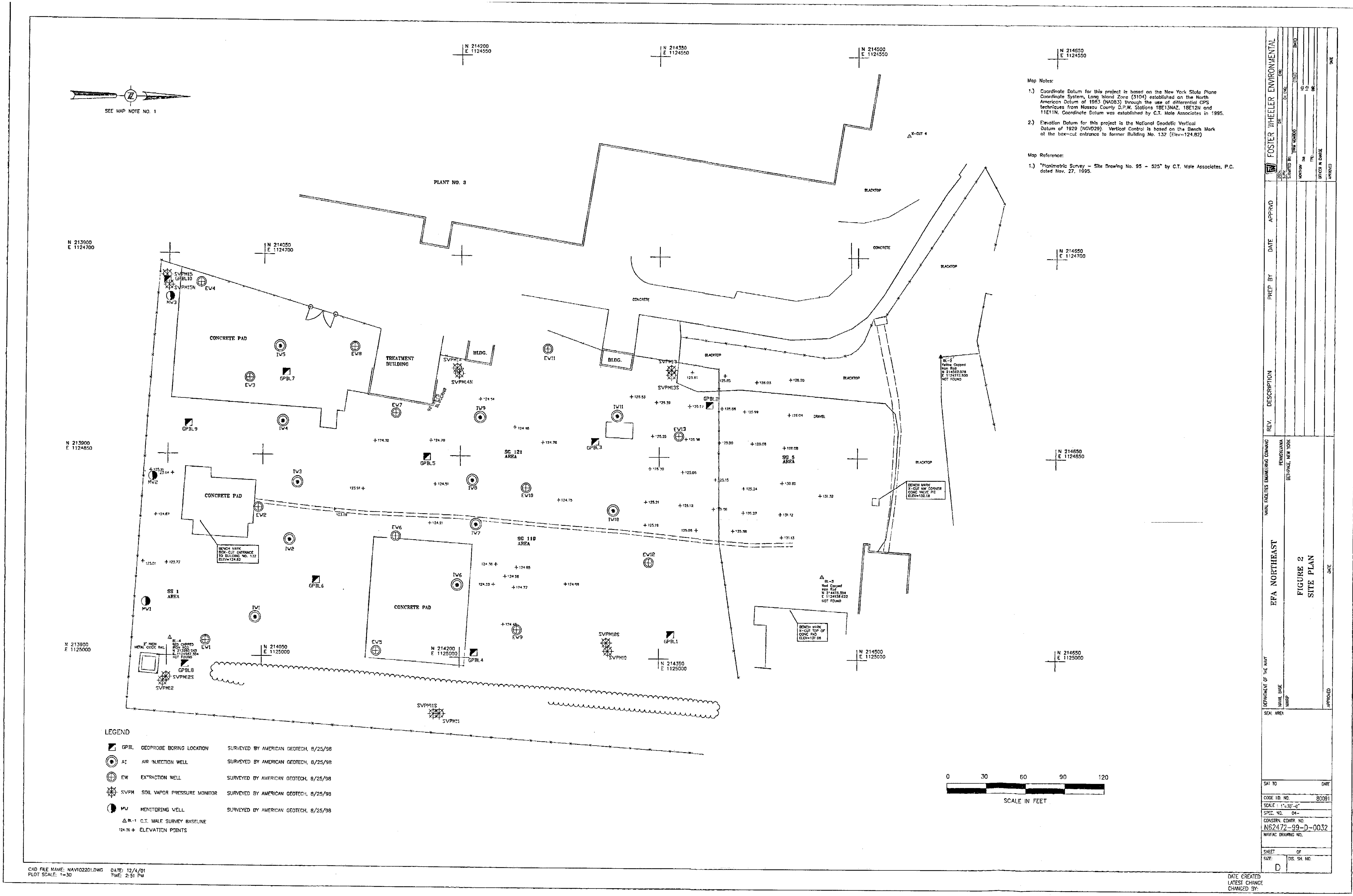


DRAWN BY J. LAMEY	DATE 2/8/00	Tetra Tech NUS, Inc.	CONTRACT NUMBER N5174	OWNER NUMBER CTO 208
CHECKED BY	DATE	SITE MAP NAVAL WEAPONS RESERVE PLANT BETHPAGE, NEW YORK	APPROVED BY	DATE
COST/SCHEDULE-AREA			APPROVED BY	DATE
SCALE AS NOTED			DRAWING NO. FIGURE 11	REV 0



DRAWN BY J. LAMEY	DATE 9/21/00	Tetra Tech NUS, Inc.	CONTRACT NUMBER —	OWNER NUMBER —
CHECKED BY —	DATE —	105 ACRE PARCEL MAP NWIRP BETHPAGE BETHPAGE, NEW YORK	APPROVED BY —	DATE —
COST/SCHEDULE-AREA			APPROVED BY —	DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 1a	REV 0

