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WSP ENGINEERING OF NEW YORK, P.C.

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NYSDEC
FEB 02 2010
Bureau of Hazardous Waste & Radiation Management
Division of Solid & Hazardous Materials

February 1, 2010

Mr. Henry Wilkie
Environmental Engineer I
New York State Department of Environmental Conservation
Hazardous Waste Management Division
625 Broadway, 9th Floor
Albany, NY 12233-7015

Re: RCRA Facility Closure Plan and Quality Assurance Project Plan
Vishay GSI, 172 Spruce Street, Westbury, New York

Dear Mr. Wilkie:

On behalf of our client, Vishay GSI, Inc. (VGSI), WSP Engineering of New York, P.C., has enclosed one hard copy of the RCRA Facility Closure Plan along with the Quality Assurance Project Plan (QAPP) for the Vishay GSI site in Westbury, New York.

Please feel free to call us with any questions or comments on the plans.

Sincerely yours,
WSP Engineering of New York, P.C.

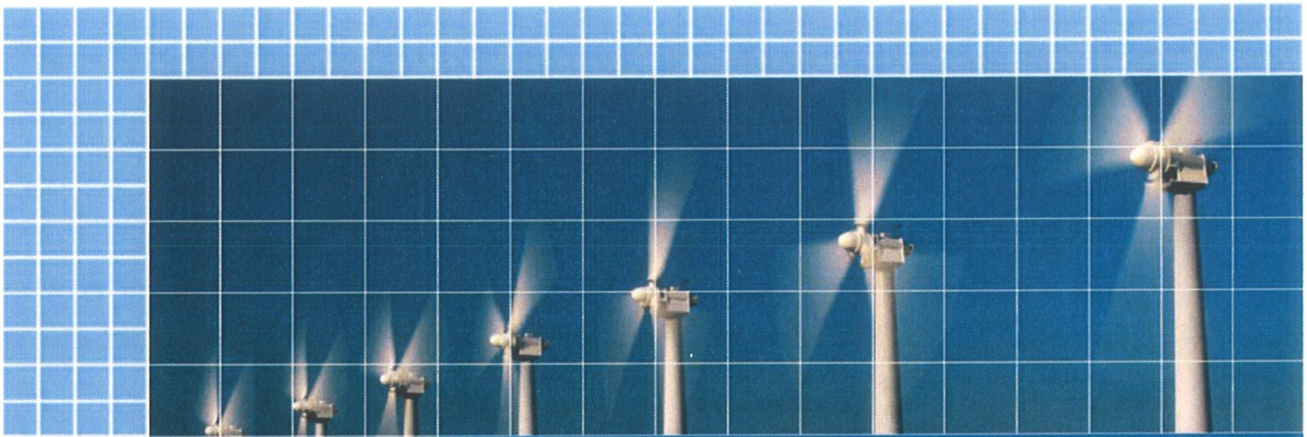
James A. Sobieraj, P.E.
Senior Project Director

Ellen LoRusso
Senior Consultant

JS:cda:bdw
k:\morris downing\hicksville\gw monitoring\may-09\110309 may09 gwmrpt cvltr.doc

cc/encl: Todd M. Hooker, Esq., Morris, Downing & Sherred LLP
Armand DeBan, VGSI
Michael Lydon, VGSI
Katie Murphy, NYSDEC

WSP Engineering of New York, P.C.
300 Trade Center
Suite 4690
Woburn, MA 01801
Tel: (781) 933-7340
Fax: (781) 933-7369



RCRA FACILITY CLOSURE PLAN

Vishay GSI Facility

172 Spruce Street

Westbury, New York

February 1, 2010

WSP Engineering of New York, P.C.
300 TradeCenter, Suite 4690
Woburn, Massachusetts 01801

Tel: +1 781 933 7340
Fax: +1 781 933 7369
http://www.wspenvironmental.com

WSP Engineering of New York, P.C.

Contents

Figures

1 Introduction

This work plan outlines the activities to be conducted during closure of the Resource Conservation and Recovery Act (RCRA)-regulated waste management and storage units at the Vishay GSI, Inc. (VGSI) facility in Westbury, New York. The primary goal of implementing the closure activities and procedures outlined in this plan is to eliminate potential threats to human health and the environment resulting from historical handling and storage of hazardous wastes onsite.

Because the VGSI facility operated as a RCRA large quantity generator of hazardous waste and not a hazardous waste treatment, storage, or disposal facility, the closure regulations concerning post-closure monitoring do not apply to this facility. A closure plan, dated February 13, 2001, was previously prepared by CA Rich Consultants, Inc., for closure of the existing 5,000-gallon aboveground storage tank, piping, and peripheral equipment. This facility-wide closure plan supersedes the 2001 plan.

Pursuant to Title 6 New York Codes, Rules, and Regulations (NYCRR) Subpart 373-3, Section 7, RCRA facility closure activities for the Westbury facility will involve:

- Preparing and submitting this comprehensive RCRA facility closure plan and a Quality Assurance Project Plan (QAPP) as required per NYSDEC Policy DSHM-HW-05-15
- A 30-day public notification process
- Cleaning and removing the 5,000-gallon aboveground hazardous waste storage tank including associated piping, pump pit, and pumps
- Cleaning the floor beneath the tank and adjacent surfaces as required
- Collecting soil samples beneath the aboveground hazardous waste storage tank and adjacent to the wastewater pump pit
- Preparing and submitting a facility closure report that outlines the results of the closure activities and includes validated laboratory analytical data.

The desired outcome of these facility closure activities is for the New York State Department of Environmental Conservation (NYSDEC) to grant the facility Corrective Action (CA) 999 closure status, which signifies that the corrective action process is complete.

2 Site History

2.1 SITE LOCATION AND DESCRIPTION

The VGSI facility is located at 172 Spruce Street in Westbury, Nassau County, New York (Figure 1). The facility consists of a single-story, 10,000-square foot building on a one-acre parcel. The facility is located on the east side of Spruce Street and is bordered by commercial properties to the south and east. Facility operations historically involved the research, development, and production of semiconductor wafers. Manufacturing activities were phased out in late 2009.

2.2 FORMER PROCESS DESCRIPTION

Former process operations consisted of chemical vapor deposition, diffusion, oxidation, cleaning, and etching. The facility operated as a large quantity generator of hazardous waste under U.S Environmental Protection Agency (EPA) identification number NYD000348474. Liquid process wastes generated onsite included sodium hydroxide solutions and spent diluted acids generated from acid gas scrubber units, acid scrubber sinks, a bell jar acid washer, a tube etching wet bench, and an engineering acid wet bench.

The facility historically used both underground and aboveground storage tanks to store liquid process wastes. A 550-gallon underground storage tank for photolithography waste (solvent wastewater) was installed on the southwest side of the building on April 30, 1981, and was removed on December 17, 1991. A 2,650-gallon underground storage tank for acidic wastewaters and spent sodium hydroxide was installed on the southwest corner of the property in December 1982 and removed on June 12, 1996. VGSI received closure documentation for these tanks from the NYSDEC and Nassau County. Additional closure details for the former 550-gallon and 2,650-gallon tanks are included in Section 2.4 of this closure plan. Figure 2 shows the former tank locations.

In 1982, the facility installed a customized PVC/polypropylene piping system to collect acidic wastewaters and sodium hydroxide wastes generated from various pieces of process equipment. An approximately 275-foot long sub-grade trench system houses the piping (Figure 2). Some portions of the trench system have an earthen bottom and some portions have a concrete bottom. The piping originally conveyed the liquid wastes to a 2,650-gallon double-walled underground storage tank located on the southwest side of the property. The piping system allowed the two principal types of liquid wastes (acidic wastewaters and sodium hydroxide wastes) to be collected and transported to the waste storage tank separately. The sodium hydroxide waste piping system was upgraded to a fused polypropylene system in 1990. Also in 1990, the piping systems were converted to double-walled systems with a leak detection system installed in the interstitial spaces.

In December 1995, VGSI installed an indoor 5,000-gallon double-walled fiberglass aboveground storage tank on the west side of the building as a replacement for the 2,650-gallon underground storage tank (Figure 2). The customized double-walled piping system conveyed the liquid wastes from its source equipment to a pump lift area (wastewater pump pit) on the south side of the property, where the liquid wastes were lifted through overhead piping and into fill ports on top of the west side of the 5,000-gallon tank. In December 1995, the pump pit was upgraded with a polypropylene liner for secondary containment. The 5,000-gallon tank has a liquid leak detection system to monitor the interstitial space, an audible and visual alarm system set to alarm at both 80% and 100% tank capacity, and a level gauge that can be read remotely. The new 5,000-gallon tank was commissioned into service on January 2, 1996.

2.3 WASTE DESCRIPTION

The hazardous liquid waste stored in the 5,000-gallon aboveground storage tank was a mixture of sodium hydroxide solution and acid gas exhaust from the scrubber, caustic wastewater from the scrubber sinks, and acid wastewater from cleaning and etching processes. The liquid waste contained sodium hydroxide (<25%), solids and grit (<3%), salts from nitric acid, hydrofluoric acid (<1%), and water. The liquid waste stream carried the characteristic waste code D002 for corrosivity. The typical pH of the liquid waste was between 8 and 14. While the facility was in operation, the hazardous wastewater was offloaded regularly by a waste disposal vendor for transport offsite to a licensed treatment and disposal facility.

2.4 PREVIOUS CLOSURE OF ONSITE RCRA UNITS

2.4.1 550-Gallon Underground Storage Tank for Solvent Waste

A 550-gallon stainless steel storage tank was installed in a below-grade concrete vault on the southwest side of the property on April 30, 1981 (Figure 2). The tank was used to store spent photolithography chemicals (flammable spent solvents). General Instrument Corporation (GIC), the operator of the facility when the tank was installed, prepared a RCRA closure plan for the tank dated January 19, 1987. The tank and associated piping, as well as the surrounding concrete vault, were decommissioned and removed from the ground between December 16 and December 17, 1991. A composite soil sample was collected from 4 sides of the excavation, the floor of the excavation, and beneath the piping. The sample was analyzed for total metals, volatile organic compounds (VOCs), semivolatile organic compounds, pH, and a complete toxicity characteristic leaching procedure (TCLP) analysis for soil disposal purposes. Analytical data and visual observations indicated that no remediation was warranted, and the pit was backfilled on December 17, 1991. GIC received a written certification of closure from the Nassau County Fire Marshall dated January 5, 1994, which is included in Appendix A.

2.4.2 2,650-Gallon Underground Storage Tank for Acidic and Caustic Wastewaters

A 2,650-gallon double-walled underground storage tank was installed on the southwest side of the property in December 1982 to store acid and caustic wastewaters generated from process equipment located throughout the facility (Figure 2). The tank and associated piping were taken out of service on January 5, 1996. GIC prepared a RCRA closure plan for the tank dated February 14, 1996. The tank piping was removed on May 1, 1996, and soil samples were collected at three locations beneath the tank piping at approximately 2.5 feet below the ground surface (bgs). GIC submitted the analytical data for the soil samples collected beneath the tank piping to the NYSDEC on May 13, 1996. In a letter dated May 14, 1996, the NYSDEC responded that no remediation was necessary in the area of the former piping and noted that the trench had been backfilled on May 1, 1996.

On March 15, 1996, a soil sample was collected at a depth between 5 and 6 feet bgs from a boring located adjacent to the tank at the tank/pipe connection. In addition, a grab sample was collected from the floor of the excavation after the tank was removed on June 12, 1996. All soil samples were analyzed for RCRA metals and VOCs. Analytical data from all soil samples indicated that no remediation was warranted, and GIC received a no further action/tank closure confirmation letter from the NYSDEC dated December 10, 1996, which is included in Appendix A.

2.5 NOVEMBER 2009 PIPING TRENCH INVESTIGATION

As described in Section 2.2, the facility has an approximately 275-foot long sub-grade trench system that houses piping that historically conveyed acidic and caustic wastewaters associated with process operations to a hazardous waste storage tank. To investigate the potential occurrence of historical releases from the piping trench, which may have affected soils beneath the building, WSP Engineering of

New York, P.C., on behalf of VGSI, collected 32 soil samples from 16 soil borings on November 17 and 18, 2009. One boring was located adjacent to the wastewater pump pit on the south side of the building, one was located adjacent to an area of concrete backfill of unknown origin, and the remaining fourteen borings were located within, or adjacent to, the piping trench system. Figure 3 shows the soil boring locations.

Based on WSP's understanding of historical operations at the site, the soil samples were analyzed for VOCs following EPA Method 5035A/8260B, target analyte list (TAL) metals plus mercury following EPA Method 6010/7000, and pH using EPA Method 150.1. Appendix B includes WSP's investigation report, which includes a summary of the sampling procedures and results, Category B laboratory analytical reports, and a data usability summary report (DUSR). While the November 2009 investigation pre-dated the QAPP submitted to the NYSDEC on February 1, 2010, the investigation conformed to all requirements specified in the QAPP.

Analytical data indicated the presence of acetone at 67.9 micrograms per kilogram (µg/kg) in a sample collected from 0.5 to 1 foot below the trench surface, which is above the protection of groundwater soil cleanup objective (SCO) of 50 µg/kg in 6 NYCRR Part 375. The same sample from SB-1 also contained 48.7 milligrams per kilogram (mg/kg) of arsenic, which exceeds the commercial and protection of groundwater SCO of 16 mg/kg. No other VOC or metal was detected at a concentration exceeding either the commercial or protection of groundwater SCO. The pH values for all soil samples ranged from 6.08 to 12.00.

3 Closure Plan for Aboveground Storage Tank, Associated Piping and Structures

The decommissioning and closure activities described below are based on the requirement for a large quantity generator of hazardous waste and operator of hazardous waste storage tank to, upon facility closure, comply with the closure performance standards of 40 Code of Federal Regulations (CFR) Section 265.111 and the standards for disposal and decontamination of equipment, structures and soils per 40 CFR 265.114 and 6 NYCRR 373-3.7(e). To comply with the federal, state, and county closure requirements cited above, all hazardous waste and residues must be removed from the tank, peripheral equipment (piping, pump pit, and pumps), and surrounding floor and walls (as necessary). A professional engineer must certify the closure plan and procedures for cleaning and dismantling of the tank, piping, pump pit, and pumps.

Rinsate and soil sampling plans are provided in Sections 3.2 and 3.3 below. No groundwater sampling is proposed in this plan based on the November 2009 soil investigation results and the local depth to groundwater. Only 1 of 32 soil samples collected in November 2009 contained compounds at concentrations exceeding the protection of groundwater SCOs in 6 NYCRR Part 375; the sample from boring SB-1 from 0.5 to 1 foot bgs contained acetone (67.9 µg/kg) and arsenic (48.7 mg/kg) above the protection of groundwater SCOs of 50 µg/kg and 16 mg/kg, respectively. These compounds did not exceed any SCOs in the deeper sample collected from SB-1 from 1 to 2 feet bgs, indicating an isolated volume of soil with concentrations exceeding the SCOs. Based on these findings and the fact that groundwater in the Westbury area is generally greater than 50 feet bgs, no groundwater sampling is warranted.

In addition, based on the absence of significant concentrations of VOCs in soil samples collected beneath the piping trench in November 2009, no indoor air sampling is warranted.

3.1 DECOMMISSIONING PLAN FOR THE TANK, PIPING, AND RELATED STRUCTURES

Decommissioning of the tank, piping, pumps, pump pit, and concrete floor beneath the tank will involve the following decontamination procedure in accordance with applicable NYSDEC guidance:

1. All wastes will be removed from the tank, pumps, pump pit, and piping.
2. The tank and pump pit will be mechanically cleaned by scraping, sweeping, or another method to remove waste residues.
3. The tank, pumps, pump pit, and floor beneath the tank will be washed using a high-pressure steam cleaner with detergent or appropriate solvent to remove previously stored waste materials or residues. The pipes will be flushed with water and detergent or appropriate solvent to remove waste materials.
4. Rinsate samples will be collected (in accordance with the rinsate sampling plan outlined below) after flushing is complete to verify that closure levels have been met. If closure levels are not met, the tank and peripheral equipment will be cleaned again and additional rinsate samples will be collected until closure levels are met.
5. After the double-walled PVC/polypropylene piping has been cleaned and closure levels have been met, it can be cut into pieces and disposed of as nonhazardous waste. The pumps can be reused or sold as scrap after clean closure has been achieved.

3.2 RINSATE SAMPLING PLAN

The piping, pumps, pump pit, tank, and floor beneath the tank will be triple-rinsed to ensure that all liquid waste residues are removed from the inside of the piping, pumps, pump pit, tank, and floor. Potable water will be used for the first two rinses and deionized (DI) water will be used for the third (final) rinse. Ambient temperature water will be used. A sample of the final DI rinse water from the piping, pumps, pump pit, tank, and floor beneath the tank will be collected to verify thorough decontamination of these areas after the pressure washing and flushing procedures are complete, in accordance with NYSDEC-approved rinsate testing procedures and the QAPP submitted to the NYSDEC on February 1, 2010.

A sample of rinsate from the third (final) rinse will be collected from the following five areas:

- One rinsate sample from the end of the discharge port on the west side of the 5,000-gallon aboveground storage tank. This sample will be designated as Rinsate Sample (RS)-1 (tank).
- One rinsate sample from the end of the caustic pipe leading from the scrubbers and scrubber sinks where it discharges into the top of the 5,000-gallon aboveground storage tank. This sample will be representative of the caustic pipelines leading from the scrubbers and scrubber sinks through the two caustic pumps (located in the pump pit on the south side of the building) and into the tank. This sample will be designated as RS-2 (caustic pipe and pumps).
- One rinsate sample from the end of the acid pipe leading from the engineering wet bench, hydrofluoric acid sink in the cleaning room, Advent Bell Jar cleaner, and tube etch process where it discharges into the top of the 5,000-gallon aboveground storage tank. This sample will be representative of the acid pipelines from the equipment listed above through the two acid pumps (located in the pump pit on the south side of the building) and into the tank. This sample will be designated as RS-3 (acid pipe and pumps).
- One rinsate sample from the interior/floor of the pump pit. This sample will be designated as RS-4 (pump pit).
- One rinsate sample from the floor beneath the fill ports on the top of the tank. This sample will be designated as RS-5 (floor).

For the rinsate samples collected from the piping/pump systems, a *minimum volume* of DI water will be passed through the piping system/pumps. A minimum volume is defined as just enough water to enable drainage of the water through the length of the piping system with subsequent collection of a grab sample at the end of the pipe. Rinsate samples will be collected in dedicated laboratory sample bottles.

A sample of rinsate from the floor of the pump pit and the floor beneath the tank will be collected by spraying DI water over a selected area of approximately one square foot, and collecting the resulting pooled water using a dedicated plastic or glass pipette/tube or syringe to suction or draw the rinsate off the floor and into sample containers.

All rinsate samples will be analyzed to demonstrate that the tank, piping, pumps, pump pit, and floor meet clean closure levels. Analytical parameters are based on the type of waste previously stored in the tank (caustic wastewater); therefore, the rinsate samples will be analyzed for pH (EPA Method 150.1). The tank, piping, pump pit, and floor will be considered clean if the analytical data for the rinsate samples indicates that the pH is in the neutral range of 6.5 to 8.5. If the pH results are outside of this range, then additional cleaning will be conducted, as necessary, and the rinsate sampling repeated until the clean closure results are achieved.

All water and residues generated during the cleaning, flushing, and first two potable water rinse cycles will be captured in the 5,000-gallon aboveground storage tank. The contents of the tank will be emptied into drums, and the tank will be flushed again before the triple-rinse procedure is conducted on the tank itself. A sample of the mixture of residues and rinsates will be collected and analyzed for pH. The tank contents will either be disposed of offsite if the data indicate that the mixture is hazardous, or will be discharged to the sanitary sewer system under written approval by the Nassau County Department of Public Works sanitary sewer system if it is nonhazardous and meets sewer use limitations.

3.3 SOIL SAMPLING PLAN

Soil samples will be collected beneath the tank after it is removed, and adjacent to the pump pit, to determine whether any historical releases may have occurred that could have affected soil beneath the tank or pump pit. All soil sampling will be conducted in accordance with the QAPP submitted to the NYSDEC on February 1, 2010.

After the tank is removed, two borings will be advanced beneath the footprint of the tank, one directly below the former locations of the two wastewater influent ports on the top (west side) of the tank (SB-18), and one directly beneath the other end (east side) of the tank (SB-19). The third boring will be advanced adjacent to the west side of the pump pit (SB-17), to supplement the data already collected near the pit during the November 2009 investigation. Because of the limited access, the soil borings will be installed using a portable direct-push rig or manually using a slide hammer and retrieval jack. Figure 3 shows the proposed soil boring locations.

In each location, soil samples will be collected with a 2-inch diameter, 4-foot long Geoprobe MacroCore sampler fitted with a new plastic liner for each sample interval. The sampler will be advanced to 4 feet below grade for SB-18 and SB-19 and 4 feet below the bottom of the pump pit for SB-17. Upon recovery, the liner will be removed from the sampler and split open using a utility knife. The samples will be described for lithology and will be screened using a photoionization detector (PID) equipped with an 11.7 eV lamp and the soil headspace method. The lithologic description and the PID measurements will be recorded in the field book and on soil boring logs. Discrete soil samples will be collected from 0 to 1 and 1 to 2 feet below grade (SB-18 and SB-19) or below the pump pit bottom (SB-17), unless PID readings or visual observations indicate higher concentrations in other intervals. The sample depths may be altered or additional samples collected based on the field observations and measurements. Specific boring locations may also be adjusted slightly in the field due to access limitations. Each boring location will be located on the site map using a tape measure relative to onsite structures. Residual soil generated during the investigation will be backfilled into the soil boring from which it was removed. Borings installed through concrete will be patched at the surface with ready mix concrete.

The soil samples for VOCs following EPA Method 5035A/8260B, TAL metals plus mercury following EPA Method 6010/7000, and pH using EPA Method 150.1. WSP will compare the results to the part 375 SCOs. If any results for VOCs or metals exceed the commercial or protection of groundwater SCOs or if the pH of any sample is less than 2.0 or above 12.5 (characteristically hazardous under RCRA), then WSP will submit a supplemental corrective action plan to the NYSDEC. If none of the results exceed the commercial or protection of groundwater SCOs, then the analytical data will be presented to the NYSDEC in the closure report and no further action will be warranted.