P:\GIS\NWIRP_BETHPAGE\APR\BETHPAGE_RAB_21700.APR 105 ACRE PARCEL MAP 9/21/00 JAL



SEE MAP NOTE NO. 1
PLANT NO. 3
TREATMENT BUILDING
BLDG.
CONCRETE PAD
CONCRETE
BLACKTOP
GRAVEL
SG 121 AREA
SG 119 AREA
SG 5 AREA
SS 1 AREA
BENCH MARK BOX-CUT ENTRANCE TO BUILDING NO. 132 ELEV=124.82
BENCH MARK X-CUT NW CORNER CONC VALVE PIT ELEV=132.18
BENCH MARK X-CUT TOP OF CONC PAD ELEV=131.86
N 214200 E 1124550
N 214350 E 1124550
N 214500 E 1124550
N 214650 E 1124550
N 213900 E 1124700
N 214050 E 1124700
N 214650 E 1124700
N 213900 E 1124850
N 214650 E 1124850
N 213900 E 1125000
N 214050 E 1125000
N 214200 E 1125000
N 214350 E 1125000
N 214500 E 1125000
N 214650 E 1125000
Map Notes:
1.) Coordinate Datum for this project is based on the New York State Plane Coordinate System, Long Island Zone (3104) established on the North American Datum of 1983 (NAD83) through the use of differential GPS techniques from Nassau County D.P.W. Stations 18E13NAZ, 18E12N and 11E11N. Coordinate Datum was established by C.T. Male Associates in 1995.
2.) Elevation Datum for this project is the National Geodetic Vertical Datum of 1929 (NGVD29). Vertical Control is based on the Bench Mark at the box-cut entrance to former Building No. 132 (Elev=124.82)
Map Reference:
1.) "Planimetric Survey - Site Drawing No. 95 - 525" by C.T. Male Associates, P.C. dated Nov. 27, 1995.
LEGEND
GPBL GEOPROBE BORING LOCATION SURVEYED BY AMERICAN GEOTECH, 8/25/98
AI AIR INJECTION WELL SURVEYED BY AMERICAN GEOTECH, 8/25/98
EW EXTRACTION WELL SURVEYED BY AMERICAN GEOTECH, 8/25/98
SVPM SOIL VAPOR PRESSURE MONITOR SURVEYED BY AMERICAN GEOTECH, 8/25/98
MW MONITORING WELL SURVEYED BY AMERICAN GEOTECH, 8/25/98
BL-1 C.T. MALE SURVEY BASELINE
124.36 + ELEVATION POINTS
0 30 60 90 120
SCALE IN FEET
CAD FILE NAME: NAV102201.DWG DATE: 12/4/01
PLOT SCALE: 1=30 TIME: 2:51 PM
FOSTER WHEELER ENVIRONMENTAL
REV. DESCRIPTION PREP BY DATE APPRVD
DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
EFA NORTHEAST
PENNSYLVANIA
BETHPAGE, NEW YORK
NAVAL BASE NWIRP
FIGURE 2
SITE PLAN
CODE I.D. NO. 80091
SCALE: 1"=30'-0"
CONSTR. CONTR. NO. N62472-99-D-0032
SIZE D
DATE CREATED
LATEST CHANGE
CHANGED BY:
0126AB2Z

Map Notes:

1.) Coordinate Datum for this project is based on the New York State Plane Coordinate System, Long Island Zone (3104) established on the North American Datum of 1983 (NAD83) through the use of differential GPS techniques from Nassau County D.P.W. Stations 18E13NAZ, 18E12N and 11E11N.

2.) Elevation Datum for this project is the National Geodetic Vertical Datum of 1929 (NGVD29). Differential GPS Observations in conjunction with standard leveling techniques were employed to establish and verify elevations shown hereon.

3.) The limited underground structures shown hereon have been scaled from record plans provided to C.T. Male by Foster-Wheeler. C.T. Male does not guarantee that all underground structures or utilities have been shown as this was not part of the scope of work. Prior to any excavation or digging, the appropriate officials should be contacted to verify the existence of such facilities.

4.) All information shown hereon is the result of an actual "on-the-ground" field survey conducted by C.T. Male Associates, P.C. during the week of November 6, 1995, and on April 25, 1996.

Map Reference:

1.) "Grumman Bethpage Quadrangle no. 115 & 121 Civil", prepared by Lockwood, Kessler & Bartlett, Inc., Syosset, N.Y., dated June 1966.

0 30 60 90 120

SCALE IN FEET

Map Notes:

1.) Coordinate Datum for this project is based on the New York State Plane Coordinate System, Long Island Zone (3104) established on the North American Datum of 1983 (NAD83) through the use of differential GPS techniques from Nassau County D.P.W. Stations 18E13NAZ, 18E12N and 11E11N. Coordinate Datum was established by C.T. Male Associates in 1995.

2.) Elevation Datum for this project is the National Geodetic Vertical Datum of 1929 (NGVD29). Vertical Control is based on the Bench Mark at the box-cut entrance to former Building No. 132 (Elev=124.82)

Map Reference:

1.) "Planimetric Survey - Site Drawing No. 95 - 525" by C.T. Male Associates, P.C. dated Nov. 27, 1995.

LEGEND

LOCATIONS SAMPLED WHERE VOCs' WERE DETECTED

LOCATIONS SAMPLED WHERE VOCs' WERE NOT DETECTED

GPBL	GEOPROBE BORING LOCATION	SURVEYED BY AMERICAN GEOTECH, 8/25/98
AI	AIR INJECTION WELL	SURVEYED BY AMERICAN GEOTECH, 8/25/98
EW	EXTRACTION WELL	SURVEYED BY AMERICAN GEOTECH, 8/25/98
SVPM	SOIL VAPOR PRESSURE MONITOR	SURVEYED BY AMERICAN GEOTECH, 8/25/98
MW	MONITORING WELL	SURVEYED BY AMERICAN GEOTECH, 8/25/98
	C.T. MALE SURVEY BASELINE	
124.35 +	ELEVATION POINTS	
SB27	BORINGS FROM GROUND SURFACE AS PREVIOUS SOIL BORINGS 7/03/96	
POSB-1	PROPOSED POST-OPERATIONAL SOIL BORING	
	APPROXIMATE MANHOLE LOCATION TAKEN FROM MAP REFERENCE NO.1	
MH	MANHOLE LOCATION	