3.4 CERTIFICATION OF CLOSURE

Upon completion of closure activities for the underground storage tank, pumps, and piping system, a WSP registered professional engineer will submit documentation to the NYSDEC stating that the system was closed in accordance with the procedures outlined in this closure plan.

3.5 CLOSURE SCHEDULE

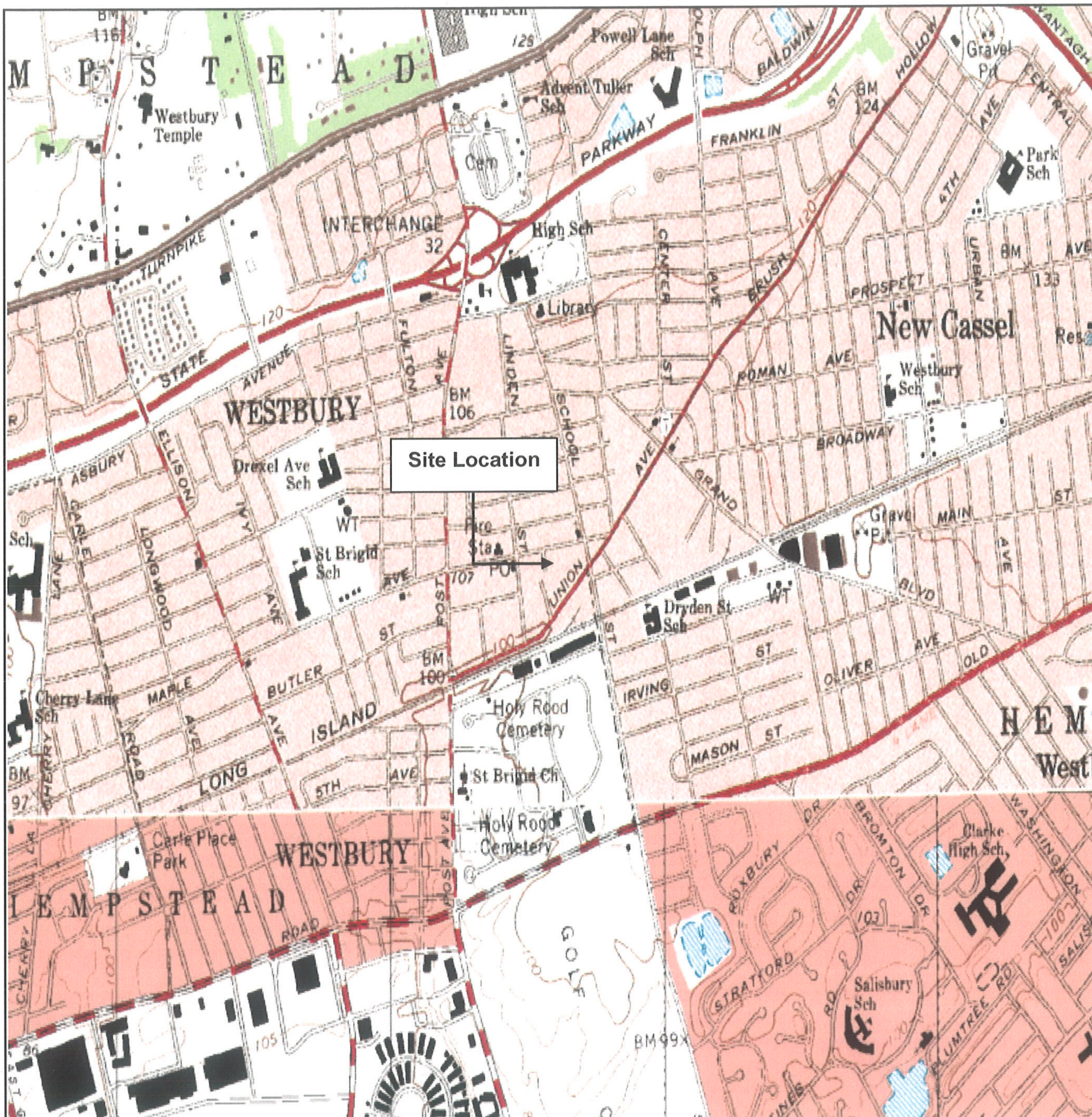
The timeline for closure activities described below is based on VGSI's plan to commence closure activities in late March or early April 2010, in order to vacate the facility by August 2010.

- Submit closure plan and QAPP to NYSDEC for review and approval at least 45 days before planned commencement of closure activities.
- Arrange public notification of submittal of closure plan via newspaper and radio after the NYSDEC completes its initial review and approval of the closure plan. The duration of the public comment period will be 30 days.
- Notify the NYSDEC 10 days before commencement of decontamination and removal of the 5,000-gallon aboveground storage tank
- Submit a Tank Abandonment/Removal Notification Form to Nassau County Department of Public Health (NCDPH) at least 7 days before the 5,000-gallon aboveground storage tank is removed. Arrange for a NCDPH inspector to be onsite to oversee the removal.
- Complete closure activities within 180 days from the date that the closure plan was approved by the NYSDEC.
- Submit a closure report, including hazardous waste manifests and analytical data for soil samples and rinseate samples, to the NYSDEC for review and approval after all facility closure activities are complete.

Acronym List

µg/kg	micrograms per kilograms
bgs	below ground surface
CA	Corrective Action
CFR	Code of Federal Regulations
DI	Deionized
DUSR	data usability summary report
EPA	U.S. Environmental Protection Agency
GIC	General Instrument Corporation
mg/kg	milligrams per kilogram
NCDPH	Nassau County Department of Public Health
NYCRR	New York Codes, Rules, and Regulations
NYSDEC	New York State Department of Environmental Conservation
PID	Photoionization Detector
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
RS	Rinsate Sample
TAL	Target Analyte List
TCLP	Toxicity Characteristic Leaching Procedure
VGSI	Vishay, GSI
VOC	volatile organic compound

Figures



Reference
7.5 Minute Series Topographic Quadrangle
Hicksville, New York
Photorevised 1979 Scale 1:24,000

Quadrangle Location

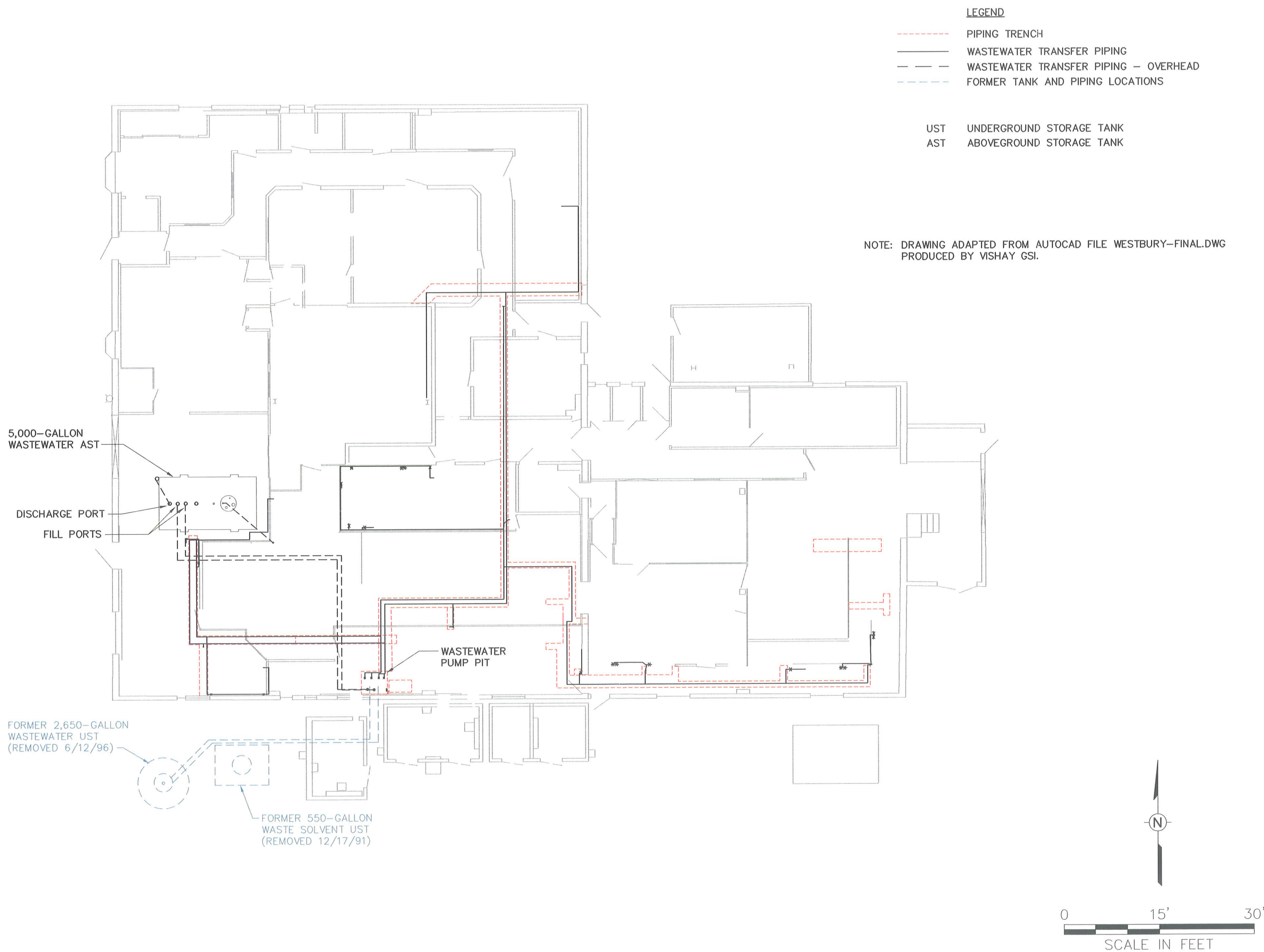
1000 0 2000 4000

Scale in Feet

WSP Engineering of New York, P.C.

WSP Engineering of New York, P.C.
300 TradeCenter Drive
Suite 4690
Woburn, Massachusetts 01801
781-933-7340

Figure 1
Site Location
Vishay GSI Facility
Westbury, New York



Drawn By: EGC
Checked: JS
Approved: JS
DWG Name: 09023502

VISHAY GSI FACILITY
WESTBURY, NEW YORK
PREPARED FOR
MORRIS, DOWNING & SHERRED LLP
NEWTON, NEW JERSEY

Figure 2

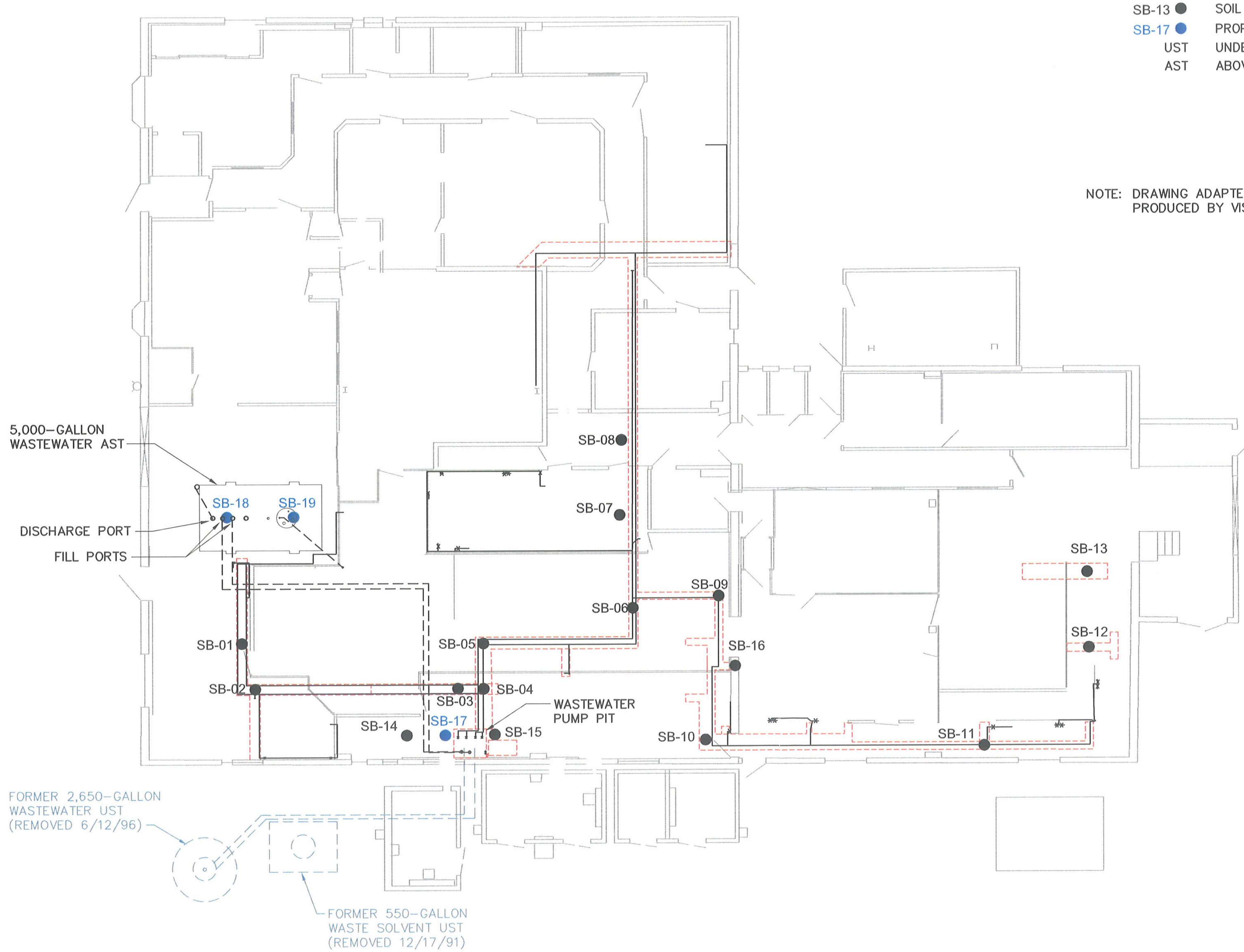
LOCATIONS OF FORMER AND CURRENT RCRA UNITS

WSP
Engineering of New York, P.C.

LEGEND

(red dashed line)	PIPING TRENCH
(solid line)	WASTEWATER TRANSFER PIPING
(long dashed line)	WASTEWATER TRANSFER PIPING – OVERHEAD
(blue dashed line)	FORMER TANK AND PIPING LOCATIONS
SB-13 ●	SOIL BORING LOCATION (NOVEMBER 2009)
SB-17 ●	PROPOSED SOIL BORING LOCATION
UST	UNDERGROUND STORAGE TANK
AST	ABOVEGROUND STORAGE TANK

NOTE: DRAWING ADAPTED FROM AUTOCAD FILE WESTBURY-FINAL.DWG PRODUCED BY VISHAY GSI.



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SCALE IN FEET

Drawn By: EGC
Checked: JS
Approved: JS
DWG Name: 09023503

VISHAY GSI FACILITY
WESTBURY, NEW YORK
PREPARED FOR
MORRIS, DOWNING & SHERRED LLP
NEWTON, NEW JERSEY

Figure 3

SOIL BORING LOCATIONS – PROPOSED AND NOVEMBER 2009

WSP
Engineering of New York, P.C.

Appendix A – Closure Documentation for Former RCRA Units

THOMAS S. GULOTTA
COUNTY EXECUTIVE

JOSEPH G. BOSLET, JR.
FIRE MARSHAL

NASSAU COUNTY FIRE COMMISSION
OFFICE OF FIRE MARSHAL
899 JERUSALEM AVENUE
P.O. BOX 128
UNIONDALE, NEW YORK 11553

TO: NASSAU COUNTY FIRE MARSHAL

FM KEY # ____________

FROM: Fenley & Nicol Environmental, Inc
445 Brook Avenue
Deer Park, New York 11729

CONCERNING TANKS AT:
General Instrument
172 Spruce St, Westbury, NY 1159(

The following flammable /combustible liquid storage tanks at the above location have been:

T - Placed temporarily out-of-service (if permitted), or

P - Permanently abandoned in place, or

R - Removed from the premises.

(indicate one of the above letters under "STATUS" for each tank.)

	TANK TYPE*	TANK SIZE	CONSTRUCTION	STATUS	DATE WHEN DONE
1	U/G	550	Stainless Steel	R	12/17/91

* NOTE: if the tank type is unknown, indicate either A/G (aboveground) or U/G (underground). If more than 8 tanks, use an additional sheet.

All work as indicated above has been done in accordance with the applicable Sections of Article III of The Nassau County Fire Prevention Ordinance.

Robert Laszcik, Construction Mgr.
Name

Robert Laszcik CONTMGR.
Signature

JAMES M. O'LEARY
NOTARY PUBLIC, State of New York
No. 30-6209600 Suffolk County
Term Expires July 31, 1994

Notary Stamp

0841C / 110788

County of SUFFOLK

State of NEW YORK

sworn to before me this

25th day of JANUARY 1994

James M. O'Leary
Notary Signature

INVESTIGATION - 566-5979 • SCHOOL - 566-5824 • INDUSTRIAL - 566-5815 • INSTITUTIONAL - 566-58..

New York State Department of Environmental Conservation
Building 40 - SUNY, Stony Brook, New York 11790-2356
Telephone: (516) 444-0230
Facsimile: (516) 444-0245

December 10, 1996

Michael D. Zagata
Commissioner

Ms. Mara Sinayuk, Manager
Environmental Health & Safety
General Instrument Corp.
172 Spruce St.
Westbury, NY 11590

Re: Closure of Underground Hazardous Waste Storage Tank
EPA ID#NYD000348474

Dear Ms. Sinayuk:

This letter is to confirm the receipt of owner/operator and independent professional engineer's certification dated October 10, 1996 of RCRA Closure for the underground storage tank at this facility. We now consider this tank officially closed.

If you have any questions regarding your partial closure or regulatory status, please contact Katy Murphy at (516) 444-0235.

Sincerely,

Anthony J. Cava, P.E.
Regional Solid & Hazardous
Materials Engineer

AJC:KM:km
cc: S. Carlomagno, Compliance Section
K. Murphy
File

Appendix B – November 2009 Trench Investigation Summary Report

SOIL INVESTIGATION REPORT

PIPING TRENCH SYSTEM

Vishay GSI Facility

172 Spruce Street

Westbury, New York

January 29, 2010

WSP Engineering of New York, P.C.
300 TradeCenter, Suite 4690
Woburn, Massachusetts 01801

Tel: +1 781 933 7340
Fax: +1 781 933 7369
http://www.wspenvironmental.com

WSP

Contents

1 Introduction

On behalf of Vishay GSI (VGSI), WSP Engineering of New York, P.C.[1] prepared this report to summarize the findings of a soil investigation conducted at the VGSI facility located at 172 Spruce Street in Westbury, New York. The facility consists of a single-story, 10,000-square foot building on a one-acre parcel. The facility is located on the east side of Spruce Street and is bordered by commercial properties to the south and east. Facility operations historically involved the research, development, and production of semiconductor wafers. Manufacturing activities were phased out in late 2009, and VGSI anticipates vacating the property in 2010.

The facility has an approximately 275-foot long sub-grade trench system that houses piping, which historically conveyed wastewaters to a Resource Conservation and Recovery Act (RCRA)-regulated 5,000-gallon aboveground hazardous waste storage tank (Figure 1; trench outline shown in red). Some portions of the trench system have an earthen bottom and some portions have a concrete bottom. In anticipation of conducting RCRA facility closure activities and to investigate the potential occurrence of historical releases which may have affected soils beneath the trench system, WSP collected soil samples from 16 soil borings (SB-01 to SB-16) at the locations shown in Figure 1. The soil samples were collected on November 17 and 18, 2009.

Section 2 of this report summarizes the soil sampling procedures, and Section 3 summarizes the analytical results.

[1] WSP Engineering of New York., P.C. is an affiliate of WSP Environment & Energy LLC that is licensed to perform engineering in New York.

2 Soil Sampling Procedures

Soil boring location SB-15 was installed adjacent to the southern wastewater pump pit area and soil boring SB-14 was installed adjacent to an area of concrete backfill of uncertain origin. The remaining borings were installed within or adjacent to the trench system. The sample locations were selected during the site visit with VGSI conducted on October 27, 2009. Because of the limited access, the soil borings were installed using a portable direct-push rig, manually using a slide hammer and retrieval jack, and/or a hand auger.

In each location, soil samples were collected with a 2-inch diameter, 4-foot long Geoprobe® MacroCore sampler fitted with a new plastic liner for each sample interval. The sampler was advanced to 4 feet below the trench bottom or floor surface, and upon recovery, the liner was removed from the sampler and split open using a utility knife. The samples were described for lithology and screened using a photoionization detector (PID) equipped with an 11.7 electron volt (eV) lamp and the soil headspace method. The lithologic description and the PID measurements were recorded in the field book and on soil boring logs (Appendix A). Discrete soil samples were collected from 0 to 1, 0.5 to 1, and 1 to 2 feet below the trench bottom (or floor surface) at all locations. If required, additional soil was obtained from the borings using a decontaminated hand auger.

Based on WSP's understanding of historical operations at the site, the soil samples were analyzed for volatile organic compounds (VOCs) following EPA Method 5035A/8260B, target analyte list (TAL) metals plus mercury following EPA Method 6010/7000, and pH using EPA Method 150.1. The samples were collected and managed following strict chain-of-custody procedures and WSP's soil sampling standard operating procedure (SOP). The samples were delivered to Accutest Laboratories of Dayton, New Jersey (a New York-certified laboratory) for analysis within a standard 2-week turnaround time.

Residual soil sample material generated during the investigation was backfilled into the soil boring from which it was removed. Borings installed through concrete were patched at the surface with ready mix concrete.