BASE MAP ADAPTED FROM C.T. MALE ASSOCIATES, P.C.
PLANIMETRIC SURVEY - SITE 1, DRAWING NO. 95-525.
DATE 5/6/96 REV 1

CAD FILENAME: NAV1260I.DWG DATE: 12/4/01
PLOT SCALE: 1=30 TIME: 2:48 PM

FOSTER WHEELER ENVIRONMENTAL

DSGN. DR. CHK. SUBMITTED BY: (FIRM MEMBER) (TITLE) (DATE)
NORTHDIV SM: HD: DIR: FPE:
OFFICER IN CHARGE
APPROVED DATE

REV. DESCRIPTION PREP BY DATE APPRVD

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
EFA NORTHEAST
NAVAL BASE PENNSYLVANIA
NWIRP BETHPAGE, NEW YORK

FIGURE 3
HISTORICAL SOIL BORING LOCATIONS
SITE 1 - FORMER DRUM MARSHALLING AREA

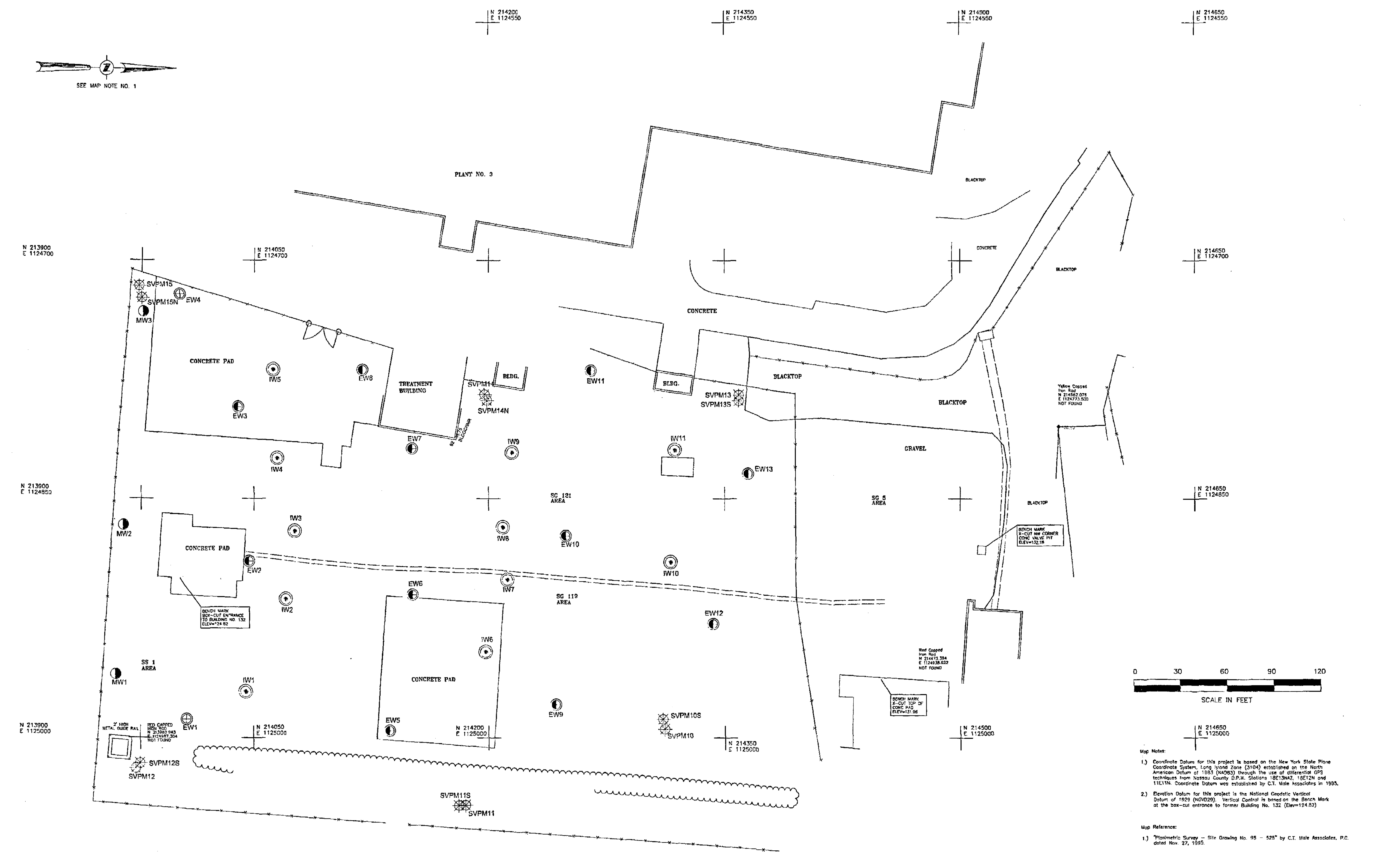
APPROVED DATE

SEAL AREA

SAT TO DATE

CODE I.D. NO. 80091
SCALE : 1"=30'-0"
SPEC. NO. 04-
CONSTRN. CONTR. NO. N62472-99-D-0032
NAVFAC DRAWING NO.
SHEET OF
SIZE: D DIS. SH. NO.