3 Soil Analytical Results

The soil analytical results are presented in Table 1 (VOCs), Table 2 (Metals), and Table 3 (pH). The New York State Department of Environmental Conservation (NYSDEC) 6 NYCRR part 375 soil cleanup objectives (SCOs) are also included in the tables for comparison. Results in the tables that exceed the commercial or protection of groundwater SCOs are shaded gray. Category B laboratory reports are included in Appendix B on compact disk (CD). Appendix C includes the data usability summary report (DUSR) prepared by ECT.CON, Inc., of Imperial, Pennsylvania, with Annotated Form 1's on CD.

3.1 VOCS

Eight VOCs were detected [acetone, tetrachloroethene (PCE), trichloroethene (TCE), 1,1,1-trichloroethane (TCA), cis-1,2-dichloroethene (DCE), 1,1-DCE, 1,2-dichlorobenzene (DCB), and toluene] in one or more of the soil samples. Acetone was detected at 67.9 micrograms per kilogram (µg/kg) in the sample from SB-01 collected at 0.5 to 1 feet below the trench surface, above the protection of groundwater SCO of 50 µg/kg. No other VOCs were detected above the 6 NYCRR part 375 SCOs.

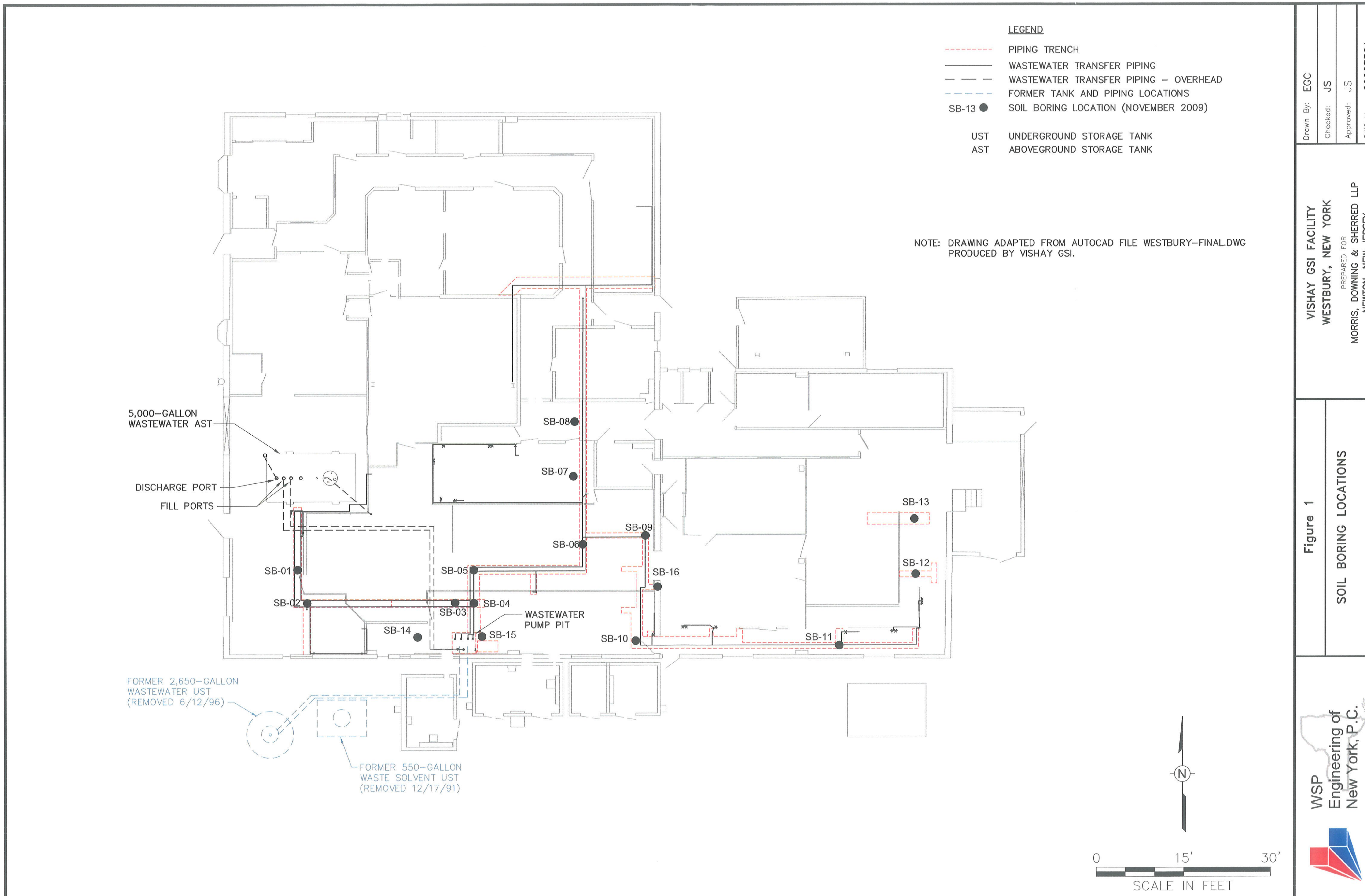
3.2 METALS

Of the 23 TAL metals including mercury, 20 metals (see Table 2) were detected in one or more of the soil samples. The sample from SB-01 collected at 0.5 to 1 feet below the trench surface contained 48.7 milligrams per kilogram (mg/kg) of arsenic, exceeding the commercial and protection of groundwater SCO of 16 mg/kg. Chromium was detected in two samples (SB-04 and SB-05, 1 to 2 feet below trench surface) at 47.5 mg/kg and 87.5 mg/kg respectively. Both samples exceeded the unrestricted use (30 mg/kg) and restricted residential use (36 mg/kg) criteria, but were below the commercial criterion (1,500 mg/kg). No other metals were detected at or above the SCOs.

3.3 PH

The pH values for all soil samples ranged from 6.08 to 12.00. The NYSDEC soil cleanup objectives do not include a criterion for pH. Under RCRA, wastes are considered characteristically hazardous at pH values less than 2.0 or above 12.5. Therefore, the analytical results suggest that the soils sampled would not be characterized as hazardous under RCRA.

Figures



LEGEND
PIPING TRENCH
WASTEWATER TRANSFER PIPING
WASTEWATER TRANSFER PIPING – OVERHEAD
FORMER TANK AND PIPING LOCATIONS
SB-13 SOIL BORING LOCATION (NOVEMBER 2009)
UST UNDERGROUND STORAGE TANK
AST ABOVEGROUND STORAGE TANK
NOTE: DRAWING ADAPTED FROM AUTOCAD FILE WESTBURY-FINAL.DWG PRODUCED BY VISHAY GSI.
5,000-GALLON WASTEWATER AST
DISCHARGE PORT
FILL PORTS
SB-01
SB-02
SB-03
SB-04
SB-05
SB-06
SB-07
SB-08
SB-09
SB-10
SB-11
SB-12
SB-13
SB-14
SB-15
SB-16
WASTEWATER PUMP PIT
FORMER 2,650-GALLON WASTEWATER UST (REMOVED 6/12/96)
FORMER 550-GALLON WASTE SOLVENT UST (REMOVED 12/17/91)
N
0 15' 30'
SCALE IN FEET
Drawn By: EGC
Checked: JS
Approved: JS
DWG Name: 09023501
VISHAY GSI FACILITY
WESTBURY, NEW YORK
PREPARED FOR
MORRIS, DOWNING & SHERRED LLP
NEWTON, NEW JERSEY
Figure 1
SOIL BORING LOCATIONS
WSP
Engineering of New York, P.C.

Tables

Table 1:
Soil Analytical Results - VOCs
Vishay GSI Facility
Westbury, NY

Sample Location	Depth (feet bgs)	Date	Acetone	PCE	TCE	1,1,1-TCA	cis-1,2-DCE	1,2-DCB	1,1-DCE	Toluene
Unrestricted Use NYSDEC Criteria			**50**	**1,300**	**470**	**680**	**250**	**1,100**	**330**	**700**
Restricted Use NYSDEC Criteria		**Residential**	**100,000**	**6,000**	**10,000**	**100,000**	**59,000**	**100,000**	**100,000**	**100,000**
		Commercial	**500,000**	**150,000**	**200,000**	**500,000**	**500,000**	**500,000**	**500,000**	**500,000**
		Industrial	**1,000,000**	**300,000**	**400,000**	**1,000,000**	**1,000,000**	**1,000,000**	**1,000,000**	**1,000,000**
		Protection of GW	**50**	**1,300**	**470**	**680**	**250**	**1,100**	**330**	**700**
SB-01	0.5-1	11/18/2009	67.9	3.5 U	0.86 J	3.5 U	3.5 U	3.5 U	3.5 U	0.38 J
	1-2	11/18/2009	7.4 U	3.7 U	9.5	0.51 J	3.7 U	3.7 U	3.7 U	0.39 J
SB-02	0.5-1	11/18/2009	10.7	3.0 U	1.8 J	3.0 U	3.0 U	3.0 U	3.0 U	0.31 J
	1-2	11/18/2009	17.6	2.9 U	1.3 J	0.36 J	2.9 U	2.9 U	2.9 U	0.58 U
SB-03	0-1	11/17/2009	4.6 U	2.3 U	0.26 J	2.3 U	2.3 U	2.3 U	2.3 U	0.61 U
	1-2	11/17/2009	5.5 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	0.61 U
SB-04	0-1	11/18/2009	7.3 U	3.6 U	0.88 J	3.6 U	3.6 U	3.6 U	3.6 U	0.73 U
	1-2	11/18/2009	5.8 U	2.9 U	1.5 J	2.9 U	0.42 J	2.9 U	2.9 U	0.58 U
SB-05	0-1	11/17/2009	5.8 U	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U	0.58 U
	1-2	11/17/2009	6.7 U	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U	0.80
SB-06	0-1	11/17/2009	3.4 J	3.4 UJ	1.7 J	3.4 UJ	3.4 UJ	3.4 UJ	3.4 UJ	0.68 UJ
	1-2	11/17/2009	5.4 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	0.61 U
SB-07	0-1	11/17/2009	6.8 U	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U	0.68 U
	1-2	11/17/2009	6.4 U	3.2 U	2.8 J	3.2 U	3.2 U	3.2 U	3.2 U	0.64 U
SB-08	0.5-1	11/18/2009	6.7 U	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U	0.31 J
	1-2	11/18/2009	5.3 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	0.23 J
SB-09	0-1	11/17/2009	5.8 U	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U	0.61 U
	1-2	11/17/2009	6.6 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	0.55 J
SB-10	0-1	11/17/2009	6.7	2.6 U	2.7	2.6 U	2.6 U	2.6 U	2.6 U	0.61 U
	1-2	11/17/2009	5.9 U	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U	0.82
SB-11	0-1	11/18/2009	7.1 UJ	3.5 UJ	3.5 UJ	3.5 UJ	3.5 UJ	3.5 UJ	3.5 UJ	0.74 J
	1-2	11/18/2009	6.2 UJ	3.1 UJ	3.1 UJ	3.1 UJ	3.1 UJ	3.1 UJ	3.1 UJ	0.66 J
SB-12	0-1	11/18/2009	4.3 J	3.9 UJ	3.9 UJ	3.9 UJ	3.9 UJ	3.9 UJ	3.9 UJ	0.58 J
	1-2	11/18/2009	9.8 J	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	0.17 J
SB-13	0-1	11/18/2009	14.3 J	3.6 UJ	3.6 UJ	3.6 UJ	3.6 UJ	3.6 UJ	3.6 UJ	0.66 J
SB-130 (d)	0-1	11/18/2009	21.1 J	3.3 UJ	3.3 UJ	3.3 UJ	3.3 UJ	3.3 UJ	3.3 UJ	0.65 UJ
SB-13	1-2	11/18/2009	22.4 J	3.2 UJ	3.2 UJ	3.2 UJ	3.2 UJ	3.2 UJ	3.2 UJ	0.64 UJ
SB-14	0-1	11/17/2009	5.9 U	0.21 J	1.9 J	3.0 U	3.0 U	3.0 U	3.0 U	1.2
	1-2	11/17/2009	6.4 U	0.78 J	4.8	3.2 U	3.2 U	1.2 J	3.2 U	0.64 U

Table 1:
Soil Analytical Results - VOCs
Vishay GSI Facility
Westbury, NY

Sample Location	Depth (feet bgs)	Date	Acetone		PCE		TCE		1,1,1-TCA		cis-1,2-DCE		1,2-DCB		1,1-DCE		Toluene	
Unrestricted Use NYSDEC Criteria			**50**		**1,300**		**470**		**680**		**250**		**1,100**		**330**		**700**	
Restricted Use NYSDEC Criteria		**Residential**	**100,000**		**6,000**		**10,000**		**100,000**		**59,000**		**100,000**		**100,000**		**100,000**	
		Commercial	**500,000**		**150,000**		**200,000**		**500,000**		**500,000**		**500,000**		**500,000**		**500,000**	
		Industrial	**1,000,000**		**300,000**		**400,000**		**1,000,000**		**1,000,000**		**1,000,000**		**1,000,000**		**1,000,000**	
		Protection of GW	**50**		**1,300**		**470**		**680**		**250**		**1,100**		**330**		**700**	
SB-15	0-1	11/17/2009	6.4	U	3.2	U	1.1	J	3.2	U	3.2	U	3.2	U	0.72	J	0.64	U
SB-15	1-2	11/17/2009	7.3	U	3.7	U	3.7	U	3.7	U	3.7	U	3.7	U	3.7	U	0.73	U
SB-150 (d)	1-2	11/17/2009	6.1	U	3.1	U	0.92	J	3.1	U	3.1	U	3.1	U	3.1	U	0.80	
SB-16	0-1	11/17/2009	6.6	U	3.3	U	1.2	J	3.3	U	3.3	U	3.3	U	3.3	U	0.68	
	1-2	11/17/2009	6.6	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	0.70	

a/ NYSDEC = New York State Department of Environmental Conservation; PCE = Tetrachloroethene; TCE = Trichloroethene; TCA = Trichloroethane; DCE = Dichloroethene; DCB = Dichlorobenzene; J = Estimated value; U = Not detected at or above the reporting limit; GW = groundwater

b/ NYSDEC Criteria are established by 6 NYCRR Part 375 - Environmental Remediation Programs (µg/kg); Shaded results exceed either the commerical or protection of groundwater Restricted Use Criteria.

c/ All soil concentrations reported in micrograms per kilogram (µg/kg); Only compounds detected above reporting limits in one or more sample are summarized in the table

d/ Blind duplicate of the primary sample listed immediately above.

Table 2:
Soil Analytical Results - Metals
Vishay GSI Facility
Westbury, NY

Sample Location	Depth (feet bgs)	Date	Aluminum	Arsenic	Barium	Cadmium	Calcium	Chromium	Cobalt	Copper
Unrestricted Use NYSDEC Criteria			NE	**13**	**350**	**2.5**	NE	**30**	NE	**50**
Restricted Use NYSDEC Criteria		**Residential**	NE	**16**	**350**	**2.5**	NE	**36**	NE	**270**
		Commercial	NE	**16**	**400**	**9.3**	NE	**1,500**	NE	**270**
		Industrial	NE	**16**	**10,000**	**60**	NE	**6,800**	NE	**10,000**
		Protection of GW	NE	**16**	**820**	**7.5**	NE	**NE**	NE	**1,720**
SB-01	0.5-1	11/18/2009	5,050	48.7	22.0 U	0.56 U	560 U	6.8	11.2	6.9
	1-2	11/18/2009	11,000	3.5	27.1	0.54 U	540 U	12.8	5.4 U	8.2
SB-02	0.5-1	11/18/2009	5,590	2.6	27.6	0.55 U	9,280	11.9	14.1	16.2
	1-2	11/18/2009	8,720	3.5	27.5	0.56 U	560 U	9.6	5.6 U	10.6
SB-03	0-1	11/17/2009	5,490	3.3	21.0 U	0.53 U	887	6.7	17.0	8.3
	1-2	11/17/2009	6,620	2.1 U	21.0 U	0.52 U	520 U	7.9	5.2 U	5.9
SB-04	0-1	11/18/2009	6,750	2.2 U	35.3	0.54 U	2,300	18.0	5.4 U	25.7
	1-2	11/18/2009	5,810	3.4	22.4	0.52 U	520 U	47.2	5.2 U	9.6
SB-05	0-1	11/17/2009	1,340	2.0 U	58.0	0.51 U	3,510	33.8	5.1 U	52.1
	1-2	11/17/2009	3,010	2.1 U	44.1	0.52 U	829	87.5	5.2 U	29.9
SB-06	0-1	11/17/2009	3,660	2.0 U	20.0 U	0.50 U	3,240	13.3	5.0 U	12.8
	1-2	11/17/2009	3,850	2.1 U	21.0 U	0.52 U	4,480	16.6	5.2 U	11.4
SB-07	0-1	11/17/2009	5,440	2.1	24.3	0.51 U	510 U	6.7	5.1 U	5.8
	1-2	11/17/2009	5,760	3.8	23.4	0.54 U	746	9.2	5.4 U	7.7
SB-08	0.5-1	11/18/2009	5,550	2.7	21.0 U	0.53 U	4,520	8.7	5.3 U	13.2
	1-2	11/18/2009	3,160	2.0 U	20.0 U	0.50 U	2,750	11.2	5.0 U	11.1
SB-09	0-1	11/17/2009	4,900	3.0	21.0 U	1.2	7,650	18.4	5.1 U	178
	1-2	11/17/2009	6,850	3.3	21.0 U	1.1	6,370	12.9	5.2 U	156 J
SB-10	0-1	11/17/2009	4,030	2.4	36.9	0.50 U	19,000	16.1	5.0 U	44.2
	1-2	11/17/2009	5,270	3.1	40.5	0.51 U	10,000	18.1	5.1 U	53.1
SB-11	0-1	11/18/2009	6,020	2.2 U	29.7	0.54 U	2,270	18.2	6.9	13.9
	1-2	11/18/2009	6,570	2.4	31.2	0.52 U	671	13.6	6.8	11.3
SB-12	0-1	11/18/2009	7,920	2.2 U	41.4	0.54 U	2,460	15.7	5.4 U	12.8
	1-2	11/18/2009	7,950 J	2.2 U	49.0 J	0.54 U	3,290 J	17.3 J	5.4 U	14.9 J
SB-13	0-1	11/18/2009	8,960	2.2 U	39.7	0.55 U	1,330	12.7	5.5 U	26.4
SB-130 (d)	0-1	11/18/2009	9,460	2.3 U	45.1	0.57 U	4,240	20.8	5.7 U	127
SB-13	1-2	11/18/2009	7,780	2.2	39.2	0.55 U	657	16.9	5.5 U	13.2
SB-14	0-1	11/17/2009	3,370	2.1	32.5	0.53 U	22,800	21.3	5.3 U	34.6
	1-2	11/17/2009	3,250	2.5	47.8	0.52 U	10,600	29.8	5.2 U	40.8
SB-15	0-1	11/17/2009	4,710	2.1 U	31.0	0.52 U	8,360	15.0	5.7	17.4
SB-15	1-2	11/17/2009	4,310	2.2 U	34.3	0.56 U	9,080	19.8	5.6 U	22.7
SB-150 (d)	1-2	11/17/2009	3,920	2.1	31.1	0.53 U	8,580	14.9	5.3 U	26.5
SB-16	0-1	11/17/2009	5,930	2.1	21.8	0.52 U	1,910	12.2	7.9	15.3
	1-2	11/17/2009	5,750	4.4	24.4	0.51 U	1,820	33.1	9.1	18.2

Table 2:
Soil Analytical Results - Metals
Vishay GSI Facility
Westbury, NY

Sample Location	Depth (feet bgs)	Date	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium
Unrestricted Use NYSDEC Criteria			NE	**63**	NE	**1,600**	**0.18**	**30**	NE
Restricted Use NYSDEC Criteria		**Residential**	NE	**400**	NE	**2,000**	**0.81**	**140**	NE
		Commercial	NE	**1,000**	NE	**10,000**	**2.8**	**310**	NE
		Industrial	NE	**3,900**	NE	**10,000**	**5.7**	**10,000**	NE
		Protection of GW	NE	**450**	NE	**2,000**	**0.73**	**130**	NE
SB-01	0.5-1	11/18/2009	6,480 J	22.2	656	122	0.035 U	4.8	1,100 U
	1-2	11/18/2009	11,200 J	26.0	1,210	177	0.036 U	8.1	1,100 U
SB-02	0.5-1	11/18/2009	7,350 J	35.8	4,870	288	0.035 U	6.5	1,100 U
	1-2	11/18/2009	8,570 J	33.4	874	159	0.036 U	6.1	1,100 U
SB-03	0-1	11/17/2009	6,350	30.8	735	90.7	0.034 U	5.9	1,100 U
	1-2	11/17/2009	5,260	12.2	590	84.7	0.034 U	8.8	1,100 U
SB-04	0-1	11/18/2009	6,290 J	20.4	811	97.5	0.032 U	6.0	1,100 U
	1-2	11/18/2009	11,700 J	15.2	704	77.0	0.042	4.2 U	1,000 U
SB-05	0-1	11/17/2009	7,660	195	2,180	46.9	0.081	6.5	1,000 U
	1-2	11/17/2009	7,500	138	882	58.9	0.033	6.0	1,000 U
SB-06	0-1	11/17/2009	7,440	14.7	784	148	0.034 U	10.2	1,000 U
	1-2	11/17/2009	6,400	11.4	676	116	0.033 U	8.6	1,000 U
SB-07	0-1	11/17/2009	6,750	20.8	885	108	0.033 U	5.3	1,000 U
	1-2	11/17/2009	9,230	17.0	1,200	166	0.033 U	7.3	1,100 U
SB-08	0.5-1	11/18/2009	6,390 J	28.2	1,970	113	0.120	5.8	1,000 U
	1-2	11/18/2009	4,800 J	14.3	693	82.3	0.094	6.3	990 U
SB-09	0-1	11/17/2009	12,300	53	982	150	0.034 U	16.2	1,000 U
	1-2	11/17/2009	11,500 J	208 J	983	133	0.033	13.7	1,000 U
SB-10	0-1	11/17/2009	6,900	65.7	10,100	296	0.035 U	7.6	1,000 U
	1-2	11/17/2009	8,180	65.9	5,320	468	0.034 U	7.3	1,000 U
SB-11	0-1	11/18/2009	12,200 J	7.5	1,590	204	0.035 U	18.3	1,100 U
	1-2	11/18/2009	12,200 J	7.3	1,610	220	0.034 U	16.3	1,000 U
SB-12	0-1	11/18/2009	13,200 J	18.5	1,910	248	0.034 U	15.8	1,210
	1-2	11/18/2009	14,400 J	23.4 J	2,190 J	243 J	0.037	17.7 J	1,130
SB-13	0-1	11/18/2009	11,400 J	14.6	1,640	285	0.034 U	14.2	1,100 U
SB-130 (d)	0-1	11/18/2009	12,800 J	17.4	3,490	250	0.036 U	17.0	1,170
SB-13	1-2	11/18/2009	14,300 J	28.1	1,400	230	0.056	14.0	1,100 U
SB-14	0-1	11/17/2009	7,480	75.1	13,700	308	0.035 U	11.6	1,100 U
	1-2	11/17/2009	7,870	94.3	5,940	889	0.034 U	7.6	1,000 U
SB-15	0-1	11/17/2009	8,510	36.6	4,180	219	0.034 U	10.1	1,000 U
SB-15	1-2	11/17/2009	11,100	47.2	4,300	360	0.035 U	8.0	1,100 U
SB-150 (d)	1-2	11/17/2009	9,910	49.4	3,540	422	0.033 U	7.2	1,100 U
SB-16	0-1	11/17/2009	6,740	34.3	1,390	161	0.033 U	6.1	1,000 U
	1-2	11/17/2009	7,920	33.7	1,370	221	0.034 U	6.6	1,000 U