DATE CREATED
LATEST CHANGE
CHANGED BY:



Map Notes:

1.) Coordinate Datum for this project is based on the New York State Plane Coordinate System, Long Island Zone (3104) established on the North American Datum of 1983 (NAD83) through the use of differential GPS techniques from Nassau County D.P.W. Stations 18E13NAZ, 18E12N and 11E11N. Coordinate Datum was established by C.T. Male Associates in 1995.

2.) Elevation Datum for this project is the National Geodetic Vertical Datum of 1929 (NGVD29). Vertical Control is based on the Bench Mark at the box-cut entrance to former Building No. 132 (Elev=124.82)

Map Reference:

1.) "Planimetric Survey – Site Drawing No. 95 – 525" by C.T. Male Associates, P.C. dated Nov. 27, 1995.

LEGEND

AI	AIR INJECTION WELL	SURVEYED BY AMERICAN GEOTECH, 8/25/98
EW	EXTRACTION WELL TO BE SAMPLED	SURVEYED BY AMERICAN GEOTECH, 8/25/98
SVPM	SOIL VAPOR PRESSURE MONITOR	SURVEYED BY AMERICAN GEOTECH, 8/25/98
MW	MONITORING WELL TO BE SAMPLED	SURVEYED BY AMERICAN GEOTECH, 8/25/98
	C.T. MALE SURVEY BASELINE	

FOSTER WHEELER ENVIRONMENTAL

REV. | DESCRIPTION | PREP BY | DATE | APPRVD

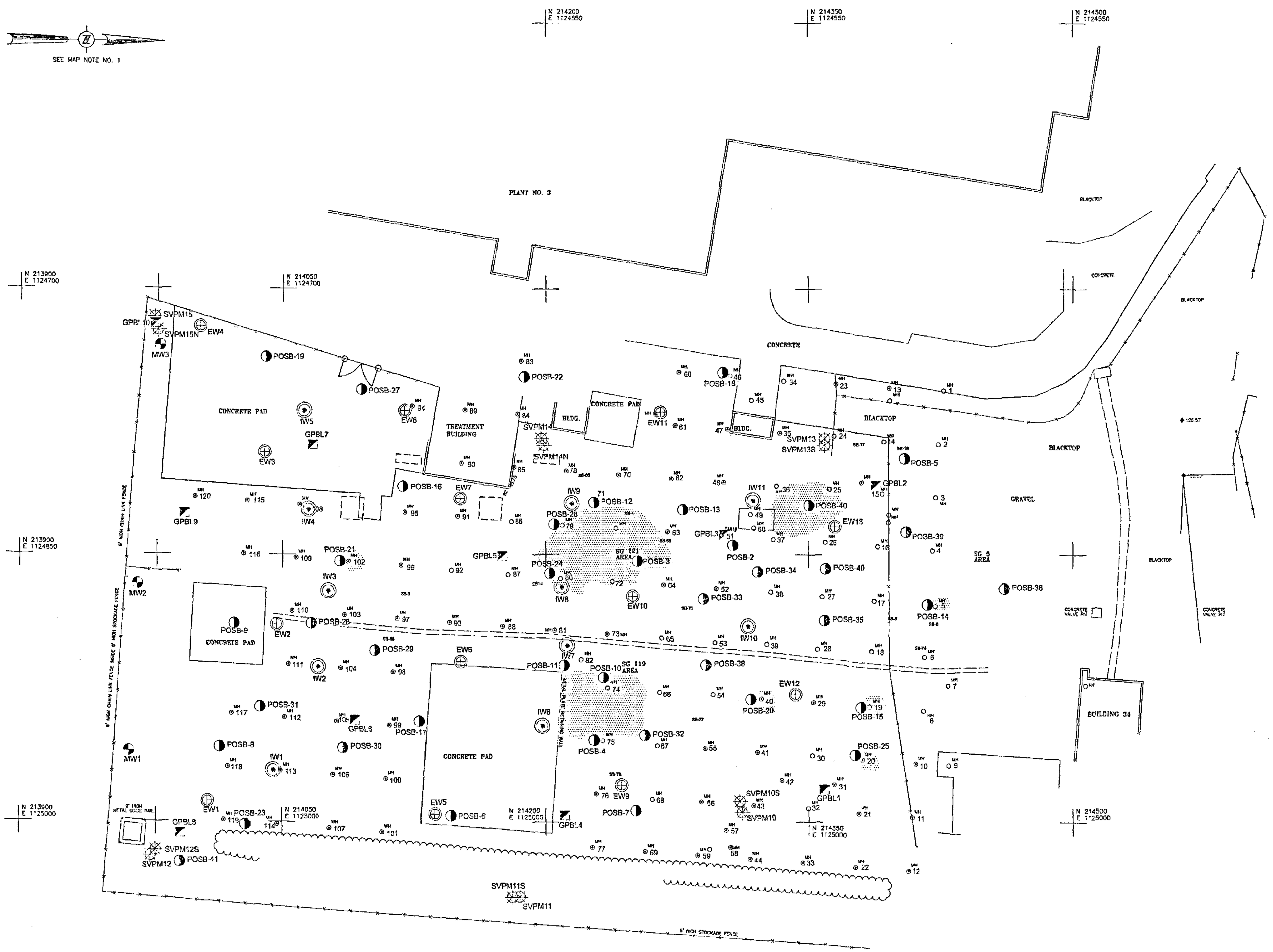
DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
EFA NORTHEAST
PENNSYLVANIA
NAVAL BASE
NWIRP
BETHPAGE, NEW YORK

FIGURE 4
POST – OPERATIONAL GROUNDWATER SAMPLING LOCATIONS
SITE 1 – FORMER DRUM MARSHALLING AREA

SEAL AREA

CODE I.D. NO. 80091
SCALE : 1"=30'-0"
SPEC. NO. 04-
CONSTRN. CONTR. NO. N62472-99-D-0032
NAVFAC DRAWING NO.
SHEET OF
SIZE: D

DATE CREATED
LATEST CHANGE
CHANGED BY:



N 214650
E 1124550

Map Notes:

1.) Coordinate Datum for this project is based on the New York State Plane Coordinate System, Long Island Zone (3104) established on the North American Datum of 1983 (NAD83) through the use of differential GPS techniques from Nassau County D.P.W. Stations 18E13NAZ, 18E12N and 11E11N.

2.) Elevation Datum for this project is the National Geodetic Vertical Datum of 1929 (NGVD29). Differential GPS Observations in conjunction with standard leveling techniques were employed to establish and verify elevations shown hereon.

3.) The limited underground structures shown hereon have been scaled from record plans provided to C.T. Male by Foster-Wheeler. C.T. Male does not guarantee that all underground structures or utilities have been shown as this was not part of the scope of work. Prior to any excavation or digging, the appropriate officials should be contacted to verify the existence of such facilities.

4.) All information shown hereon is the result of an actual "on-the-ground" field survey conducted by C.T. Male Associates, P.C. during the week of November 6, 1995, and on April 25, 1996.

Map Reference:

1.) "Grumman Bethpage Quadrangle no. 115 & 121 Civil", prepared by Lockwood, Kessler & Bartlett, Inc., Syosset, N.Y., dated June 1966.

N 214650
E 1124700

0 30 60 90 120

SCALE IN FEET

Map Notes:

1.) Coordinate Datum for this project is based on the New York State Plane Coordinate System, Long Island Zone (3104) established on the North American Datum of 1983 (NAD83) through the use of differential GPS techniques from Nassau County D.P.W. Stations 18E13NAZ, 18E12N and 11E11N. Coordinate Datum was established by C.T. Male Associates in 1995.

2.) Elevation Datum for this project is the National Geodetic Vertical Datum of 1929 (NGVD29). Vertical Control is based on the Bench Mark at the box-cut entrance to former Building No. 132 (Elev=124.82)

Map Reference:

1.) "Planimetric Survey - Site Drawing No. 95 - 525" by C.T. Male Associates, P.C. dated Nov. 27, 1995.

N 214650
E 1125000

LEGEND

GPBL	GEOPROBE BORING LOCATION	SURVEYED BY AMERICAN GEOTECH, 8/25/98
AI	AIR INJECTION WELL	SURVEYED BY AMERICAN GEOTECH, 8/25/98
EW	EXTRACTION WELL	SURVEYED BY AMERICAN GEOTECH, 8/25/98
SVPM	SOIL VAPOR PRESSURE MONITOR	SURVEYED BY AMERICAN GEOTECH, 8/25/98
MW	MONITORING WELL	SURVEYED BY AMERICAN GEOTECH, 8/25/98
	C.T. MALE SURVEY BASELINE ELEVATION POINTS	
POSB-1	PROPOSED POST-OPERATIONAL SOIL BORING	
MH	MANHOLE LOCATION	
	AREAS OF PREVIOUS IDENTIFIED SOIL VOC CONTAMINATION	

BASE MAP ADAPTED FROM C.T. MALE ASSOCIATES, P.C.
PLANIMETRIC SURVEY - SITE 1, DRAWING NO. 95-525,
DATE 5/6/96 REV 1

REV. | DESCRIPTION | PREP BY | DATE | APPRVD

FOSTER WHEELER ENVIRONMENTAL

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
EFA NORTHEAST

NAVAL BASE NWIRP PENNSYLVANIA BETHPAGE, NEW YORK

FIGURE 5
PROPOSED SOIL BORING LOCATIONS
SITE 1 - FORMER DRUM MARSHALLING AREA

SEAL AREA

SAT TO | DATE

CODE I.D. NO. 80091
SCALE : 1"=30'-0"
SPEC. NO. 04-
CONSTR. CONTR. NO. N62472-99-D-0032
NAVFAC DRAWING NO.
SHEET OF
SIZE D

DATE CREATED
LATEST CHANGE
CHANGED BY:

Attachment A

- Mobilization and Demobilization
- Deep Subsurface Soil Boring Sampling
- Soil Sample Field Screening
- Air Monitoring (Real time)
- Water Level Measurement
- Groundwater Sampling –Field Parameter Measurement
- Groundwater Sampling – Low Flow Purge Procedure
- Decontamination – Drilling Equipment
- Decontamination – Field Instrumentation
- Decontamination – Non-disposable Chemical Sampling Equipment
- Decontamination – Low Flow Groundwater Sampling Equipment

Mobilization and Demobilization

Standard Operating Procedure

This field investigation activity consists of field personnel orientation, equipment mobilization, the determination of sampling locations, and demobilization. Each field team member will attend an on-site orientation meeting to become familiar with the history of the site, health and safety requirements, and field investigation procedures.

1. Equipment mobilization will entail the ordering, purchase, and if necessary, fabrication of all sampling supplies and equipment needed for the field investigation. An inventory of available Foster Wheeler Environmental supplies/equipment will be conducted prior to initiating field activities, and all additional equipment required will be secured.

2. For the Reconnaissance Phase, grid locations for the geophysical and soil gas surveys will be determined prior to field operations. In addition, locations for the test pits will be staked. Building interior and exterior sumps, pits, drains, catch basins, etc. will be located. On-site production wells will also be located, if possible, and their condition assessed.