Table 2:
Soil Analytical Results - Metals
Vishay GSI Facility
Westbury, NY

Sample Location	Depth (feet bgs)	Date	Selenium	Silver	Sodium	Vanadium	Zinc
Unrestricted Use NYSDEC Criteria			3.9	2	NE	NE	109
Restricted Use NYSDEC Criteria		Residential	36	36	NE	NE	2,200
		Commercial	1,500	1,500	NE	NE	10,000
		Industrial	6,800	6,800	NE	NE	10,000
		Protection of GW	4	8.3	NE	NE	2,480
SB-01	0.5-1	11/18/2009	2.2 U	1.1 U	1,100 U	7.7	19.5
	1-2	11/18/2009	2.2 U	1.1 U	2,130	15.3	32.0
SB-02	0.5-1	11/18/2009	2.2 U	1.1 U	2,680	9.9	29.3
	1-2	11/18/2009	2.2 U	1.1 U	4,710	12.9	31.4
SB-03	0-1	11/17/2009	2.1 U	1.1 U	1,100 U	10.0	25.9
	1-2	11/17/2009	2.1 U	1.0 U	1,000 U	7.4	20.1
SB-04	0-1	11/18/2009	2.2 U	1.1 U	2,480	8.4	35.6
	1-2	11/18/2009	2.1 U	1.0 U	1,440	10.6	21.4
SB-05	0-1	11/17/2009	2.0 U	7.4	1,000 U	5.1 U	33.3
	1-2	11/17/2009	2.1 U	1.0 U	1,000 U	5.7	30.9
SB-06	0-1	11/17/2009	2.0 U	1.0 U	3,020	5.4	27.9
	1-2	11/17/2009	2.1 U	1.0 U	3,360	5.4	24.0
SB-07	0-1	11/17/2009	2.2	1.0 U	1,370	8.0	28.4
	1-2	11/17/2009	2.6	1.1 U	1,880	10.3	28.7
SB-08	0.5-1	11/18/2009	2.1 U	1.1 U	1,360	8.5	31.3
	1-2	11/18/2009	2.0 U	0.99 U	995	5.5	20.6
SB-09	0-1	11/17/2009	2.1 U	1.0 U	3,410	8.6	41.4
	1-2	11/17/2009	2.7	1.0 U	3,720	9.4	41.3
SB-10	0-1	11/17/2009	2.0 U	1.0 U	5,190	14.6	39.8
	1-2	11/17/2009	2.0 U	1.0 U	5,990	17.2	41.3
SB-11	0-1	11/18/2009	2.2 U	1.1 U	6,100	13.7	22.6
	1-2	11/18/2009	2.1 U	1.0 U	5,430	15.2	21.4
SB-12	0-1	11/18/2009	2.2 U	1.1 U	9,270	14.3	31.1
	1-2	11/18/2009	2.2 U	1.1 U	10,800	15.8 J	41.4 J
SB-13	0-1	11/18/2009	2.2 U	1.1 U	5,920	11.4	27.5
SB-130 (d)	0-1	11/18/2009	2.3 U	1.1 U	6,290	15.1	32.8
SB-13	1-2	11/18/2009	2.2 U	1.1 U	6,350	14.4	37.4
SB-14	0-1	11/17/2009	2.1 U	1.1 U	1,100 U	13.1	44.4
	1-2	11/17/2009	2.1 U	1.0 U	1,000 U	13.0	45.9
SB-15	0-1	11/17/2009	2.1 U	1.0 U	7,800	10.4	60.7
SB-15	1-2	11/17/2009	2.2 U	1.1 U	5,510	12.2	61.7
SB-150 (d)	1-2	11/17/2009	2.1 U	1.1 U	5,200	18.3	66.2
SB-16	0-1	11/17/2009	2.1 U	1.0 U	1,000 U	10.0	32.2
	1-2	11/17/2009	2.1 U	1.0 U	1,000 U	12.9	31.7

a/ NYSDEC = New York State Department of Environmental Conservation; NE = Not established; J = Estimated value; U = Not detected at or above the reporting limit; GW = groundwater

b/ NYSDEC Criteria are established by 6 NYCRR Part 375 - Environmental Remediation Programs (mg/kg); Shaded results exceed either the commerical or protection of groundwater Restricted Use Criteria.

c/ All soil concentrations reported in micrograms per kilogram (mg/kg); Only compounds detected above reporting limits in one or more sample are summarized in the table

d/ Blind duplicate of the primary sample listed immediately above.

Table 3:
Soil Analytical Results - pH
Vishay GSI Facility
Westbury, NY

Sample Location	Depth (feet bgs)	Date	pH
SB-01	0.5-1	11/18/2009	8.16
	1-2	11/18/2009	7.94
SB-02	0.5-1	11/18/2009	9.78
	1-2	11/18/2009	9.58
SB-03	0-1	11/17/2009	8.35
	1-2	11/17/2009	6.08
SB-04	0-1	11/18/2009	7.68
	1-2	11/18/2009	7.66
SB-05	0-1	11/17/2009	9.31
	1-2	11/17/2009	9.09
SB-06	0-1	11/17/2009	11.49
	1-2	11/17/2009	11.32
SB-07	0-1	11/17/2009	8.90
	1-2	11/17/2009	9.24
SB-08	0.5-1	11/18/2009	8.16
	1-2	11/18/2009	8.49
SB-09	0-1	11/17/2009	9.70
	1-2	11/17/2009	9.43
SB-10	0-1	11/17/2009	10.42
	1-2	11/17/2009	10.59
SB-11	0-1	11/18/2009	10.95
	1-2	11/18/2009	10.68
SB-12	0-1	11/18/2009	11.23
	1-2	11/18/2009	12.00
SB-13	0-1	11/18/2009	10.21
SB-130 (a)	0-1	11/18/2009	11.35
SB-13	1-2	11/18/2009	10.44
SB-14	0-1	11/17/2009	8.43
	1-2	11/17/2009	8.17
SB-15	0-1	11/17/2009	10.08
SB-15	1-2	11/17/2009	10.20
SB-150 (a)	1-2	11/17/2009	10.13
SB-16	0-1	11/17/2009	8.76
	1-2	11/17/2009	8.72

a/ Blind duplicate of the primary sample listed immediately above.

Appendix A – Soil Boring Logs

Boring Log: SB-01

Project: Vishay - GSI
Project No.: 090235
Location: Westbury, NY
Completion Date: November 18, 2009

Surface Elevation (feet AMSL*): NA
Total Depth (feet): 4
Borehole Diameter (inches): 2

*AMSL = Above mean sea level

WSP

Sample Data					Subsurface Profile	
Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description
						Ground Surface
0–1	X	3.5	- -	90		6" Concrete (good condition)
1–2	X	3.6	- -	90		**Poorly-Graded Sand with Clay (SP-SC)** Dark-brown (7.5 YR 3/2), loose, very fine-grained sand with some soft "clay-like" lenses and mica. Moist and "sticky".
2–3	X	0.2	- -	90		**Poorly-Graded Sand with Gravel (SP)** Yellow-brown (10 YR 5/8), loose, fine to coarse-grained sand with ochre colored, small, rounded gravel. Dry; no odor.
3–4	X	0.0	- -	90		
4–10			- - - - - - - -			Bottom of Boring at 4 feet

Geologist(s): Heather M. Usle
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Charlie Green
Method: Direct Push

WSP Environment & Energy
300 TradeCenter; Suite 4690
Woburn, MA 01801

Boring Log: SB-02

Project: Vishay - GSI
Project No.: 090235
Location: Westbury, NY
Completion Date: November 18, 2009

Surface Elevation (feet AMSL*): NA
Total Depth (feet): 4
Borehole Diameter (inches): 2

*AMSL = Above mean sea level

Sample Data					Subsurface Profile	
Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description
						Ground Surface
0–1	X	5.7	- -	90		6" Concrete (good condition)
1–2	X	4.5	- -	90		**Poorly-Graded Sand with Clay (SP-SC)** Dark-brown (7.5 YR 3/2), loose, very fine-grained sand with some soft "clay-like" lenses and mica. Moist and "sticky".
2–3	X	3.3	- -	90		**Poorly-Graded Sand with Gravel (SP)** Yellow-brown (10 YR 5/8), loose, fine to coarse-grained sand with ochre colored, small, rounded gravel. Dry; no odor.
3–4	X	1.7	- -	90		
4–6			- - - -			Bottom of Boring at 4 feet
6–8			- - - -			
8–10						

Geologist(s): Heather M. Usle
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Charlie Green
Method: Direct Push

WSP Environment & Energy
300 TradeCenter; Suite 4690
Woburn, MA 01801

Boring Log: SB-03

Project: Vishay - GSI

Project No.: 090235

Location: Westbury, NY

Completion Date: November 17, 2009

Surface Elevation (feet AMSL*): NA

Total Depth (feet): 4

Borehole Diameter (inches): 2

**AMSL = Above mean sea level*

WSP

Sample Data

Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery
0–1	X	0.7	- / -	50
1–2	X	0.0	- / -	50
2–3	X	0.0	- / -	50
3–4	X	0.0	- / -	50
4–6			- / - / - / -	
6–8			- / - / - / -	

Subsurface Profile

Description

Ground Surface

3" Concrete

Poorly-Graded Sand with Silt and Gravel (SP-SM)
Dark-brown with mottled orange (7.5 YR 3/3 and 7.5 YR 5/8), loose, fine to medium-grained sand with ochre colored, small, rounded gravel (0.5"-1" diameter) and trace silt. Moist; no odor.

Poorly-Graded Sand (SP)
Brown (10 YR 5/3), loose, fine to coarse-grained sand. Moist; no odor.

Bottom of Boring at 4 feet

Geologist(s): Heather M. Usle
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Jose Garcia
Method: Direct Push

WSP Environment & Energy
300 TradeCenter; Suite 4690
Woburn, MA 01801

Boring Log: SB-04

Project: Vishay - GSI
Project No.: 090235
Location: Westbury, NY
Completion Date: November 18, 2009

Surface Elevation (feet AMSL*): NA
Total Depth (feet): 4
Borehole Diameter (inches): 2

*AMSL = Above mean sea level

Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description
						Ground Surface
0-1	X	0.7	- / -	25		**Poorly-Graded Sand with Gravel (SP)** Brown (10 YR 4/3), loose, fine to coarse-grained sand with weathered concrete fragments. Moist; no odor.
1-2	X	0.2	- / -	25		**Poorly-Graded Sand with Gravel (SP)** Dark-brown (10 YR 3/3), loose, fine to coarse-grained sand with some ochre-colored, small, rounded gravel. Dry; no odor.
2-3	X	0.1	- / -	25		
3-4	X	0.0	- / -	25		
4						Bottom of Boring at 4 feet

Geologist(s): Heather M. Usle
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Charlie Green
Method: Direct Push

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Woburn, MA 01801

Boring Log: SB-05

Project: Vishay - GSI
Project No.: 090235
Location: Westbury, NY
Completion Date: November 17, 2009

Surface Elevation (feet AMSL*): NA
Total Depth (feet): 4
Borehole Diameter (inches): 2

*AMSL = Above mean sea level

WSP

Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description
						Ground Surface
0–1	X	0.4	- / -	100		3" Deteriorated concrete
1–2	X	1.7	- / -	100		***Poorly-Graded Sand with Gravel (SP)*** Brown (10 YR 4/3), loose, fine to coarse-grained sand with ochre colored, small, rounded gravel (<0.5"-1" diameter). Dry to moist; no odor.
2–3	X	0.6	- / -	100		***Poorly-Graded Sand with trace Gravel (SP)*** Browinsh-yellow (10 YR 6/6), loose, very fine-grained sand with trace small gravel (<25 %). Dry; no odor.
3–4	X	0.5	- / -	100		
4–6			- / - / - / -			Bottom of Boring at 4 feet
6–8			- / - / - / -			
8–10						

Geologist(s): Heather M. Usle
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Jose Garcia
Method: Direct Push

WSP Environment & Energy
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Woburn, MA 01801

Boring Log: SB-06

Project: Vishay - GSI
Project No.: 090235
Location: Westbury, NY
Completion Date: November 17, 2009

Surface Elevation (feet AMSL*): NA
Total Depth (feet): 4
Borehole Diameter (inches): 2

*AMSL = Above mean sea level

Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description
						Ground Surface
0–1	X	1.9	- -	50		3" Concrete fragments and dust (10 YR 6/2)
						Poorly-Graded Sand (SP) Yellow brown (10 YR 4/6), loose, fine to coarse-grained sand. Dry; no odor.
1–2	X	1.2	- -	50		
						Poorly-Graded Sand with Gravel (SP) Light yellow-brown (10 YR 6/8) with small white quartz rock. Dry; no odor.
2–3	X	0.0	- -	50		
3–4	X	0.3	- -	50		
4						Bottom of Boring at 4 feet

Geologist(s): Heather M. Usle
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Jose Garcia
Method: Direct Push

WSP Environment & Energy
300 TradeCenter; Suite 4690
Woburn, MA 01801

Boring Log: SB-07

Project: Vishay - GSI
Project No.: 090235
Location: Westbury, NY
Completion Date: November 17, 2009

Surface Elevation (feet AMSL*): NA
Total Depth (feet): 4
Borehole Diameter (inches): 2

*AMSL = Above mean sea level

Sample Data					Subsurface Profile	
Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description
						Ground Surface
0–1	X	0.7	- / -	90		3" Concrete
1–2	X	1.1	- / -	90		***Poorly-Graded Sand with Clay and Gravel (SP-SC)*** Dark-brown (7.5 YR 3/2), loose, very fine-grained sand with some soft "clay-like" lenses and trace small gravel. Moist and "sticky"; no odor.
2–3	X	0.0	- / -	90		***Poorly-Graded Sand (SP)*** Orange-brown (7.5 YR 5/8), loose, fine to medium-grained sand. Moist; no odor.
3–4	X	0.0	- / -	90		***Poorly-Graded Sand with Gravel (SP)*** Yellow-brown (10 YR 6/6), loose, fine-grained sand with trace small gravel. Dry; no odor.
4–6			- / - / - / -			Bottom of Boring at 4 feet
6–8			- / - / - / -			
8–10						

Geologist(s): Heather M. Usle
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Jose Garcia
Method: Direct Push

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Boring Log: SB-08

Project: Vishay - GSI

Project No.: 090235

Location: Westbury, NY

Completion Date: November 18, 2009

Surface Elevation (feet AMSL*): NA

Total Depth (feet): 4

Borehole Diameter (inches): 2

*AMSL = Above mean sea level

Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description
						Ground Surface
0–1	X	3.9	-, -	50		5" Concrete
						Poorly-Graded Sand with Gravel (SP) Dark-brown (7.5 YR 3/2), loose, fine-grained sand with red brick fragments. Moist; no odor.
1–2	X	0.2	-, -	50		**Poorly-Graded Sand (SP)** Yellow-brown (10 YR 5/4), loose, fine-grained sand. Dry; no odor.
2–3	X	0.0	-, -	50		**Poorly-Graded Sand with Gravel (SP)** Black (10 YR 2/1), medium dense, fine-grained sand with some soft "clay-like" lenses and some small gravel (1" diameter). Moist and "sticky"; no odor.
3–4	X	0.0	-, -	50		
4–10			-, -, -, -, -, -, -, -			Bottom of Boring at 4 feet

Geologist(s): Heather M. Usle

Subcontractor: Zebra Environmental Corporation

Driller/Operator: Charlie Green

Method: Direct Push

WSP Environment & Energy
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Woburn, MA 01801

Boring Log: SB-09

Project: Vishay - GSI
Project No.: 090235
Location: Westbury, NY
Completion Date: November 17, 2009

Surface Elevation (feet AMSL*): NA
Total Depth (feet): 4
Borehole Diameter (inches): 2

*AMSL = Above mean sea level

Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Description
					Ground Surface
0-1	X	3.0	- -	95	3" Deteriorated concrete
1-2	X	0.6	- -	100	**Poorly-Graded Sand with Clay and Gravel (SP-SC)** Yellowish-brown (10 YR 5/4) to brown, loose, fine-grained sand with concrete fragments and trace soft clay. Ochre colored, small, rounded gravel. Dry; no odor.
2-3	X	0.3	- -	100	**Poorly-Graded Sand with Gravel (SP)** Dark gray-brown (10 YR 3/2), loose, fine-grained sand with ochre colored, small, rounded gravel (0.5"-1" diameter). Moist; no odor.
3-4	X	0.9	- -	100	**Poorly-Graded Sand with Gravel (SP)** Yellowish-brown (10 YR 5/6), loose, fine to medium-grained sand with very small gravel (<0.5" diameter). Dry; no odor.
4					Bottom of Boring at 4 feet

Geologist(s): Heather M. Usle
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Jose Garcia
Method: Direct Push

WSP Environment & Energy
300 TradeCenter; Suite 4690
Woburn, MA 01801

Boring Log: SB-10

Project: Vishay - GSI
Project No.: 090235
Location: Westbury, NY
Completion Date: November 17, 2009

Surface Elevation (feet AMSL*): NA
Total Depth (feet): 4
Borehole Diameter (inches): 2

*AMSL = Above mean sea level

Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description
						Ground Surface
0–1	X	0.7	- / -	80		3" Severly deteriorated concrete and concrete fragments
1–2	X	0.6	- / -	80		**Poorly-Graded Sand with Clay and Gravel (SP-SC)** Dark-brown (7.5 YR 3/2), loose, very fine-grained sand with some soft "clay-like" lenses and trace small gravel. Moist and "sticky"; no odor.
2–3	X	0.2	- / -	80		**Poorly-Graded Sand with Gravel (SP)** Yellow-brown (10 YR 6/6), loose, fine-grained sand with some ochre colored, small, rounded gravel. Dry; no odor.
3–4	X	0.0	- / -	80		
4						Bottom of Boring at 4 feet

Geologist(s): Heather M. Usle
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Jose Garcia
Method: Direct Push

WSP Environment & Energy
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Boring Log: SB-11

Project: Vishay - GSI

Project No.: 090235

Location: Westbury, NY

Completion Date: November 18, 2009

Surface Elevation (feet AMSL*): NA

Total Depth (feet): 4

Borehole Diameter (inches): 2

**AMSL = Above mean sea level*

Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description
						Ground Surface
0–1	X	0.2	-, -	40		1"-2" Concrete
1–2	X	0.3	-, -	40		***Poorly-Graded Sand with Gravel (SP)*** Yellowish-brown (10 YR 5/4), loose, fine-grained sand with 1" diameter gravel. Dry; no odor.
2–3	X	0.0	-, -	40		
3–4	X	0.0	-, -	40		
4						Bottom of Boring at 4 feet
4–6			-, -, -, -			
6–8			-, -, -, -			
8–10						

Geologist(s): Heather M. Usle
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Charlie Green
Method: Direct Push

WSP Environment & Energy
300 TradeCenter; Suite 4690
Woburn, MA 01801

Boring Log: SB-12

Project: Vishay - GSI
Project No.: 090235
Location: Westbury, NY
Completion Date: November 18, 2009

Surface Elevation (feet AMSL*): NA
Total Depth (feet): 4
Borehole Diameter (inches): 2

*AMSL = Above mean sea level

Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description
						Ground Surface
0–1	X	1.7	- / -	50		4" Severly deteriorated concrete **Poorly-Graded Sand with Gravel (SP)** Light-brown (10 YR 5/4), loose, fine-grained sand with small white gravel (0.5" diameter) and crystals. Dry.
1–2	X	3.4	- / -	50		
2–3	X	0.5	- / -	50		**Poorly-Graded Sand with Clay (SP-SC)** Dark-brown (7.5 YR 3/2), loose, very fine-grained sand with some soft "clay-like" lenses. Moist and "sticky".
3–4	X	0.2	- / -	50		**Poorly-Graded Sand with Gravel (SP)** Yellow-brown (10 YR 6/6), loose, fine-grained sand with some ochre colored, small, rounded gravel. Dry.
4–6			- / - / - / -			Bottom of Boring at 4 feet
6–8			- / - / - / -			
8–10						

Geologist(s): Heather M. Usle
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Charlie Green
Method: Direct Push

WSP Environment & Energy
300 TradeCenter; Suite 4690
Woburn, MA 01801

Boring Log: SB-13

Project: Vishay - GSI	**Surface Elevation (feet AMSL*):** NA		
Project No.: 090235	**Total Depth (feet):** 4		
Location: Westbury, NY	**Borehole Diameter (inches):** 2		
Completion Date: November 18, 2009			

*AMSL = Above mean sea level

Sample Data					Subsurface Profile	
Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description
						Ground Surface
0–1	X	1.7	-	50		2" Severly deteriorated concrete
1–2	X	3.4	-	50		***Poorly-Graded Sand with Gravel (SP)*** Light-brown (10 YR 5/4), loose, fine-grained sand with small white gravel (0.5" diameter) and crystals. Dry.
2–3	X	0.5	-	50		***Poorly-Graded Sand with Clay (SP-SC)*** Dark-brown (7.5 YR 3/2), loose, very fine-grained sand with some soft "clay-like" lenses. Moist and "sticky".
3–4	X	0.2	-	50		***Poorly-Graded Sand with Gravel (SP)*** Yellow-brown (10 YR 6/6), loose, fine-grained sand with some ochre colored, small, rounded gravel. Dry.
4–10			-			Bottom of Boring at 4 feet

Geologist(s): Heather M. Usle
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Charlie Green
Method: Direct Push

WSP Environment & Energy
300 TradeCenter; Suite 4690
Woburn, MA 01801

Boring Log: SB-14

Project: Vishay - GSI

Project No.: 090235

Location: Westbury, NY

Completion Date: November 17, 2009

Surface Elevation (feet AMSL*): NA

Total Depth (feet): 4

Borehole Diameter (inches): 2

*AMSL = Above mean sea level

Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description
						Ground Surface
0–1	X	2.4	-, -	50		5" Concrete
1–2	X	2.3	-, -	50		**Poorly-Graded Sand with Gravel (SP)** Dark-brown (7.5 YR 3/2), loose, very fine-grained sand with some medium white quartz gravel (1"-1.5" diameter) and ochre colored, small, rounded gravel. Dry; no odor.
2–3	X	0.5	-, -	50		
3–4	X	1.7	-, -	50		**Poorly-Graded Sand with Gravel (SP)** Orange-brown (7.5 YR 5/6), loose, coarse-grained sand with ochre colored, small, rounded gravel. Dry to moist; no odor.
4–6			-, -, -, -			Bottom of Boring at 4 feet
6–8			-, -, -, -			
8–10						

Geologist(s): Heather M. Usle

Subcontractor: Zebra Environmental Corporation

Driller/Operator: Jose Garcia

Method: Direct Push

WSP Environment & Energy
300 TradeCenter; Suite 4690
Woburn, MA 01801

Boring Log: SB-15

Project: Vishay - GSI

Project No.: 090235

Location: Westbury, NY

Completion Date: November 17, 2009

Surface Elevation (feet AMSL*): NA

Total Depth (feet): 4

Borehole Diameter (inches): 2

*AMSL = Above mean sea level

Sample Data					Subsurface Profile	
Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description
						Ground Surface
0–1	X	0.2	- -	100		4" concrete
1–2	X	2.1	- -	100		***Poorly-Graded Sand with Gravel (SP)*** Yellowish-brown (10 YR 5/6), loose, fine-grained sand with trace, ochre colored, small (0.5" diameter), rounded gravel. Dry; no odor.
2–3	X	2.1	- -	100		***Poorly-Graded Sand with Clay (SP-SC)*** Dark-brown (10 YR 3/3), loose, fine-grained sand. Moist and "sticky".
						Poorly-Graded Sand with Gravel (SP) Pale-brown (10 YR 7/3), loose, coarse-grained sand with white crystals and 0.5"-1" diameter gravel. Dry; no odor.
3–4	X	1.5	- -	100		***Poorly-Graded Sand with Gravel (SP)*** Orange-brown (7.5 YR 5/6), loose, fine to coarse-grained sand with some small white gravel. Moist; no odor.
4–6			- - - -			***Poorly-Graded Sand (SP)*** Brownish-yellow (10 YR 6/6), medium dense, fine-grained sand. Moist; no odor.
6–8			- - - -			Bottom of Boring at 4 feet
8–10						

Geologist(s): Heather M. Usle

Subcontractor: Zebra Environmental Corporation

Driller/Operator: Jose Garcia

Method: Direct Push

WSP Environment & Energy
300 TradeCenter; Suite 4690
Woburn, MA 01801

Boring Log: SB-16

Project: Vishay - GSI
Project No.: 090235
Location: Westbury, NY
Completion Date: November 17, 2009

Surface Elevation (feet AMSL*): NA
Total Depth (feet): 4
Borehole Diameter (inches): 2

*AMSL = Above mean sea level

WSP

Sample Data | **Subsurface Profile**

Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description
						Ground Surface
0–1	X	2.2	-	80		4" Concrete
1–2	X	0.8	- -	80		**Poorly-Graded Sand with Gravel (SP)** Dark-brown (7.5 YR 3/2), loose, fine-grained sand with some small to medium angular gravel (1"-2" diameter). Dry; no odor.
2–3	X	1.7	- -	80		**Poorly-Graded Sand with Gravel (SP)** Brownish-yellow (10 YR 6/6), loose, fine-grained sand with some small gravel and quartz fragments (0.5"-1" diameter). Dry; no odor.
3–4	X	0.2	- -	80		
4						Bottom of Boring at 4 feet

Depth scale: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Geologist(s): Heather M. Usle
Subcontractor: Zebra Environmental Corporation
Driller/Operator: Jose Garcia
Method: Direct Push

WSP Environment & Energy
300 TradeCenter; Suite 4690
Woburn, MA 01801

Appendix B – Category B Laboratory Reports (on CD)

Appendix C – Data Usability Summary Report (with Annotated Form 1s on CD)

Data Validation Report

WSP Environment and Energy
Vishay GSI, Westbury, NY
Project Number: 090235/01

SDG# JA33216

ECT.CON INC.
Environmental and Computer
Technology Consultants

3531 Fox Chase Drive
Imperial, PA 15126
(724) 695-8042
FAX (724) 695-2698
e-mail: ectconinc@comcast.net

ECT.CON INC.
Environmental and Computer Technology Consultants

Data Validation Report

SDG#	JA33216
Validation Report Date	January 18, 2010
Validation Guidance	USEPA CLP National Functional Guidelines for Data Review
Client Name	WSP Environment & Energy
Project Name	Westbury, NY
Laboratory	ACCUTEST Laboratories
Method(s) Utilized	SW 846 8260B, 7470/7471, 6010, 9045
Analytical Fraction	Volatile organic compounds (VOCs), Mercury, (Hg), Metals, pH

Samples/Matrix:

Date Sampled	Sample ID	Laboratory ID	VOCs	Mercury	Metals	pH	Matrix
11/17/09	SB-03/0-1	JA33216-1	X	X	X	X	Solid
11/17/09	SB-03/1-2	JA33216-2	X	X	X	X	Solid
11/17/09	SB-05/0-1	JA33216-3	X	X	X	X	Solid
11/17/09	SB-05/1-2	JA33216-4	X	X	X	X	Solid
11/17/09	SB-06/0-1	JA33216-5	X	X	X	X	Solid
11/17/09	SB-06/1-2	JA33216-6	X	X	X	X	Solid
11/17/09	SB-07/0-1	JA33216-7	X	X	X	X	Solid
11/17/09	SB-07/1-2	JA33216-8	X	X	X	X	Solid
11/17/09	SB-09/0-1	JA33216-9	X	X	X	X	Solid
11/17/09	SB-09/1-2	JA33216-10	X	X	X	X	Solid
11/17/09	SB-10/0-1	JA33216-11	X	X	X	X	Solid
11/17/09	SB-10/1-2	JA33216-12	X	X	X	X	Solid
11/17/09	SB-14/0-1	JA33216-13	X	X	X	X	Solid
11/17/09	SB-14/1-2	JA33216-14	X	X	X	X	Solid
11/17/09	SB-15/0-1	JA33216-15	X	X	X	X	Solid
11/17/09	SB-15/1-2	JA33216-16	X	X	X	X	Solid
11/17/09	TB111709A	JA33216-17	X				Solid
11/17/09	EB111709	JA33216-18	X	X	X	X	Aqueous
11/17/09	SB-16/0-1	JA33216-19	X	X	X	X	Solid
11/17/09	SB-16/1-2	JA33216-20	X	X	X	X	Solid
11/17/09	SB-15O/1-2	JA33216-21	X	X	X	X	Solid

Analytical data in this report were screened to determine analytical limitations of the data based on specific quality control criteria. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. Laboratory calculations have been verified as part of this validation. Specific findings on analytical limitations are presented in this report. Annotated Form 1s or spreadsheets for samples reviewed are included after the Data Assessment Findings. Form 1s for the MS/MSD samples and spreadsheets are not annotated.

SUMMARY

The sample set for Westbury, NY site consists of 19 solid field samples, one equipment blank and one trip blank. These samples were analyzed for the parameters as listed above.

The organic findings presented in this review of the analytical data assume that the information presented by the analytical laboratory is correct.

The VOC findings are based upon the assessment of the following:

* • Data Completeness
* • Holding Times
* • Calibration (Initial and Continuing)
• Blanks
• System Monitoring Compounds (Surrogate Spikes)
* • Laboratory Control Sample (LCS)
* • Matrix Spike/Matrix Spike Duplicates
* • Internal Standards
* • Target Compound Identification
• Compound Quantification and Reported Contract Quantitation Limits
* • System Performance

* Criteria were met for this evaluation item.

The inorganic findings are based upon the assessment of the following, where applicable:

* • Data Completeness
* • Holding Times
• Calibration (Initial and Continuing)
* • Blanks
* • ICP Interference Check samples (ICS)
* • Laboratory Control Sample (LCS)
* • Duplicate Sample Analysis
• Spike Sample Analysis
NA • Graphite Furnace Atomic Absorption (GFAA) QC
* • ICP Serial Dilution
* • Field Duplicates

* Criteria were met for this evaluation item.
NA - Not Applicable

This evaluation was conducted in accordance with USEPA CLP National Functional Guidelines for Organic and Inorganic Data Review and the analytical method. Findings from this evaluation should be considered when using the analytical data. This report presents a summary of the data qualifications based on the review of the aforementioned evaluation criteria. This is followed by annotated Form 1s/ spreadsheets. Finally, the worksheets used to perform the evaluation are provided.

FINDINGS

VOLATILE ORGANIC COMPOUNDS

1. System Monitoring Compounds

For sample SB-06/0-1, surrogate dibromofluoromethane percent recovery on 11/30/09 (24%) was less than the low control limit. The sample was re-run on 12/1/09 to confirm the percent recovery of dibromofluoromethane (10%). For sample SB-06/0-1 qualify all positive sample results as estimated biased low "J" and nondetected results as estimated "UJ".

2. Banks

The following compounds were reported in the field and/or laboratory blanks at the listed maximum concentrations.

Blank	Compound	Maximum Concentration (ppb)	Action*
Trip Blank	Toluene	0.61	SR<MC&RL; U RL SR<MC&>RL; BLK U

SR – Sample Result: MC – Maximum Concentration; RL – Reporting Limit; BLK – Blank
*Maximum concentration was dry weight adjusted prior to evaluating sample.

3. Compound Quantitation

Positive results less than the required reporting limit were qualified as estimated "J" due to uncertainty near the detection limit.

INORGANIC COMPOUNDS AND GENERAL CHEMISTRY

4. Matrix Spike

For SB-09/1-2 matrix spike/matrix spike duplicate, the percent recovery of antimony (56%, 58%) was less than the low control limit. No post-digestion spike was run. Soil samples are heterogenous; therefore, only the following sample positive results for antimony are qualified as estimated biased low "J" and nondetected results are estimated biased low "UJ".

SB-09/1-2

For SB-09/1-2 matrix spike, the percent recovery of copper (-9.5%) was less than the low control limit and less than 30%. For SB-09/1-2 matrix spike duplicate, the percent recovery of copper (65.9%) was less than the low control limit. The relative percent difference (23.4%) was greater than the control limit. No post-digestion spike was run. Soil samples are heterogenous; therefore, only the following sample positive results for copper are qualified as estimated biased low "J" and nondetected results are estimated biased low "UJ".

SB-09/1-2

For SB-09/1-2 matrix spike/matrix spike duplicate, the percent recovery of lead (0%, 0%) was less than the low control limit and less than 30%. No post-digestion spike was run. Soil samples are heterogenous; therefore, only the following sample positive results for lead are qualified as estimated biased low "J" and reject "R" nondetect results.

SB-09/1-2

For SB-09/1-2 matrix spike/matrix spike duplicate, the percent recovery of iron (216%, 621%) was greater than the high control limit. The relative percent difference (65%) was greater than the control limit. No post-digestion spike was run. Soil samples are heterogenous; therefore, only the following sample positive results for iron are qualified as estimated biased high "J".

SB-09/1-2

5. **Calibration**

The aqueous reporting limit verification sample (CRI) percent recovery for lead was greater than the high control limit of 130%. For the following sample, qualify positive results of lead as estimated biased high "J".

EB111709

The aqueous reporting limit verification sample (CRI) percent recovery for silver was less than the low control limit of 70%. For the following sample, qualify positive results of silver as estimated biased low "J" and nondetected results as estimated baised low "UJ".

EB111709

NOTES

VOLATILE ORGANIC COMPOUNDS

Matrix Spike

For run dates 11/25/09 and 11/30/09, the matrix spikes were not project samples. For these matrix spikes, all percent recoveries and relative percent differences were within control limits with the following exceptions: Matrix spike 11/30/09 percent recovery of chloroethane (158%) and dichlorofluoromethane (177%) were greater than the high control limit. Since this was not sample with this sample delivery group and soil samples are heterogeneous, data were not qualified on this basis.

Analytical Duplicate

The exact value as presented by the laboratory could not be regenerated for the analytical duplicate SB-03/1-2. The relative percent difference calculated using the validator generated result was within control limits. The relative percent difference calculated using the laboratory generated result was within control limits. Data are not qualifid on this basis.

Field Duplicates

Calculate the RPD for positive results only.

Sample ID	Duplicate ID	Parameter	RPD
SB-15/1-2	SB-150/1-2		
ND	0.8	Toluene	--
ND	0.92	Trichloroethene	--

-- - RPD is not calculated because at least one sample result is not detected (ND).

INORGANIC COMPOUNDS AND GENERAL CHEMISTRY

Data Completeness

Sample pH was not recorded for each sample upon receipt at the laboratory. The sample receipt form indicates that all samples were preserved properly. Data are not qualified on this basis.

For the ICP metals, the laboratory has used some of the quality control data from the 11/30/09 sample run. All analytical results were taken from the 12/1/09 sample run. Data from both run dates were reviewed to assess the quality control items. Data from the 12/1/09 run were used to ensure that the sample results were correct. Data are not qualified on this basis.

Percent solid samples were analyzed 13 days after sample collection. Data are not qualified on this basis.

Blanks

The initial calibration blank and bracketing calibration blanks were reviewed to evaluate the data. Not all continuing calibration blanks were used only the bracketing blanks were identified as applicable for the review.

Calibration

The initial calibration verification and bracketing continuing calibration verifications were reviewed to evaluate the data. Not all continuing calibration verifications were used only the bracketing verifications were identified as applicable for the review.

Field Duplicate

Sample ID	Duplicate ID	Parameter	PRD
SB-15/1-2	SB-150/1-2		
4310	3920	Aluminum	9.48%
ND	ND	Antimony	--
ND	2.1	Arsenic	--
34.3	31.1	Barium	9.79%
ND	ND	Beryllium	--
ND	ND	Cadmium	--
9080	8580	Calcium	5.66%
19.8	14.9	Chromium	28.24%
ND	ND	Cobalt	--
22.7	26.5	Copper	-15.45%
11100	9910	Iron	11.33%
47.2	49.4	Lead	-4.55%
4300	3540	Magnesium	19.39%
360	422	Manganese	-15.86%
ND	ND	Mercury	--
8	7.2	Nickel	10.53%
ND	ND	Potassium	--
ND	ND	Selenium	--
ND	ND	Silver	--
5510	5200	Sodium	5.79%
ND	ND	Thallium	--
12.2	18.3	Vanadium	-40.00%
61.7	66.2	Zinc	-7.04%
89.8	94.1	% Solids	-4.68%
10.2	10.13	pH	0.7%

-- - RPD is not calculated because at least one sample result is not detected (ND).

Matrix Spike

The mercury aqueous matrix spike/matrix spike duplicate was not a project sample in this sample delivery group. The percent recovery and relative percent difference was within control limits. Data are not qualified on this basis.

There was no ICP aqueous matrix spike. Since the only aqueous sample was the equipment blank, data are not qualified on this basis.

For SB-09/1-2 matrix spike/matrix spike duplicate, the percent recovery and relative percent difference for calcium was not calculated because the sample result was greater than 4x the spike amount. Data are not qualified on this basis.

[signature]
Data Reviewer

1/18/10
Date

QUALITY ASSURANCE PROJECT PLAN

Vishay GSI Facility

172 Spruce Street

Westbury, New York

February 1, 2010

WSP Engineering of New York, P.C.
300 TradeCenter, Suite 4690
Woburn, Massachusetts 01801

Tel: +1 781 933 7340
Fax: +1 781 933 7369
http://www.wspenvironmental.com

WSP
Engineering of
New York, P.C.

Contents

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1 Project Description

1.1 INTRODUCTION

On behalf of Vishay GSI (VGSI), WSP Engineering of New York, P.C. (WSP Engineering), prepared this Quality Assurance Project Plan (QAPP) for the VGSI facility located in Westbury, New York. WSP Engineering has prepared the QAPP pursuant to New York State Department of Environmental Conservation's (NYSDEC's) Policy DSHM-HW-05-15. This QAPP describes the quality assurance/quality control (QA/QC) protocols used during the November 2009 sampling activities associated with the piping trench investigation. These protocols will also be implemented during sampling activities associated with the Resource Conservation and Recovery Act (RCRA) Closure Plan.

As WSP Engineering is responsible for collecting environmental samples associated with the project, WSP Engineering prepared this QAPP in accordance with the NYSDEC's Draft DER-10 Technical Guidance for Site Investigation and Remediation (Guidance), dated December 25, 2002.

A copy of the approved QAPP will be kept at the site during implementation of the closure plan. All personnel involved in the implementation of sampling programs will be properly trained to ensure strict adherence to the QAPP and other plans.

1.2 SCOPE OF THE QUALITY ASSURANCE PROJECT PLAN

The QAPP provides information on the objectives, project organization, and specific QA/QC procedures required to implement all environmental sampling activities associated with the VGSI facility and yield technically defensible data. Essential elements addressed in this QAPP include:

- project description
- project organization
- QA objectives and criteria
- sampling procedures and sample custody
- instrumentation calibration and maintenance
- analytical procedures
- internal QC checks
- data reduction, validation, and reporting
- specific standard operating procedures used to assess data
- precision, accuracy, representativeness, and completeness
- corrective action

1.3 SITE LOCATION AND DESCRIPTION

The VGSI facility is located at 172 Spruce Street in Westbury, Nassau County, New York (Figure 1). The facility consists of a single-story, 10,000-square foot building on a one-acre parcel. The facility is located on the east side of Spruce Street and is bordered by commercial properties to the south and east. Facility operations historically involved the research, development, and production of semiconductor wafers. Manufacturing activities were phased out in late 2009.

Former process operations consisted of chemical vapor deposition, diffusion, oxidation, cleaning, and etching. The facility operated as a large quantity generator of hazardous waste under U.S Environmental Protection Agency (EPA) identification number NYD000348474. Liquid process wastes generated onsite included sodium hydroxide solutions and spent diluted acids generated from acid gas scrubber units, acid scrubber sinks, a bell jar acid washer, a tube etching wet bench, and an engineering acid wet bench.

1.4 FIELD SAMPLING PROGRAM

To investigate whether any historical releases may have occurred that could have affected soils beneath the building, soil samples were collected during November 2009 from locations in the piping trench system. Additional soil samples will be collected from the vicinity of a 5,000-gallon double-walled fiberglass aboveground storage tank (AST) following its removal. The soil sampling program is outlined below.

1.4.1 Piping Trench System (Soil Sampling)

During November 2009, WSP Engineering collected soil samples from 16 soil boring locations (SB-01 to SB-16). Soil boring location SB-15 was installed within the southern "pump pit" area and soil boring SB-14 was installed within an area of concrete backfill of unknown origin. The remaining borings were installed within or adjacent to the trench system. Because of the limited access, the soil borings were installed using a portable direct-push rig, manually using a slide hammer and retrieval jack, and/or a hand auger.

In each location, soil samples were collected with a 2-inch diameter, 4-foot long Geoprobe® MacroCore sampler fitted with a new plastic liner for each sample interval. The sampler was advanced to 4 feet below the trench bottom or floor surface, and upon recovery, the liner was removed from the sampler and split open using a utility knife. The samples were described for lithology and screened using a photoionization detector (PID) equipped with an 11.7 electron volt (eV) lamp and the soil headspace method. The lithologic description and the PID measurements were recorded in the field notebook and on soil boring logs.

Discrete soil samples were collected from 0 to 1, 0.5 to 1, and 1 to 2 feet below the trench bottom (or floor surface) at all locations. If required, additional soil was obtained from the borings using a decontaminated hand auger. A personal aerosol monitor (e.g. dustTRAK 8520) was used onsite to monitor for nuisance dust levels.

The collected soil samples were analyzed for volatile organic compounds (VOCs) following EPA Method 5035A/8260B, target analyte list (TAL) metals plus mercury following EPA Method 6010/7000, and pH using EPA Method 150.1. The samples were collected and managed following strict chain-of-custody procedures and WSP Environment & Energy's[1] soil sampling standard operating procedures (SOPs). The samples were delivered to Accutest Laboratories (Accutest) of Dayton, New Jersey (a New York-certified laboratory) for analysis within a standard 2-week turnaround time.

1.4.2 Tank Closure (Soil Sampling)

The facility has historically used a 5,000-gallon double-walled fiberglass AST with interstitial space leak detection monitors to accumulate and store caustic wastewater generated from acid gas scrubbers, a wet bench, a cleaning room, a jar cleaner, and a tube etch process. As part of the closure plan, WSP anticipates collecting soil samples from the vicinity of the tank to determine whether any historical releases may have occurred that could have affected soil.