3. During mobilization for the Phase I Investigation, locations for the surface soil samples, monitoring wells, sediment/surface water samples, etc. (as applicable) will be staked at the start of the operations. These locations will be finalized from information obtained during the Reconnaissance Phase, and measured from existing landmarks prior to surveying.

4. Phase II Investigation mobilization will consist of staking all additional locations (as applicable), prior to sampling. The types and locations of samples to be collected during this phase will be determined from Reconnaissance Phase and Phase I Investigation data. Prior approval of the additional locations will be obtained from the client before commencement of operations.

5. Equipment and personnel will be demobilized at the completion of each phase of field activities as necessary. Equipment demobilization may include (but will not be limited to) sampling equipment, drilling subcontractor equipment, and field office trailer and utility hookups. Demobilization will also consist of site-area clean-up, staging and inventory of investigation-derived wastes, and organization of investigation records.

Deep Subsurface Soil Boring Sampling [Split-Spoon]

Standard Operating Procedure

1. Drill a borehole to the desired sampling depth. Drive a split-spoon sampler into the undisturbed soil to be sampled.

2. Drive a decontaminated carbon steel 3-inch outer diameter split-spoon sampler with blows from 300 pound hammer falling 30 inches until either approximately 2 feet has been penetrated or 100 blows within a 6-inch interval have been applied (modified from ASTM Method D-1586-84).

3. Record the number of blows required for each 6 inches of penetration or fraction thereof. The first 6 inches is considered to be a seating drive. The sum of the number of blows required for the second and third 6 inches of penetration is termed the penetration resistance. If the sampler is driven less than 2 feet, the penetration resistance is that for the last 1 foot of penetration. (If less than 1 foot is penetrated, the logs shall state the number of blows and the fraction of 1 foot penetrated.)

4. Bring the sampler to the surface and remove both ends and one half of the split-spoon so that the recovered soil rests in the remaining half of the barrel. Place the split-spoon on clean polyethylene sheeting. Describe thoroughly the approximate recovery (length), the USCS and Burmeister classifications, composition, color, moisture, etc. of the recovered soil.

5. Collect the TCL VOC sample immediately upon opening the sample tube. In addition, obtain samples for field screening directly after opening the split-spoon sampler.

6. Homogenize remaining soil in a stainless steel bowl, using a decontaminated stainless steel spatula or spoon. Fill sample containers for TCL VOCs, TCL pesticides/PCBs, and TAL metals.

7. Complete sample logs, labels, custody seals, and chain of custody forms. Record sample information in the field notebook.

8. Place the analytical samples in coolers for shipment and chill to 4°C.

Soil Sample Field Screening

Standard Operating Procedure

Soil samples will be field screened using PID headspace analysis in accordance with the following procedure:

1. Collect representative soil samples from each sample interval, and place in two clean, unpreserved wide mouth glass jars. The jars will be filled approximately two-thirds with soil, leaving one-third empty.

2. The mouth of the jars will be covered with aluminum foil (shiny side out). The foil shall cover the mouth of each jar tightly and be secured with a rubber band to prevent the escape of VOCs.

3. After a minimum period of 5 minutes, the foil of one of the jars will be pierced using the probe of the PID, and the instrument inserted into the jar to sample the headspace.

4. Field screening readings and ambient background readings will be recorded in the field log book and on the boring log sheets at the appropriate interval.

Air Monitoring [Real Time]

Standard Operating Procedure

Real-time air monitoring will be conducted during all intrusive site program activities to ensure the safety of all field personnel. Air monitoring will be conducted by a trained SHSO utilizing a PID, as outlined in the SHSP. The procedure for conducting air monitoring is described below:

1. Wear appropriate health and safety equipment as outlined in the SHSP.

2. Ensure that the selected air monitoring equipment has been fully charged in accordance with the SHSP, and the manufacturer's instructions.

3. At the start of each day's activities, and as appropriate during the day, calibrate all air-monitoring instruments in accordance with the SHSP, and the manufacturer's instructions.

4. During drilling activities, air monitoring readings should be measured at the borehole and in the breathing zone of field personnel at regular intervals, as described in Section 7.0 of the SHSP. In addition, air monitoring readings will be collected from each split-spoon sampler as they are opened. Readings will be measured during all other intrusive activities (e.g., sediment sampling, opening monitoring wells, etc.). Readings should be recorded in field logbooks and on log sheets as described in the SHSP.

5. Should readings exceed action levels, appropriate action will be taken, as described in the SHSP.

Water Level Measurement

Standard Operating Procedure

Water level measurements will be conducted in accordance with the following procedure:

1. Groundwater level measurements will be collected from all monitoring wells primarily using an electronic water level indicator. An interface probe will also be used during the initial measurement round and periodically through the program to check for the presence of free product. Water levels will be measured, relative to surveyed datum (i.e., top of well riser), at a specific mark on the casing, to the nearest 0.01 foot.

2. Electronic water level indicators will preferably be the type with water level markings on the cable at increments of 0.01 foot or less.

3. All electronic water level measurements will be recorded in the appropriate field logbook or data sheet.

4. The electronics of the water level indicator will be checked prior to the commencement of measurements with a jar of water and the depths calibrated on the ground against a steel tape.

5. The water level indicator cable, tape and probe will be decontaminated between wells by rinsing with deionized water.

Groundwater Sampling [Field Parameter Measurement]

Standard Operating Procedure

Field parameters (temperature, pH, turbidity, Eh, specific conductance, and/or dissolved oxygen) will be monitored during purging of the monitoring wells, utilizing a Horiba® water quality meter or equivalent. Measurements will be conducted in accordance with the manufacturer's instructions and the following procedure:

1. Calibrate the water quality meter as per manufacturer's instructions.

2. For low flow purging of the monitoring wells:

   - Attach a flow-through cell to the Teflon-lined polyethylene tubing. Position the water quality meter probe in the flow-through cell. Begin purging the monitoring well, following the groundwater sampling - low flow purge procedure.

   - After the cell has been "flushed" at least twice, begin monitoring the field parameters, and continue approximately every 3 to 5 minutes during purging. All water quality measurements will be recorded in the appropriate field logbook or on a well purge data sheet.

   - When the indicator parameters have stabilized for three consecutive readings (see step 11 of the groundwater sampling - low flow purge procedure), the well is considered stabilized and ready for sample collection. Remove the flow-through cell from the tubing.

3. All water quality measurements will be recorded in the appropriate field logbook.

4. The probe of the water quality meter will be decontaminated between wells by rinsing with deionized water (see Decontamination – field instrumentation).

Groundwater Sampling [Low Flow Purge Procedure]

Standard Operating Procedure

Groundwater samples will be obtained starting at the least contaminated well and proceeding systematically to the well likely to be most contaminated. All monitoring well samples will be analyzed for TCL VOCs in accordance with the following procedures:

1. Check and record the condition of the well for any damage or evidence of tampering.

2 Remove the well cap.

3. Measure well headspace with a PID or FID and record the reading in the field logbook.

4. Measure and record the depth to water as stated in the water level measurement procedure, and record the measurement in the field logbook. Do not measure the depth to the bottom of the well at this time (to avoid disturbing any sediment that may have accumulated). Obtain depth to bottom information from installation information in the field logbook or drilling logs. Calculate volume of the water column.

5. Lay out plastic sheeting and place the monitoring, purging and sampling equipment on the sheeting. To avoid cross-contamination, do not let any downhole equipment touch the ground.

6. Re-check and record the depth to water after approximately 5 minutes at the well location. If the measurement has changed more than 0.01 foot, check and record the measurement again, then begin well purging.

7. Attach and secure the Teflon-lined polyethylene tubing to the low-flow submersible pump. As the pump is slowly lowered into the well, secure the safety drop cable, tubing, and electrical lines to each other using nylon stay-ties placed approximately 5 feet apart.

8. Set the pump at approximately the middle of the screen and/or the best depth based on the stratigraphy of the well. Be careful not to place the pump intake less than 2 feet above the bottom of the well as this may cause mobilization of any sediment present in the bottom of the well. Start pumping the well at 0.2 to 0.5 liters per minute.

9. Monitor the water level in the well periodically during pumping, and ideally the pump rate should equal the well recharge rate with little or no water level drawdown in the well (drawdown shall be 0.3 foot or less). There should be at least 1 foot of water over the pump intake so there is no risk of the pump suction being broken, or entrapment of air in the sample. Record the pumping rate adjustments and depth(s) to water in the logbook. Pumping rates should, if needed, be reduced to the minimum capabilities of the pump (0.1 to 0.2 liters per minute) to avoid purging the well dry. However, if the recharge rate of the well is very low and the well is purged dry, then wait until the well has recharged to a sufficient level and collect the appropriate volume of sample with the submersible pump.

10. Purge the well at a low-flow rate (from 0.2 to 0.5 liters per minute). During purging, monitor the field parameters (temperature, pH, turbidity, Eh, specific conductance, and dissolved oxygen) approximately every 3 to 5 minutes. A flow-through cell will be used to monitor the field parameters. Begin measuring field parameters after the flow-through cell has been "flushed" with groundwater twice.

11. The well is considered stabilized and ready for sample collection when the indicator parameters have stabilized for three consecutive readings, as follows:

    - 0.1 for pH
    - 3 percent for specific conductance
    - 10 percent for dissolved oxygen
    - 10 percent for turbidity
    - 10 mV for Eh

    Dissolved oxygen and turbidity usually require the longest time to achieve stabilization. The pump must not be removed from the well between purging and sampling.

12. Once the field parameters have stabilized, collect the samples directly from the end of the tubing. Volatiles and analyses that degrade by aeration must be collected first. The bottles should be preserved and filled according to the procedures specified below.

13. Fill all sample bottles by allowing the pump discharge to flow gently down the inside of the bottle with minimal turbulence. Cap each bottle as it is filled.

14. Preserve and label the samples, and record them on the chain of custody. Place immediately into a cooler for shipment and maintain at 4°C.

Standard Operating Procedure

15. The filling and preservation procedures will be:

    - VOCs - Fill each container with sample to just overflowing so that no air bubbles are entrapped inside. If effervescence occurs, submit the sample without preservative and note on the chain of custody form.

    - Other Parameters - Fill each container and preserve immediately as required. To test for pH, pour a minimal portion of sample onto broad range pH paper to verify that the appropriate pH level has been obtained.

16. Carefully remove the pump assembly from the well. The Teflon-lined polyethylene tubing will be dedicated to each well. The tubing should be placed in a large plastic garbage bag, sealed, and labeled with the appropriate well identification number.

17. After sampling is complete, measure the total depth of the well.

18. Close and lock the well.

Decontamination [Drilling Equipment]

Standard Operating Procedure

All drilling equipment involved in field sampling activities will be decontaminated prior to and subsequent to sampling. Equipment leaving the site will also be decontaminated.