[1] WSP Engineering of New York, P.C. is an affiliate of WSP Environment & Energy that is licensed to perform engineering in New York State.

WSP Engineering will collect soil samples from three soil borings. After the tank is removed, two borings will be advanced beneath the footprint of the tank, directly below the former locations of the two wastewater influent ports on the top of the tank. The third boring will be advanced in or adjacent to the pump pit, to supplement the data already collected near the pit during the November 2009 investigation.

In each location, soil samples will be collected as described in the piping trench system investigation above. The lithologic description and the PID measurements will be recorded in the field notebook and on soil boring logs. Discrete soil samples will be collected from 0 to 1 and 1 to 2 feet below grade or below the pump pit bottom, as applicable, unless PID readings or visual observations indicate higher concentrations in other intervals. The sample depths may be altered or additional samples collected based on the field observations and measurements. Specific boring locations may also be adjusted in the field due to access limitations and underground site structures. Each boring location will be located on the site map using a tape measure relative to onsite structures.

The soil samples will be analyzed for VOCs, TAL metals plus mercury, and pH. The samples will be collected and managed following strict chain-of-custody procedures and WSPs' soil sampling SOP. The samples will be delivered to Accutest for analysis within a standard 2-week turnaround time.

1.4.3 Tank Closure (Rinsate Sampling)

The piping, pumps, pump pit, tank, and floor beneath the tank will be triple-rinsed to ensure that all liquid waste residues are removed from the inside of the piping, pumps, pump pit, tank, and floor. Potable water will be used for the first two rinses and deionized (DI) water will be used for the third (final) rinse. Ambient temperature water will be used. A sample of the final DI rinse water from the piping, pumps, pump pit, tank, and floor beneath the tank will be collected to verify thorough decontamination of these areas after the pressure washing and flushing procedures are complete in accordance with NYSDEC-approved rinsate testing procedures.

A sample of rinsate from the third (final) rinse will be collected from the following five areas:

- One rinsate sample from the end of the discharge port on the west side of the 5,000-gallon aboveground storage tank. This sample will be designated as Rinsate Sample (RS)-1 (tank).
- One rinsate sample from the end of the caustic pipe leading from the scrubbers and scrubber sinks where it discharges into the top of the 5,000-gallon aboveground storage tank. This sample will be representative of the caustic pipelines leading from the scrubbers and scrubber sinks through the two caustic pumps (located in the pump pit on the south side of the building) and into the tank. This sample will be designated as RS-2 (caustic pipe and pumps).
- One rinsate sample from the end of the acid pipe leading from the engineering wet bench, hydrofluoric acid sink in the cleaning room, Advent Bell Jar cleaner, and tube etch process where it discharges into the top of the 5,000-gallon aboveground storage tank. This sample will be representative of the acid pipelines from the equipment listed above through the two acid pumps (located in the pump pit on the south side of the building) and into the tank. This sample will be designated as RS-3 (acid pipe and pumps).
- One rinsate sample from the interior/floor of the pump pit. This sample will be designated as RS-4 (pump pit).
- One rinsate sample from the floor beneath the fill ports on the top of the tank. This sample will be designated as RS-5 (floor).

For the rinsate samples collected from the piping/pump systems, a *minimum volume* of DI water will be passed through the piping system/pumps. A minimum volume is defined as just enough water to enable drainage of the water through the length of the piping system with subsequent collection of a grab sample at the end of the pipe. Rinsate samples will be collected in dedicated laboratory sample bottles.

A sample of rinsate from the floor of the pump pit and the floor beneath the tank will be collected by spraying DI water over a selected area of approximately one square foot, and collecting the resulting pooled water using a dedicated plastic or glass pipette/tube or syringe to suction or draw the rinsate off the floor and into sample containers.

All rinsate samples will be analyzed to demonstrate that the tank, piping, pumps, pump pit, and floor meet clean closure levels. Analytical parameters are based on the type of waste previously stored in the tank (caustic wastewater); therefore, the rinsate samples will be analyzed by Accutest for pH (EPA Method 150.1) within a standard two-week turnaround time.

2 Project Organization and Responsibility

The names, addresses, and telephone numbers of key individuals responsible for overall project management, collecting valid measurement data, and assessment of measurement systems for precision and accuracy are listed in Table 1. The resumes for WSP Engineering's management and field team are included in Appendix A.

WSP Engineering is the principal consultant to VGSI and will be responsible for performing all sampling services, including field operations, data management, and reporting. Mr. James A. Sobieraj, P.E., is both the client and project manager for VGSI. Mr. Sobieraj is responsible for coordination and implementation of the piping trench system investigation and the closure plan. He has overall responsibility for the sampling and analysis activities conducted in accordance with this QAPP and ensuring that all work completed for VGSI meets or exceeds expectations.

Mr. Sobieraj will provide senior technical and resource management support and routinely evaluate program performance. Mr. Sobieraj has the authority to commit the firm's resources to accomplish the project objectives. He will have ultimate responsibility for WSP Engineering and subcontractor performance.

Ms. Heather Usle is the project's primary technical staff who will lead and execute the project's technical and operational tasks. Ms. Usle will be responsible for leading and coordinating the day-to-day activities of the subcontractors (laboratory and drilling) hired to complete the piping trench system investigation and closure plan activities. The technical staff also has the responsibility for collecting samples and assuring compliance with the schedule and QA/QC procedures. In addition, the technical staff will provide data management and data QA/QC.

Ms. Usle has also been designated as WSP Engineering's quality assurance officer (QAO) and is responsible for all aspects of QA/QC related to the sampling activities. She will coordinate with the WSP Engineering project manager and the laboratory QA managers. She will report directly to WSP Engineering's client/ project manager when corrective action is required as a result of QA/QC reviews.

Accutest will provide the analytical services for collected soil samples. Accutest conducts analyses for the NYSDEC Analytical Services Protocol (ASP) and is certified for analysis in the applicable categories under the New York State Department of Health's Environmental Laboratory Approval Program (ELAP). Accutest has performed analytical services for numerous EPA and state-led environmental projects and can provide references upon request. The laboratory's QA manager, Mr. Phil Worby, will work with WSP Engineering's QAO to facilitate coordination of all planned sampling and chemical testing activities. The laboratory's QA managers or their designees working under their direction will serve as the representative for day-to-day contacts with WSP Engineering. Copies of Accutest's laboratory quality manuals (LQMs) are available upon request.

The key individuals and their major areas of responsibility are outlined below. They are responsible for the performance of tasks through the task leaders and the maintenance of quality work throughout all sampling and analysis activities.

- **Overall QA/QC**
  - James A. Sobieraj, WSP Engineering
  - Heather M. Usle, WSP Engineering
- **Field Sampling Operations and QC**
  - Heather M. Usle, WSP Engineering
- **Laboratory Analyses and Laboratory QC**
  - Heather M. Usle, WSP Engineering
  - Phil Worby, Accutest - Dayton, New Jersey
- **Data Review**
  - James A. Sobieraj, WSP Engineering
  - Heather M. Usle, WSP Engineering

3 Quality Assurance Objectives and Criteria

The criteria used most commonly to specify data quality objectives (DQOs) and to evaluate available sampling, analytical, and QA/QC options during investigation and remedial activities are as follows:

- Precision – A measure of the reproducibility of analyses under a set of given conditions.
- Accuracy – A measure of the bias that exists in a measurement system.
- Representativeness - The degree to which sampling data accurately and precisely represent selected characteristics.
- Completeness – The measure of the amount of valid data obtained from a measurement system compared to the amount expected to be obtained under "normal" conditions.
- Comparability – The degree of confidence with which one data set can be compared to another.

The following section presents the criteria for accomplishing the precision, accuracy, representativeness, completeness, and comparability parameters that will be used to attain the QAPP objectives.

3.1 DATA QUALITY REQUIREMENTS AND ASSESSMENTS

DQOs are quantitative and qualitative statements specifying the quality of environmental data required to support the decision making process. DQOs define the total uncertainty in the data that is acceptable for each activity. This uncertainty includes both sampling error and instrument error. The overall objective is to keep the total uncertainty within an acceptable range that will not limit the intended use of the data. This objective will be achieved by establishing specific data quality requirements, such as detection limits, criteria for accuracy and precision, data comparability, and data completeness. Data quality requirements and assessments applicable to the analytical laboratory and consistent with the projected data use have been developed and are described in this section.

3.1.1 Chemical Analyses and Quality Assurance Protocols

Samples collected during the closure plan investigation will be analyzed using approved EPA methods included in SW-846 (3rd Edition), including updates, other EPA manuals, or promulgated regulations. The proposed analytical methods for all the samples, including the associated analytical parameters, are summarized in Table 2. The DQOs for precision, accuracy, and completeness will be based on the QC requirements stipulated by the analytical methods. The sample containers, preservatives, and holding times for each analysis are also summarized in Table 2. Table 3 summarizes the reporting limits associated with TCL/TAL parameters to be analyzed. For purposes of QC, a minimum of 5 percent of samples from soils collected in the field for laboratory analyses will be replicated (i.e., there will be 1 duplicate sample for every 20 samples collected). These duplicates are "blind" to the laboratory. Laboratory duplicates will also be analyzed at the rate of 1 per every 20 samples.

The accuracy of analytical techniques and instrument calibration is monitored through the use of calibration standards. QC checks, such as the analysis of equipment blanks and trip blanks, will provide guidance and will ascertain the integrity of the analyses. Equipment blanks will be prepared at a rate of one per equipment type per monitoring event, when non-disposable equipment is used. A trip blank will be submitted with each cooler of samples shipped to the laboratory for analysis of VOCs. QC samples will be prepared in accordance with WSPs' SOPs

If groundwater samples are collected, they will be examined to evaluate their affect on the analytical protocol. Examination will be performed by analysis of one matrix spike/matrix spike duplicate (MS/MSD) for every 20 samples of the same matrix.

Laboratory QC reference samples are integrated into the analytical scheme to assess accuracy and precision. All laboratory QC samples are to be analyzed according to the same protocols as the investigative samples, including all dilutions, spikes, and processing. QC reference samples will be evaluated based on the EPA acceptance criteria specified in SW-846. Laboratory blanks are to be analyzed with each run to detect container, sample preparation, reagent, or system contamination.

3.1.2 Field Sampling Quality Requirements

The objective for collecting field samples is to maximize the confidence in the data in terms of precision, accuracy, completeness, and comparability. This QAPP presents the frequency with which field duplicates and blanks will be collected such that a certain degree of precision and accuracy can be calculated. The DQOs for field duplicates are to achieve precision equal to or greater than laboratory duplicate precision requirements specified in SW-846. The DQO, for the completeness of data, with respect to sampling, is 100 percent. It is anticipated that there may be deficiencies. However, every effort will be made to obtain valid data for all sampling points. Deficiencies will be discussed with appropriate personnel and a determination will be made as to whether they affect the numerical accuracy of the data and the objectives of the project.

3.2 DATA QUALITY ASSURANCE ASSESSMENT

All data will be reported to the NYSDEC completely. No data will be omitted unless an error occurred in the analyses or the run was invalidated because of QC sample recovery or poor precision.

Method-specific requirements for accuracy and precision will be followed. Data precision is routinely evaluated based on the results of the samples analyzed in duplicate. The range is calculated and then divided by the average of the two analyses. When multiplied by 100, this value equals the relative percent difference (RPD) between the duplicate samples. The RPD of duplicates in each data set will be compared with method-specific precision requirements to determine the accuracy of the data.

3.3 DATA REPRESENTATIVENESS

All proposed field testing and measurement procedures are designed to maximize the goal that field data will represent the conditions found at the Westbury facility. All sampling efforts will be conducted using procedures designed to maximize the goal that the sample will be representative of the matrix from which it was taken.

All analytical activities are designed to produce data representative of the samples submitted for analysis. The main tool for ensuring data representativeness is the laboratory QA/QC protocol described in this QAPP.

3.4 DATA COMPARABILITY

All data collection mechanisms proposed in site work plans and this QAPP are designed to produce comparable data. Tests performed at various locations across the facility will be conducted using accepted procedures in a consistent manner between locations and over time, and will include appropriate QA/QC procedures (i.e., instrument calibration) to ensure the validity of the data. Any limits on the comparability of test data will be noted and test results will be evaluated on that basis.

All samples will be analyzed by the laboratory using the protocols for sample preservation, holding times, sample preparation, analytical methodology, and QC as described in SW-846 (3rd Edition), the NYSDEC (ASP, the MDCWW and other EPA-approved manuals. Data will be reduced, reported, and documented in a consistent manner. For example, water quality data will be reported using a consistent set of units. Any deviations from established protocols will be noted so that data comparability can be maintained.

3.5 DATA COMPLETENESS

The data generated by the field sampling are intended to be complete. Analytical and field data completeness will be addressed by applying data quality checks and assessments described in this section to ensure that the data collected are valid and significant.

3.6 DATA MANAGEMENT

To meet data management objectives, all aspects of the field sampling including sample design, collection, shipment, analysis, use, and decisions, will be performed in conjunction with rigorous QA/QC documentation. The specific details of this documentation can be found throughout this QAPP. Separate data quality requirements for field sampling and laboratory analysis will allow any problems in the system to be isolated and resolved. Conversely, the data quality requirements are also designed to provide an indication of the variability inherent to the overall system.

Through the use of a phased approach to sampling, analysis, data assessment (data review), data qualification, and feedback, the overall data management objective is to provide a complete database with a high degree of confidence that thoroughly characterizes the environmental media collected in relation to the Westbury site.

4 Field Sampling Procedures

Field Sampling procedures and equipment decontamination procedures are described fully in WSPs' SOPs (Appendix B) for the field sampling program summarized in Section 1.4.

In general, samples will be numbered with less than ten alphanumeric characters. The first two characters of the soil samples will denote the method of collection or the type of location by which the sample was collected (e.g., SB for soil boring). The next two or three digits will follow a dash "-" sign and indicate the numerical designation for where the sample was collected. The remaining digits will follow a forward slash "/" sign and denote the depth interval below the collection surface (e.g., below the trench bottom or floor surface).The depth intervals are labeled as 0'-1' or 1'-2' (e.g. 0 to 1 foot and 1 to 2 feet) below the collection surface. The general format will appear as SB-XX/ D'-D' where the "XX" denotes the numerical soil boring location and the D'-D' denotes the depth interval of the collected sample.

QA/QC samples, such as blind duplicates, will be assigned arbitrary sample identifications and sampling times using the same numbering scheme described above to assure that they are not identified as QA/QC samples by the laboratory. The depths of the QA/QC samples will correspond to the exact depth of which they were collected in the field.

The laboratory will provide appropriate preservatives for sample containers. The required holding times, sample containers, and preservative requirements are presented in Table 2 along with the respective matrices and methods. Procedures for collecting QC samples are presented in WSPs' SOPs (Appendix B). If groundwater sampling is required, MS/MSD samples will be collected at the designated sample location by sampling three times the normal volume.

4.1 SAMPLING PROCEDURES

WSP Engineering personnel will complete all sampling activities in accordance with WSPs' SOPs. Specifically, soil samples will be collected in accordance with WSPs' SOPs for sampling with a hand auger (9) and GeoProbe® sampling (24). WSPs' SOPs are included in Appendix B. .

Field observations and data will be recorded in the field notebook in accordance with WSPs' SOPs. Field parameters collected during soil sampling will be recorded in the log book and will include but are not limited to the time, boring number, lithologic description including any unusual odors, and PID readings, Sample data recorded in the field notebook will include, but are not limited to the date, time, sample location and ID number, and proposed analyses.

4.2 SAMPLING EQUIPMENT DECONTAMINATION PROCEDURES

Non-disposable sampling equipment will be decontaminated before each use in accordance with the procedures outlined in WSPs' SOPs.

4.3 QA SAMPLES

Samples such as trip blanks, blind duplicates, equipment blanks, and MS/MSD samples will be collected for QA purposes. As shown on Table 2, one trip blank will accompany each container of samples for VOC analysis. One blind duplicate will be collected for every 20 field samples. One MS/MSD sample will be collected for every 20 field samples, if groundwater sampling is required. Split samples may be collected at the discretion of the NYSDEC.

4.4 SAMPLE VOLUME

Care will be taken that sufficient sample volume is provided for all necessary analyses to be performed, including equipment blanks, field duplicates, MS/MSD samples, and field samples.

4.5 SAMPLE PRESERVATION AND HOLDING TIMES

Soil samples will be immediately placed on ice to maintain a temperature of approximately 4ºC. WSP Engineering will coordinate with the laboratory to ensure that all holding times are not exceeded. A comprehensive list of proper sample preservation and holding times is presented in Table 2.

4.6 FIELD DOCUMENTATION OF SAMPLING AND SITE OBSERVATIONS

Field records provide the direct evidence and support for the necessary technical interpretations, judgments, and discussions concerning project activities as well as historical evidence for later reviews and analyses. It is important that they are accurate, complete, legible, identifiable, retrievable, and protected against deterioration or loss. Field records will consist of bound field notebooks, sample location maps, and chain-of-custody forms. When field analysis or screening is performed, such as with a PID, field records will also include equipment maintenance and calibration information. Other field records, such as personnel training forms and a site-specific health and safety plan, will be kept onsite.

5 Documentation and Chain-of-Custody

Sample custody is controlled and maintained through the chain-of-custody procedures. Chain of custody is the means by which the possession and handling of samples will be tracked from the source (field) to the laboratory. A sample is considered to be in a person's custody if it is in the person's possession, or in the appropriate ice chest or shipping container, and that person has secured it to prevent tampering.

5.1 SAMPLE CONTAINER PREPARATION

Sample containers for the investigations will be prepared and supplied by the laboratory. These containers will be new and certified to be contaminant-free by the manufacturer for each lot number.

5.2 FIELD SAMPLING OPERATIONS

WSP Engineering personnel will be responsible for the custody of samples from the time they are collected until they are hand-delivered to the laboratory or transferred to the shipping courier for delivery to the laboratory. The chain-of-custody procedures for the sampling activities are described below.

The sample will be placed in a thermal shipping container with ice and will otherwise be preserved as required. The container will remain within the sampler's view or locked in the sampling vehicle for temporary storage and transport to the sample staging area.

On arrival at the sample staging area, the sampler will fill out chain-of-custody form(s) to account for each sample. Trip blanks and QA samples may be sent with each group of samples as listed in Table 2. The copy of the chain-of-custody form will be retained as a permanent record in the project files.

The location of sampling points in the field will be documented to ensure that sampling points can be relocated in the future and are accurately represented in subsequent reports. Soil sampling locations will be temporarily marked in the field with marking paint or by another appropriate method (e.g., wooden stake or flag). The field notes and sample location maps will be retained as a permanent record in the project files. After the samples have been packaged for shipment in accordance with WSPs' SOPs, the sampler will record the date and time and sign in the appropriate block of the form to relinquish custody. If samples require shipment, the original chain-of-custody record will be placed inside a sealed bag within the shipping container. Otherwise, the original chain-of-custody record will be provided to the laboratory sample coordinator or shipping courier. The shipping container will then be sealed with custody seals and secured with strapping tape. The seals will indicate whether the samples have been tampered with during transport to the laboratory.

The laboratory will assume custody of the samples on receipt. A designated laboratory sample coordinator or shipping courier will record the date and time and sign the chain-of-custody form upon receipt. The sample coordinator will immediately inspect the shipment for damage and completeness and will report any problems to the WSP Engineering QAO. The laboratory sample coordinator will then complete the appropriate lab tracking forms and logs.

5.3 LABORATORY OPERATIONS

The laboratory sample coordinator is responsible for custody of the samples from the time of sample receipt to the time of discard. Laboratory custody procedures are outlined in Accutest's LQM and at a minimum will include the following:

- identification of the responsible party (sample custodian) who is authorized to sign for incoming field samples, obtain documents of shipment, and verify the data entered onto the sample custody records

- provision for a laboratory sample custody log consisting of serially numbered, standard, lab-tracking report sheets
- specification of laboratory sample custody procedures for sample handling, storage, and disbursement for analysis

6 Instrument Calibration and Preventative Maintenance

Calibration and maintenance procedures and schedules have been established for all test and measuring equipment to be used at the site. By following these procedures, the accuracy of instruments and measuring equipment will be maintained.

6.1 FIELD INSTRUMENTS

Field meters to be used during sampling activities include a PID and an aerosol dustTRAK monitor. Calibration will be checked as necessary in accordance with the manufacturer's recommendations to ensure proper measurements are taken. All calibration, maintenance, repair, and equipment usage will be recorded in the field notebook.

Minimal maintenance is required for the field testing equipment. All equipment that may be used will be checked before starting any field tests. Battery checks will be made for all instruments before sampling begins and periodically during the day. Battery-operated field instruments, such as air sampling monitors, will be recharged daily.

The field monitoring equipment and measuring devices are maintained by the instrument suppliers under a routine schedule, thereby minimizing the potential for unscheduled downtime. Field maintenance will consist mainly of keeping the instruments clean and dry. If necessary, replacement parts for damaged instruments or replacement instruments will be delivered within one day from the instrument supplier.

6.2 LABORATORY INSTRUMENTS

The calibration and maintenance schedule for the laboratory analytical instruments are described in Accutest's LQM.

7 Internal Quality Control Checks

7.1 FIELD QUALITY CONTROL CHECKS

QC procedures for PID and dustTRAK measurements will include calibrating the instruments as described in Section 6.1 of this QAPP. Assessment of field sampling precision and bias will be made by collecting field duplicates and equipment blanks for laboratory analysis. Samples will be collected in accordance with the applicable procedures in WSPs' SOPs (Appendix B) and Section 4 of the QAPP. If requested by the client or the NYSDEC, WSP Engineering may conduct internal audits of field sampling procedures to ensure QC objectives are met.

7.2 LABORATORY QUALITY CONTROL CHECKS

Laboratory QC checks will be conducted in accordance with the laboratory LQM and the analytical method.