All drilling equipment will be steam cleaned prior to use. Pressurized steam will be used to remove all visible excess material from augers, rods, drill bits, the back of the drilling rig, and other parts of the rig which contact augers, rods, and split-spoons.

Steam cleaning will be conducted on a decontamination pad, which will be constructed on-site for the field investigation.

Any decontamination fluids that result from steam cleaning operations will be stored in U.S. Department of Transportation (DOT)-approved 55-gallon drum until disposal. Personnel directly involved in equipment decontamination will wear appropriate protective clothing, as stated in the SHSP.

Decontamination [Field Instrumentation - Probes, Water Quality Meters, etc.]

Standard Operating Procedure

Field instrumentation (such as interface probes, water quality meters, etc.) will be decontaminated between sample locations by rinsing with deionized water. If visible contamination still exists on the equipment after the rinse, an Alconox detergent scrub will be added, and the probe thoroughly rinsed again.

Decontamination of sampling equipment will be kept to a minimum in the field and wherever possible, dedicated disposable sampling equipment will be used. Any decontamination fluids generated will be stored in U.S. Department of Transportation (DOT)-approved 55-gallon drums or in an on-site storage tank (liquids only) until disposal. Personnel directly involved in equipment decontamination will wear appropriate protective clothing, as stated in the SHSP.

Decontamination [Non-disposable Chemical Sampling Equipment]

Standard Operating Procedure

Decontamination of non-disposable sampling equipment used to collect samples for chemical analyses (i.e., scoops, trowels, bowls, split-spoons, etc.) will be conducted as described below:

1. Alconox detergent and potable water scrub
2. Potable water rinse.
3. Deionized water rinse.
4. Methanol rinse followed by a hexane rinse (solvents are pesticide grade or better) for equipment involved in the sampling of organics.
5. Deionized water rinse (volume at least five times amount of solvent used in rinse step above).
6. Air dry.
7. Wrap or cover exposed ends of equipment with aluminum foil for transport and handling.

Decontamination of sampling equipment will be kept to a minimum in the field and wherever possible, dedicated disposable sampling equipment will be used. Decontamination fluids will be stored in U.S. Department of Transportation (DOT)-approved 55-gallon drums or in an on-site storage tank (liquids only) until disposal. Personnel directly involved in equipment decontamination will wear appropriate protective clothing, as stated in the SHSP.

Decontamination [Low Flow Groundwater Sampling Equipment]

Standard Operating Procedure

The following decontamination procedures will be performed for the low flow purge and sampling procedures as specified by the low flow groundwater sampling procedure.

Non-disposable sampling equipment, including the pump, support cable and electrical wires in contact with the sample, must be decontaminated thoroughly each day before use ("daily decon") and after each well is sampled ("between-well decon"). For pumps, it is strongly recommended that non-disposable sampling equipment, including the pump, support cable and electrical wires in contact with the sample, be decontaminated thoroughly each day before use ("daily decon"). EPA's field experience indicates that the life of pumps may be extended by removing entrained grit. All non-dedicated sampling equipment (pumps, tubing, etc.) must be decontaminated after each well is sampled ("between-well decon," see below).

Daily Decon

1. Pre-rinse: Operate pump in a deep basin containing 8 to 10 gallons of potable water for 5 minutes and flush other equipment with potable water for 5 minutes.

2. Wash: Operate pump in a deep basin containing 8 to 10 gallons of a non-phosphate detergent solution, such as Alconox, for 5 minutes and flush other equipment with fresh detergent solution for 5 minutes. Use the detergent sparingly.

3. Rinse: Operate pump in a deep basin of potable water for 5 minutes and flush other equipment with potable water for 5 minutes.

4. Disassemble pump.

5. Wash pump parts: Place the disassembled parts of the pump into a deep basin containing 8 to 10 gallons of non-phosphate detergent solution. Scrub all pump parts with a test tube brush.

6. Rinse pump parts with potable water.

7. Rinse the following pump parts with distilled/deionized water: inlet screen, shaft, suction interconnector, motor lead assembly, and stator housing.

8. Place impeller assembly in a large glass beaker and rinse with 1 percent nitric acid (HNO_3).

9. Rinse impeller assembly with potable water.

10. Place impeller assembly in a large glass beaker and rinse with isopropanol.

11. Rinse impeller assembly with distilled/deionized water.

Decontamination [Low Flow Groundwater Sampling Equipment] (Cont'd)

Standard Operating Procedure

Between-Well Decon

1. Pre-rinse: Operate pump in a deep basin containing 8 to 10 gallons of potable water for 5 minutes and flush other equipment with potable water for 5 minutes.

2. Wash: Operate pump in a deep basin containing 8 to 10 gallons of a non-phosphate detergent solution, such as Alconox, for 5 minutes and flush other equipment with fresh detergent solution for 5 minutes. Use the detergent sparingly.

3. Rinse: Operate pump in a deep basin of potable water for 5 minutes and flush other equipment with potable water for 5 minutes.

4. Final Rinse: Operate pump in a deep basin containing 1 to 2 gallons of distilled/deionized water, as final rinse.

Decontamination of sampling equipment will be kept to a minimum in the field and wherever possible, dedicated disposable sampling equipment will be used. Decontamination fluids will be stored in U.S. Department of Transportation (DOT)-approved 55-gallon drums or in an on-site storage tank (liquids only) until disposal. Personnel directly involved in equipment decontamination will wear appropriate protective clothing, as stated in the SHSP.