8 Data Reduction, Validation, and Reporting

The reporting scheme from sample collection to data validation is described in this section. As previously described, samples will be collected and sent by a shipping courier or delivered to the laboratory with the proper chain-of-custody documentation. After the analytical data have been reviewed by laboratory personnel, data packages meeting the requirements specified in this section will be compiled.

8.1 FIELD DATA

Direct reading field instruments will be used during the implementation of the piping trench system investigation and closure plan. The direct reading data will be recorded in the field notebook or on operations and maintenance checklists. Relevant data will be presented in tables or on boring logs as appropriate. All instrument calibration data will be included in field notebooks or the checklists. Extra care will be exercised by field personnel to ensure proper transcription of data from instruments to field notebooks. Periodic audits of field notebooks by project management will ensure proper recording of field data and the proper calibration of all instruments.

8.2 LABORATORY DATA

The procedures used to calculate concentrations will be the same as those specified in the specific analytical methodology used. Laboratory data will be reduced by the laboratory by procedures outlined in the laboratory's LQM or similar document.

8.2.1 Data Validation

Before transmitting laboratory data, an agent of the laboratory will check 100 percent of the data for QA purposes. The laboratories will produce data reports that allow for validation by including all QA/QC deliverables for the relevant analytical method. Method-appropriate equations for precision, accuracy (bias), and completeness will be used for all analyses. The data packages will be reviewed thoroughly by WSP Engineering's QAO and designated data validation subcontractor for data validation purposes. For volatile parameters, data validation will be based on ensuring that the following criteria comply with the EPA Contract Laboratory Program (CLP) National Functional Guidelines:

- holding times
- GC and/or GC/MS instrument performance check
- initial calibration
- continuing calibration
- laboratory blank sample results
- surrogate recoveries
- MS/MSD sample results
- field duplicates, where applicable
- internal standards
- target compound identification
- analyte quantitation and reporting limits
- system performance

- overall assessment

For inorganic parameters, data validation will be based on ensuring that the following criteria comply with the Functional Guidelines:

- holding times
- laboratory blank sample results
- laboratory control sample/reference sample
- MS/MSD sample results
- field duplicates, where applicable
- analyte quantitation and reporting limits
- overall assessment

A preliminary review upon initial receipt of data will be performed to verify that all necessary paperwork (such as chain-of-custody forms, analytical reports, and laboratory personnel signatures) and deliverables are present. A data usability summary report (DUSR) will be prepared. The report will consist of a general introduction section, followed by qualifying statements that should be taken into consideration for the analytical results to be used. Based on the QA review, CLP qualifier codes will be placed next to specific sample results on the data summary table(s). These qualifier codes will serve as an indication of the qualitative and quantitative reliability of the reported analytical results.

When the review has been completed, the QAO (or designated data validation subcontractor) will submit the DUSR report and the validated data to the Project Manager for subsequent evaluation and interpretation. If field or laboratory data are determined to be unusable, corrective action will be implemented as outlined in Section 10.0 of this document.

All analytical environmental data collected during completion of the piping trench system investigation and closure plan will be independently validated by a third party not affiliated with VGSI, WSP Engineering, or Accutest.

8.2.2 Data Reporting

The laboratories will be required to provide Category B data packages in accordance with NYSDEC ASP. The data packages will provide all the necessary information for validation as detailed in this QAPP and will contain at a minimum the following information:

- a cover page, including:
  - the site name and address
  - laboratory name and address
  - laboratory certification number
  - date of analytical report preparation
  - the signature of laboratory director
- a list of field and corresponding laboratory sample identification numbers
- a list of analytical methods used, including matrix cleanup method
- the method detection and practical quantitation limits for each analyte (per analytical method)
- sample results, including date of analysis

- method blank results
- chain-of-custody documentation

Once the data validation is complete, analytical data will be summarized in tabular form with sample number, sample matrix description, parameters analyzed and their corresponding detected concentrations and CLP qualifiers where appropriate. The results from the sampling activities will be incorporated into reports as data tables and maps showing sampling locations and analyte concentrations.

8.2.3 Data Management

A rigorous data control program will be implemented to ensure that all documents are accounted for following completion of the work. Accountable documents include items such as notebooks, field data records, laboratory data packages, photographs, and reports. The project manager will be responsible for maintaining a central file in which all documents will be inventoried.

The documentation of sample collection will include the use of bound field notebooks in which all information on sample collection will be entered in indelible ink. Appropriate information will be recorded to reconstruct the sampling event, including the site name (top of each page), sample identification, brief description of sample, date and time of collection, sampling method, field measurements and observations, and sampler's initials and date on the bottom of each page.

9 Specific Routine Procedures to Assess Data

The process of assessing completed data will include the sampling activities detailed in the piping trench system investigation and closure plan, DQOs from this QAPP, and the DUSR reports where applicable. The project management team will utilize the Guidance for Data Quality Assessment (EPA QA/G-9 QA97) to determine whether the DQO objectives were met during field activities, the sampling plan design achieved desired results, and the data gathered through sample collection was representative of the areas of concern. In addition, the Data Quality Assessment guidance document will be used to select an appropriate statistical method (if necessary) that uses data collected to verify completeness of the sampling plan design and assists in drawing appropriate conclusions from the data.

10 Corrective Action

Corrective action is the process of identifying, recommending, approving, and implementing measures to counter unacceptable procedures or out-of-QC performance, which can affect data quality. Corrective action can occur during field activities, laboratory analyses, data validation, and data assessment. Corrective action shall only be implemented after approval by Mr. James A. Sobieraj, WSP Engineering's project manager. If immediate corrective action is required, approvals secured by telephone from Mr. Sobieraj should be documented in an additional memorandum.

For noncompliance problems, a formal corrective action program will be determined and implemented at the time the problem is identified. The person who identifies the problem is responsible for notifying Mr. Sobieraj, who in turn will notify Mr. Todd Hooker of Morris, Downing, & Sherred, LLC. Implementation of corrective action will be confirmed in writing through the same channels.

Any nonconformance with the established QC procedures in the QAPP, piping trench investigation, or closure plan will be identified and corrected in accordance with the QAPP. Mr. Sobieraj, or his designee, will issue a nonconformance report for each nonconformance condition.

10.1 FIELD CORRECTIVE ACTION

Corrective action in the field may be required when the sampling program is changed (e.g., more/less samples, sampling locations other than those specified), or when sampling procedures and/or field analytical procedures require modification due to unexpected conditions. In general, WSP Engineering's field team leader, project manager, or QAO may identify the need for corrective action. The field staff, in consultation with the field team leader, will recommend a corrective action. WSP Engineering's project manager will approve the corrective measure that will then be implemented by the field team. It will be the responsibility of the field team leader to ensure that the corrective action has been implemented.

If corrective actions result in fewer samples, alternate locations, or other changes that may cause project QA objectives not to be achieved, it will be necessary that all levels of project management, including Mr. Henry Wilkie in the Hazardous Waste Management Division at the NYSDEC, concur with the proposed action.

Corrective action resulting from internal field reviews will be implemented immediately if data may be adversely affected due to unapproved or improper use of approved methods. WSP Engineering's QAO will identify deficiencies and recommend corrective action to WSP Engineering's project manager. WSP Engineering's field team leader and field team will implement the recommended corrective action, document activities completed in the field notebook, and report the activities to the entire project management team. No staff member will initiate corrective action without prior communication of findings through the proper channels. If corrective actions are insufficient, work may be temporarily stopped until appropriate revisions are made.

10.2 CORRECTIVE ACTION DURING DATA VALIDATION AND DATA ASSESSMENT

WSP Engineering may identify the need for corrective action during either data validation or data assessment. Potential types of corrective action may include re-sampling by the field team or re-analysis of samples by the laboratory.

These actions are dependent upon the ability to mobilize the field team, and whether the data to be collected are necessary to meet the required QA objectives (e.g., the holding time for samples is not exceeded). When the QAO (or designated data validation subcontractor) identifies a situation requiring corrective action, WSP Engineering's project manager will be responsible for approving the implementation of corrective action. The QAO or WSP Engineering's project manager will document all corrective actions of this type in the project file.

11 References

NYSDEC. 2009. Draft DER-10 Technical Guidance for Site Investigation and Remediation. Prepared by the Division of Environmental Remediation. November 4.

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U.S. EPA. 1999. U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review. EPA540/R-99/008). October.

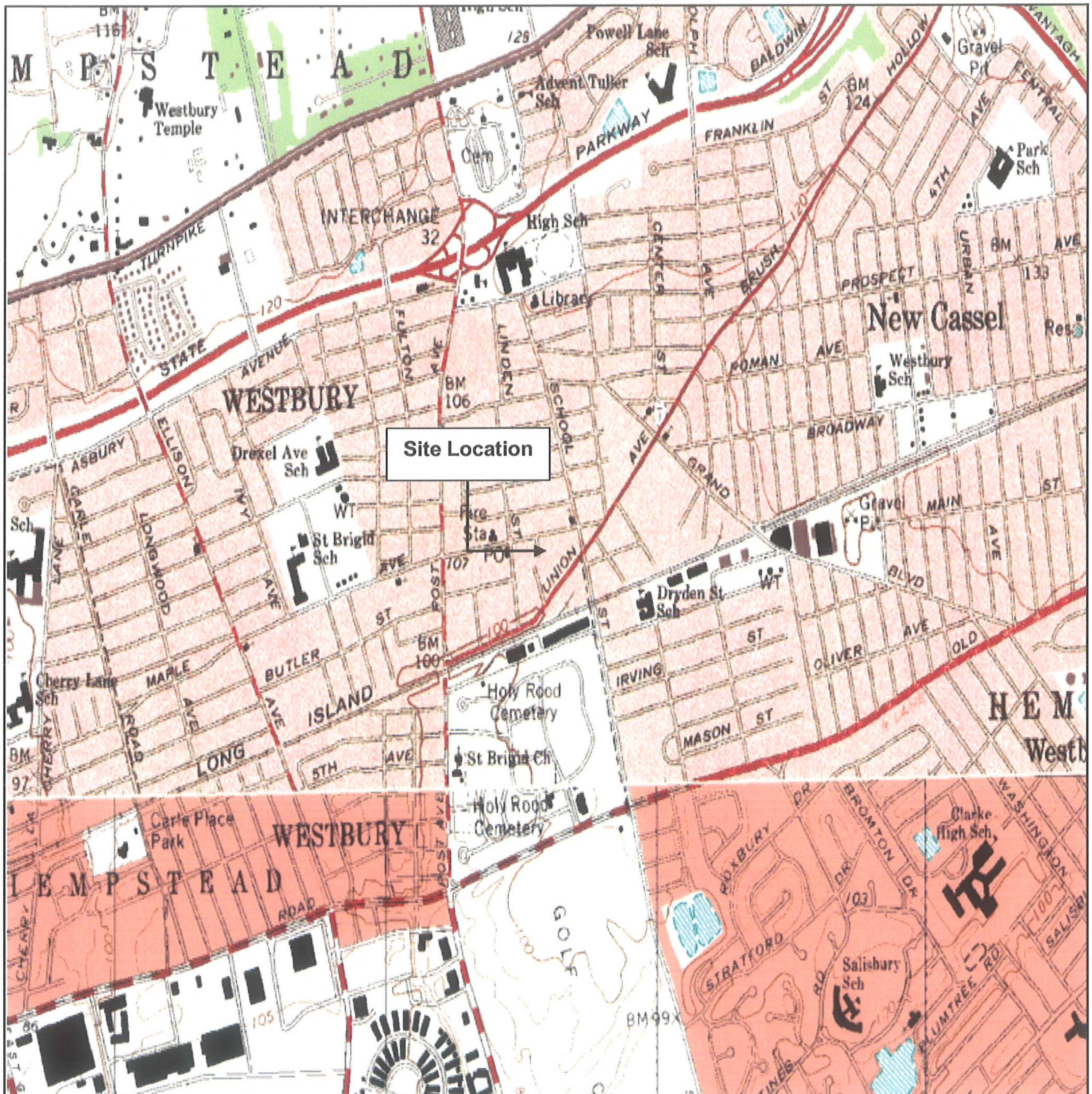
U.S. EPA. 1998. Guidance for Data Quality Assessment: Practical Methods for Data Analysis. EPA QA/G-9, QA97 version. January.

U.S. EPA. 1986. Test Methods for Evaluating Solid Waste, Third Edition SW-846, including all promulgated updates. Prepared by the Office of Solid Waste and Emergency Response.

12 Acronym List

ASP	Analytical Services Protocol
AST	aboveground storage tanks
CLP	Contract Laboratory Program
DI	deionized
DQOs	data quality objectives
DUSR	data usability summary report
ELAP	Environmental Laboratory Approval Program
EPA	U.S. Environmental Protection Agency
eV	electron volt
LQM	laboratory quality manual
MS/MSDs	matrix spike/matrix spike duplicate
NYSDEC	New York State Department of Environmental Conservation
PID	photoionization detector
QA/QC	quality assurance/quality control
QAO	quality assurance officer
QAPP	quality assurance project plan
RCRA	Resource Conservation and Recovery Act
RPD	relative percent difference
RS	rinsate sample
SOP	standard operating procedure
TAL	target analyte list
VOCs	volatile organic compounds

Figures



Reference

7.5 Minute Series Topographic Quadrangle
Hicksville, New York
Photorevised 1979 Scale 1:24,000

Quadrangle Location

1000 0 2000 4000

Scale in Feet

WSP Engineering of New York, P.C.
300 TradeCenter Drive
Suite 4690
Woburn, Massachusetts 01801
781-933-7340

Figure 1
Site Location
Vishay GSI Facility
Westbury, New York

Tables

Table 1

Names, Addresses, and Telephone Numbers of Key Personnel
VGSI
Westbury, New York

Name	Contact Information
Todd Hooker	Morris, Downing & Sherred, LLP One Main Street Newton, NJ 07860 (973) 383-2700
Henry Wilkie, Environmental Engineer I	NYSDEC Hazardous Waste Management Division 625 Broadway, 9th Floor Albany, NY 12233-7015 (518) 402-8594
Katy Murphy, Environmental Program Specialist III	NYSDEC SUNY at Stony Brook 50 Circle Road Stony Brook, New York 11790-2356 (631) 444-0235
James A. Sobieraj, P.E., Client and Project Manager **Heather M. Usle, Quality Control**	WSP Engineering of New York, P.C. 300 TradeCenter Suite 4690 Woburn, MA 01801 (781) 933-7340
Phil Worby, Quality Assurance Manager	Accutest Laboratories 2235 Route 130 Dayton, NJ 08810 (732) 329-0200

Table 2

Analytical Methods/Quality Assurance Summary
VGSI
Westbury, New York

Matrix Type	Equipment Blanks	Blind Duplicates	MS/MSD Samples	Trip Blanks	Analytical Parameters	Analytical Methods	Preservatives	Sampling Volume	Maximum Holding Time
Solids (a)									
Soil	1 per sampling day	1 per 20 samples	N/A	N/A	TCL/TAL Metals (Including Merucry)	EPA Method 6010B (Metals except Mercury); EPA Method 7471 (Mercury)	Cool to <6°C	300-mL amber glass jar with Teflon-lined cap	6 months from VTSR. 28 days from VTSR for Mercury.
	1 per sampling day	1 per 20 samples	N/A	1 per shipping container	TCL/TAL Volatiles	EPA Method 5035/8260B	Cool to 4°C	3 40-mL vials preserved with (2) DI Water Vials & (1) Methanol Vial	14 days from collection
	1 per sampling day	1 per 20 samples	N/A	N/A	pH	EPA Method 150.1	Cool to <6°C	60-mL glass jar with Teflon-lined cap	Immediately from VTSR.
Water									
Water (b)	1 per sampling day	1 per 20 samples	1 per 20 samples	1 per cooler per event	TCL/TAL Metals (Including Merucry)	EPA Method 6010B (Metals except Mercury); EPA Method 7471 (Mercury)	Cool to <6°C; preserve to pH <2	500-mL plastic container with Teflon-lined cap. Preserved with HNO3	6 months from VTSR. 28 days from VTSR for Mercury.
					TCL/TAL Volatiles	EPA Method 8260B	Cool to 4°C; preserve to pH <2	3 40-mL vials preserved with HCL	14 days from collection
					pH	EPA Method 150.1	None	50-mL	Analyze Immediately

N/A = not applicable; VTSR = Verified Time of Sample Receipt
a/ Unless requested by the NYSDEC, separate matrix spike/matrix spike duplicate samples will not be collected but rather laboratory batch spike data will be used.
b/ Rinsate samples (pH only) and groundwater samples if required.

Table 3

Target Compound List/Target Analyte List Reporting Limits
VGSI
Westbury, New York

Parameter (a)	Water (µg/l)	Soil (mg/kg)
Metals		
Aluminum	200	20
Antimony	6	2
Arsenic	3	2
Barium	200	20
Beryllium	1	0.5
Cadmium	4	0.5
Calcium	5,000	500
Chromium	10	1
Cobalt	50	5
Copper	25	2.5
Iron	100	10
Lead	3	2
Magnesium	5,000	500
Manganese	15	1.5
Mercury	0.0002	0.033
Nickel	40	4
Potassium	10,000	1,000
Selenium	10	2
Silver	10	1
Sodium	10,000	1,000
Thallium	2	1
Vanadium	50	5
Zinc	20	2
Parameter (a)	**Water (µg/l)**	**Soil (µg/kg)**
Volatile Organics		
Dichlorodifluoromethane	5	5
Chloromethane	1	5
Vinyl Chloride	1	5
Bromomethane	2	5
Chloroethane	1	5
Trichlorofluoromethane	5	5
1,1-Dichloroethene	1	5
1,1-2-Trichloro-1,2,2-trifluoroethane	5	5
Acetone	10	10
Carbon disulfide	2	5
Methyl acetate	5	5
Methylene Chloride	2	5
trans-1,2-Dichloroethane	1	5
Methyl tert-butyl ether	1	1
1,1-Dichloroethane	1	5
cis-1,2-Dichloroethene	1	5

Table 3

Target Compound List/Target Analyte List Reporting Limits
VGSI
Westbury, New York

Parameter (a)	Water (µg/l)	Soil (µg/kg)
Volatile Organics		
2-Butanone	10	10
Bromochloromethane	5	5
Chloroform	1	5
1,1,1-Trichloroethane	1	5
Cyclohexane	5	5
Carbon Tetrachloride	1	1
Benzene	1	1
1,2-Dichloroethane	2	2
1,4-Dioxane	130	130
Trichloroethene	1	5
Methylcyclohexane	5	5
1,2-Dichloropropane	1	5
Bromodichloromethane	1	1
cis-1,3-Dichloropropene	1	5
4-Methyl-2-pentanone	5	5
Toluene	1	1
trans-1,3-Dichloropropene	1	5
1,1,2-Trichloroethane	1	5
Tetrachloroethene	1	5
2-Hexanone	5	5
Dibromochloromethane	1	5
1,2-Dibromoethane	2	1
Chlorobenzene	1	5
Ethylbenzne	1	1
m,p-Xylene	1	2
o-Xylene	1	1
Styrene	5	5
Bromoform	4	4
Isopropylbenzene	2	5
1,1,2,2-Tetrachloroethane	1	5
1,3-Dichlorobenzene	1	5
1,4-Dichlorobenzene	1	5
1,2-Dichlorobenzene	1	5
1,2-Dibromo-3-Chloropropane	10	10
1,2,4-Trichlorobenzene	5	5
1,2,3-Trichlorobenzene	5	5

Table 3

Target Compound List/Target Analyte List Reporting Limits
VGSI
Westbury, New York

Parameter (a)	Water (mg/l)	Soil (µg/kg)
General Chemistry		
pH	NE	NE

a\TCL/TAL constituents and quantitation limits from Accutest Laboratories
www.accutest.com
NE = Not Established

Appendix A – Resumes of WSP Engineering Key Personnel

- Project Management: Managing the domestic third-party environmental compliance audit program for a large industrial client. Management tasks include client communication, auditor scheduling, report reviews, review and evaluation of complex environmental compliance issues, and invoicing.

- Environmental Compliance Assistance: Developing plans, programs and procedures for facilities to ensure that they maintain compliance with environmental regulations. Prepares spill prevention, control, and countermeasures plans; storm water pollution prevention plans; EPA biennial hazardous waste reports; contingency plans; hazardous materials business plans; waste reduction guidelines; and SARA Title III Tier II and Form R reports.

- Site Investigation and Remediation: Coordinated and directed cleanup of sites with leaking underground storage tanks, spilled oil, fuel, solvents, and/or pesticides. Directed the installation and abandonment of groundwater monitoring wells and conducted quarterly groundwater sampling at sites undergoing groundwater remediation. Collected soil samples for Phase II investigation purposes by hand and using hollow-stem auger drilling rigs and Geoprobe rigs. Directed the installation of bedrock monitoring wells in karst terrain using a roto-sonic drilling rig, and evaluated subsurface site characteristics based on field observations, boring logs, and soil and groundwater data. Managed the operation and maintenance of an activated carbon groundwater treatment system, and analyzed soil and groundwater sampling data to evaluate the progress and efficiency of remediation systems.

EDUCATION

1996 - B.S. - Geology - California State University, Hayward

AWARDS AND PUBLICATIONS

2008 - LoRusso, E. 2005, 2006, 2007, 2008. Presenter, Annual Canadian Environmental Compliance Seminar, Canada.

2008 - LoRusso, E. October 2008. Understanding the Aboveground Storage Tank Integrity Testing Requirements in Your SPCC Plan. Emerson Environmental Compliance Newsletter: Ask the Auditor.

2007 - LoRusso, E. May 2007. Presenter, All Appropriate Inquiry (AAI) Phase I Training.

2001 - Martin, B. and McDermott (LoRusso), E. 2001. Outsourcing: A Growing Trend in EHS Management. Environmental Quality Management Journal. Winter 2001. Vol. 11, No. 2, pp. 45-50.

2001 - McDermott (LoRusso), E. 2001. Recent Developments in RCRA TRI Reporting. Environmental Quarterly. Fall 2001.Vol. 13, No. 3, pp. 5-8.

2001 - Romano, A. and McDermott (LoRusso), E. 2001. Current Technical Developments: TRI Lead Rule. Environmental Claims Journal. Summer/Autumn 2001. Vol. 13, No. 4, pp. 171-182.

CERTIFICATIONS AND AUTHORISATIONS

2009 - Canadian Transportation of Dangerous Goods Regulation (TDGR) Training
2008 - Occupational Safety and Health Administration (OSHA) HAZWOPER 40-hour Health and Safety Training
2008 - DOT Hazardous Materials Training
2001 - Board of Environmental Health and Safety Certifications, CPEA

Curriculum Vitae

James Sobieraj PE

SENIOR PROJECT DIRECTOR –WSP ENVIRONMENT & ENERGY USA

PROFESSIONAL MEMBERSHIPS

1995 - American Society of Civil Engineers

SUMMARY

James Sobieraj is an environmental engineer with 14 years of professional experience designing and implementing innovative remedial solutions for contaminated property. Mr. Sobieraj has managed remediation projects in a variety of regulatory environments, including the Federal Superfund program, the Resource Conservation and Recovery Act (RCRA) corrective action program, various state-lead consent decrees, and various voluntary state cleanup programs. Throughout his career, Mr. Sobieraj has implemented numerous remedial technologies, including dual phase extraction, steam-enhanced dual-phase extraction, air sparging, soil vapor extraction (SVE), barrier walls, permeable reactive barrier walls, groundwater circulation wells, in-situ bioremediation, groundwater interception trenches, groundwater pump and treat, excavation, stabilization, soil caps, and RCRA caps.

As a senior project director and engineer, Mr. Sobieraj directs all aspects of remedial projects and represents clients with regulators and the public. Clients frequently utilize Mr. Sobieraj's remedial expertise in support of litigation and to evaluate and estimate environmental liabilities.

KEY ACHIEVEMENTS

- Soil and Groundwater Remediation: Manages a complex remediation project in Long Island, New York, which involves a groundwater plume of chlorinated volatile organic compounds (VOCs) that extends approximately 4,500 feet downgradient from the source and more than 500 feet below grade, and is commingled with plumes from several other industrial sources. Mr. Sobieraj assumed management of the project from another consulting firm, and quickly improved both technical and political aspects of the project. He made modifications to an existing SVE system intended to remediate a source area that resulted in contaminant mass removal rates approximately 80 times greater than previously achieved. Mr. Sobieraj also turned what was a contentious, unproductive relationship with the New York State Department of Environmental Conservation into a productive working relationship that moves the project forward in a manner consistent with the client's best interests.

- Litigation Support: Providing ongoing litigation support to legal counsel for a client involved in two simultaneous cases with several industrial defendants. For these cases, Mr. Sobieraj is directing the development of computer models of groundwater flow and contaminant fate and transport to distinguish the client's plume of VOCs from regional groundwater contamination.

- Liability Estimating/Modeling: Prepared settlement reports in support of negotiations between clients and their insurance companies over site remediation costs. In support of these cases, Mr. Sobieraj developed a probabilistic model for estimating remediation costs at sites where the available data were insufficient to develop rigorous site-specific cost estimates.

- Insurance Risk Assessments: Developed internal underwriting procedures with two major insurance companies for evaluating risks associated with environmental liability insurance and remediation cost cap insurance. Performed more than 20 engineering evaluations of industrial sites to assess and quantify environmental insurance risks.

- Pollution Prevention: Developed a work plan for a client to conduct a pilot test of biofiltration to treat ethanol emissions from commercial bakery ovens. The project was conducted under a grant from the New York State Energy, Research, and Development Authority for implementing an alternative treatment technology that would eliminate the use of fossil fuels.

- Investigations: Designed, supervised, and participated in numerous investigations involving sampling of air, soil, soil vapor, sediment, surface water, groundwater, and building materials. Mr. Sobieraj is currently directing a groundwater investigation that utilizes Waterloo profiling to characterize groundwater quality to depths up to 500 feet below grade.

- Environmental Due Diligence: Conducted numerous due diligence environmental assessments of vacant, commercial, and industrial sites including manufacturing facilities, warehouses, radio and television studios and towers, truck washing facilities and terminals, auto service stations, and printing facilities.

EDUCATION

1994 - MS - Environmental Engineering - University of California at Berkeley
1993 - BS - Civil and Environmental Engineering - Cornell University

EMPLOYMENT HISTORY

WSP Environment & Energy

2008- - Senior Project Director

2006-2008 - Project Director

Environmental Strategies Consulting LLC

2004-2006 - Project Director

Environmental Strategies Corporation

2001-2004 - Senior Engineer

Clough Harbor & Associates LLP

2000-2001 - Project Environmental Engineer

Environmental Strategies Corporation

1999-2000 - Senior Engineer

1995-1999 - Staff Engineer

AWARDS AND PUBLICATIONS

2006 - Simon, John A., and James A. Sobieraj. Summer 2006. Contributions of Common Sources of Polycyclic Aromatic Hydrocarbons to Soil Contamination. Remediation Journal. 2006 Wiley Periodicals, Inc., New York.

2004 - Sobieraj, James A., David P. Bouchard, and Christine D. Albertin. May 2004. Design and Operation of a Deep, Dual-Cell Groundwater Circulation Well. Proceedings of the Fourth International Conference on Remediation of Chlorinated and Recalcitrant Compounds. Battelle Press, Columbus, Ohio.

2004 - Todd M. Musterait, James A. Sobieraj, and, David P. Bouchard. May 2004. Steam-Enhanced Dual-Phase Extraction: A Case Study. Proceedings of the Fourth International Conference on Remediation of Chlorinated and Recalcitrant Compounds. Battelle Press, Columbus, Ohio.

2003 - Bouchard, David P., Todd M. Musterait, and James A. Sobieraj. Summer 2003. A Practical Approach to Steam-Enhanced Dual-Phase Extraction: A Case Study. Remediation Journal. 2003 Wiley Periodicals, Inc., New York.

1995 - Sobieraj, James A., and John A. Simon. Autumn 1995. Survey: Bioremediation Contractors Guarantee Performance. Remediation Journal. John Wiley & Sons, New York.

CERTIFICATIONS AND AUTHORISATIONS

2008 - Michigan Professional Engineer (#6201055248)
2008 - Maine Professional Engineer (#11614)
2008 - Connecticut Professional Engineer (#26411)
2000 - New York Professional Engineer (#077394)

Curriculum Vitae

Heather M. Usle

CONSULTANT -WSP ENVIRONMENT & ENERGY USA

PROFESSIONAL MEMBERSHIPS

2004 - Geological Society of America

SUMMARY

Heather Usle is a Geologist with 2 1/2 years of professional experience in hydrogeologic investigations of soil and groundwater contamination and remediation. Ms. Usle has managed the assessment and remediation of over 30 petroleum impacted sites throughout west-central Florida. As a project manager and geologist, Ms. Usle was responsible for the development and implementation of field tasks, proposal preparation, budget tracking and invoicing, agency interaction, reporting, and supervising subcontractors. Field tasks have included installation of monitoring wells, soil and groundwater sampling, characterizing soil lithology, operation and maintenance of remedial systems, oversight of soil excavation activities, and oversight of air sparging (AS) and soil vapor extraction (SVE) remediation system installation.

At WSP Environment & Energy, a subsidiary of WSP Group plc., her primary responsibilities are focused on site hydrogeologic characterization and involve soil and groundwater sampling, monitoring well installation, data analysis, and reporting. Ms. Usle coordinates field activities and completes hydrogeologic characterizations in a variety of environments.

EDUCATION

2005 - BS - Marine Geology - Eckerd College

PROJECT EXPERIENCE

2007 - 2009 Various

Groundwater Sampling: Conducting groundwater sampling using low-flow methods, standard purge-and-sample methods, and direct-push groundwater profiling. US States include: OH, MA, MI, MO, NJ, NH, NY, GA, FL, and Canada.

2007 - 2009 Various

Soil and Groundwater Investigation: Implementing investigations to characterize soil and groundwater contamination at sites in a variety of geologic settings. Has worked with state voluntary cleanup programs in Florida, Georgia, and Massachusetts.

2007 - 2009 Various

Monitoring Well Installation: Oversight of single- and double-cased monitoring well installations using direct-push, hollow-stem auger, minisonic, and mud rotary techniques

2007 - 2008 FDEP Pre-approval Program

Project Management: Responsible for managing the assessment of petroleum impacted sites under the Florida state-lead and pre-approval regulatory programs. Ms. Usle was responsible for preparing and submitting phase I and II environmental site assessments, natural attenuation monitoring, template site assessment, and post-active remediation reports to regulatory agencies. Ms. Usle was also responsible for the reporting of tank upgrade activities at retail petroleum stations.

2007 - 2008 Various

Soil and Groundwater Remediation: Oversight of AS and SVE remediation system installations and operation and maintenance of remedial systems.

EMPLOYMENT HISTORY

Earth Systems Inc.

2007-2008 - Staff Geologist/ Office Manager

Task Manager responsible for the assessment and remediation of over 30 petroleum impacted sites throughout west-central Florida. Responsibilities included development and implementation of field tasks, proposal preparation, budget tracking and invoicing, agency interaction, reporting, and supervising subcontractors. Field tasks included installation of monitoring wells, soil and groundwater sampling, characterizing soil lithology, operation and maintenance of remedial systems, oversight of soil excavation activities, and oversight of air sparge/soil vapor extraction remediation system installation.

Also responsible for preparing Phase I and II Environmental Site Assessments, supervising emergency spill response activities, and general office responsibilities.

Eckerd College/ USGS

2004-2005 - Sedimentologist

Summer Internship/ Work Study:

Gathered, assessed, and reported geochronological sedimentary analysis on drill cores for the Tampa Bay Estuary Project. Data cataloging, laboratory work, and research was performed to present a historical analysis of Tampa Bay.

AWARDS AND PUBLICATIONS

2004 - Duncan, David S., Barber, Bruce J., Brooks, Gregg R., Usle, Heather M., Gorman, Quinn E., Drechsel, Jessie A., Cuba, Tom, and Hansen, Mark, 2004. Antecedent Topography and Local Geologic and Physical Processes Contribute to a Unique Estuarine Hardbottom Community: Tampa Bay, FL. Geological Society of America Abstracts with Programs, Vol. 36, No. 5, p. 301, Denver, Colorado, November 7-10.

2004 - "Comprehensive Cataloging of Triple Junctions" for IRIS, Prof. Laura Wetzel, Eckerd College

CERTIFICATIONS AND AUTHORISATIONS

2009 - OSHA 8-hour HAZWOPER refresher
2007 - OSHA 40-hour HAZWOPER certification

COURSES

2004 - Chemical & Physical Oceanography - Eckerd College
2004 - Marine Stratigraphy & Sedimentation - Eckerd College
2004 - Coastal Geology - Eckerd College
2004 - Statistics - Eckerd College
2003 - Earth Materials - Eckerd College
2003 - Chemistry (I, II) - Eckerd College/ James Cook University
2003 - Physics (I, II) - James Cook University/ Eckerd College
2003 - Principles of Hydrology - James Cook University
2003 - Earth Structure - Eckerd College
2002 - Marine Geology - Eckerd College
2002 - Marine Invertebrate Biology - Eckerd College
2002 - Earth Systems History - Eckerd College
2002 - Calculus (I, II) - Eckerd College
2001 - Introduction to Marine Science - Eckerd College

Appendix B – WSPs' Standard Operating Procedures

Standard Operating Procedure – 1

Note Taking and Log Book Entries

Materials:

Permanently bound log book (no spiral-bound log books)
Black or blue ballpoint pen (waterproof ink)

Procedure:

1. Use black or blue ballpoint pen with waterproof ink. Felt-tip pens should not be used.

2. Reserve the inside front cover for business cards from key personnel who visit the site (including the person in charge of the log book).

3. On the first page of the log book, place a return for reward notice, WSP's phone number, and the project manager's name.

4. Enter the following on the second page of the log book: project name, project number, project manager's name, onsite contacts, onsite telephone number and address, telephone numbers for all key personnel, and emergency fire and medical telephone numbers.

5. Number each page, initial each page, and put the date at the top of each page. Start a new page for each day. At the end of a day, summarize the day's activities, sign the page, and put a slash through the rest of the blank lines. Start the next day on a new page.

6. Enter the time (in military time, e.g., 0830) in the left column of each page when an entry is recorded in the field notebook.

7. If a mistake is made in an entry, cross out the mistake with one line and initial the end of the line.

8. At all times, maintain the chain of custody on the field log book.

Content:

1. Be sure that log book entries are LEGIBLE and contain accurate and inclusive documentation of project field activities.

2. Provide sufficient detail to enable others to reconstruct the activities observed.

3. Thoroughly describe all field activities while onsite. Be objective, factual, and thorough. Language should be free of personal feelings or other terminology that might prove inappropriate.

4. Describe problems, delays, and any unusual occurrences such as wrong equipment or breakdowns along with the resolutions and recommendations that resulted.

5. Fully document any deviations from or changes in the work plan.

6. Describe the weather and changes in the weather, particularly during sampling events.

7. Sketch a map of the facility or areas onsite where activities are occurring, especially the location of sampling points.

8. During sampling activities, record all information pertaining to the sampling event. Include descriptive locations and diagrams of the sample locations, time, sample media, analysis, sampling procedure, equipment used, sizes and types of containers, preservation and any resulting reactions, sampling identification (especially for duplicate samples), shipping procedures (record airbill numbers), and addresses.

9. Note decontamination or disposal procedures for all equipment, samples, and protective clothing and how effectively each is performed.

10. If possible, photograph all sample locations and areas of interest. Maintain a photographic log in the field log book and include:

    Date, time, photographer, name of site, general direction faced, description of the subject taken, and sequential number of the photograph and the roll number.

11. Record the names and affiliations of key personnel onsite each day.

12. List all field equipment used and record field measurements, including distances, monitoring and testing instrument readings (e.g., photoionization detector (PID), organic vapor analyzer (OVA), pH, conductivity, model numbers, etc.), and calibration activities.

13. Record proposed work schedules and changes in current schedules in the log book.

14. Describe site security measures.

15. Include drum inventory for all investigation-derived waste (IDW) materials generated during site activities. Provide information on how IDW material was labeled.

Standard Operating Procedure - 2

Sample Container, Preservatives, & Holding Times

Scope:

This operating procedure describes the ways and means of selecting the appropriate sampling containers for environmental sampling.

Application:

The purpose of this procedure is to assure that sample volumes and preservatives are sufficient for analytical services required under EPA-approved protocols.

Materials:

Sample containers
Sample container labels
Indelible (waterproof) markers or pens
Clear tape

Procedures:

1. Refer to Table 1 for minimum sample volume and glassware types required for sampling a particular matrix and compound class.

2. Select the appropriate glassware (i.e., bottles or jars) from those provided by the analytical laboratory. Verify that the analytical laboratory has provided the correct number of sample containers and the correct preservatives for the project per the sampling plan requirements.

3. The analytical laboratory should always provide extra sample containers for all analytical parameters in case of breakage or other problems encountered in the field. This is particularly true for VOC sample containers (i.e., 40-ml vials).

4. Report any discrepancies or non-receipt of specific types of sample containers to the Quality Assurance Officer immediately. Arrangements should be made with the laboratory to immediately ship the missing or additional sampling containers to the project site.

5. Apply WSP sample labels to the sample containers.

6. Information on the sample labels should contain the following data:

    Site/Project name
    Project/Task number
    Unique sample identification number
    Sample date
    Time of sample collection (military system, e.g., 0000 to 2400 hours)

Analytical parameters
Preservative
Sampling personnel

7. Once sample containers are properly labeled, the sample labels should be wrapped with clear tape to prevent deterioration of sample label.

8. Proceed with the sample collection per the sampling plan requirements.

9. Collected samples should be immediately placed in an iced cooler to maintain as close as possible a 4°C atmosphere for shipment to the analytical laboratory. Follow sample shipping procedures detailed in Sample Shipping Standard Operating Procedures.

10. Recommended order of sample collection:

    In-situ measurements (e.g., temperature, pH, specific conductance)
    Volatile organic analytes (VOA)
    Purgeable organic carbon (POC)
    Purgeable organic halogens (POX)
    Total organic halogens (TOX)
    Total organic carbon (TOC)
    Extractable organics
    Total petroleum hydrocarbons (TPH)
    Total metals
    Dissolved metals
    Microbiologicals
    Phenols
    Cyanide
    Sulfate and chloride
    Turbidity
    Nitrate and ammonia
    Radionuclides

Standard Operating Procedure – 9

Soil Sampling Using Bucket Auger

Materials:

Field log book
Personal protective equipment (PPE)
Bucket augers
Auger extension rods
Auger handle
Pipe wrenches (for threaded connections)
Push pins (for snap connections)
Stainless steel spoons or trowels
Mixing tray or bowl
Plastic sheeting
Expanding ruler or tape measure

Note: Decontamination is not required for dedicated sampling equipment.

Procedure:

1. Use appropriate PPE as specified in the site-specific health and safety plan.

2. Remove all vegetation or other surface material (e.g., gravel) with a hand trowel or other tool (e.g., shovel).

3. Advance the borehole to the desired sampling depth (i.e., the top of the sample interval). Attach a decontaminated auger bucket to collect the soil sample.

4. Place the auger bucket in the borehole. Grip the cross-handle with both hands and twist it clockwise to advance the auger.

5. Withdraw the auger bucket from the borehole and place it on plastic sheeting. For VOC samples, use a decontaminated stainless steel spoon or trowel to transfer the sample material directly into the appropriate sample container. A closed-system sampler (e.g., Encore Sampler) should be used, if necessary, to collect sludge samples for VOC analysis using EPA Method 5035 for preservation.

6. Remove the retrieved soil from the bucket with a decontaminated stainless steel spoon or trowel and place the material in a decontaminated mixing tray or bowl. If additional soil is needed to provide sufficient sample volume, repeat Step 4.

7. If necessary, screen the lead end of the auger with a PID/OVA or perform headspace analysis in accordance with SOP 22. Record the reading in the field logbook.

8. Describe the remaining sample material in accordance with ASTM International Standard D 2488 and the Unified Soil Classification System. Record the sample description in the field logbook.

9. For all other parameters, the sample material should be transferred into a decontaminated mixing tray or bowl. Use the stainless steel spoon to separate large clumps of soil material and mix the contents of the tray to a homogeneous particle size and texture.

10. Examine the contents of the tray and remove coarse gravel, organic material (e.g., roots, grass, and woody material) and any other debris with the stainless steel spoon.

11. Transfer the tray contents to the appropriate sample container using a stainless steel spoon.

12. Label the containers, cover the labels with tape, and immediately place the containers in a cooler maintained at an ambient temperature of 4° Celsius with wet ice. Freezer packs or dry ice should not be used for sample preservation.

13. Measure and record the sample depth in the field logbook, along with the sample location, sampler name, and the requested analytical parameters.

14. Complete the chain-of-custody form with appropriate sampling information.

15. Samples should be maintained and shipped in accordance with SOP 20.

16. Properly manage all PPE and investigation-derived wastes in accordance with state and federal requirements.

Standard Operating Procedure - 15

Decontamination of Drilling Equipment

Materials:

Canvas or plastic tarp(s)
4-mil polyethylene liner
Pressurized steam cleaner (steam jenny)
55-gallon steel drums with bung (closed) tops
55-gallon steel drums with open tops, rings, lids, ring-nut and ring-bolt
Hammer, nails, duct tape, extension cord(s)
Wood boards - 4" x 4", 2" x 4" or 2" x6"
Portable wet/dry vacuum
Shovel, funnel, and squeegee

Construction of Decontamination Basin:

1. Place tarp(s) on flat, firm surface in an accessible area of the site away from areas of surface contamination. Use enough tarp to accommodate the rear of the drilling rig and hollow stem augers and to prevent overspray from the steam jenny from falling onto adjacent soil surfaces. If necessary, place more than one tarp on the ground. Overlap tarp edges and secure with duct tape. Area should be slightly inclined toward one corner so that the decontamination water will pool in one corner for easier pumping to the containment drums.

2. Place a layer of polyethylene liner on top of the tarp(s). If one sheet cannot completely cover the tarp, use another one. Overlap the sheets at the edges and secure with duct tape.

3. Place 4" x 4" boards along the tarp's outer edges to form a square or rectangular basin. Roll each 4" x 4" board toward the center so the tarp and polyethylene wrap completely around it at least once. Secure the tarp and liner to the top of the boards with nails, tacks or heavy-duty staples.

4. Place the drums, steam cleaner, and wet/dry vacuum adjacent to one side of the basin on the outside.

Decontamination Procedure:

1. Unload drilling equipment from the drilling rig and place in one side of the basin.

2. Activate the steam cleaner. Personnel performing steam cleaning should don rubber boots, Tyvek or Saranex suits, rubber gloves, and a hard hat with a face shield for splash protection.

3. Clean each piece of drilling equipment, including auger bits, drill bits, portable power augers, hollow stem augers, auger holders, split spoons, rod lifters, and drilling rods, by holding the nozzle of the steam cleaner a few inches away. Wood 2" x 4"s can be placed on the basin floor to prevent drilling equipment from

coming into contact with solids that will build up beneath it as it is being steam cleaned.

4. After each piece is cleaned, place it on rows of 2" x 4" boards in a separate area of the basin.

5. If space allows, position the rear of the drill rig in the basin and use the steam cleaner to clean off rig surfaces and the hoist and derrick as needed.

6. Reload drilling equipment onto rig and drive it out of the basin.

7. Vacuum up liquids on the basin floor with the flexible hose of the portable wet/dry vacuum. A long-handled squeegee can be used to pool liquid together to aid vacuuming.

8. Remove accumulated solids from the basin floor with a shovel and place in open-top drums. During removal of the accumulated solids, be careful so that the polyethylene liner is not torn, cut, or punctured with the shovel.

9. Empty the canister of the wet/dry vacuum into a bung-top drum using a funnel.

10. Secure and tighten tops of drums and apply appropriate hazardous waste or nonhazardous waste labels to each drum. The accumulation date should be placed on each drum. An inventory of all onsite drums should be entered into the field log book by field personnel. All drums should be marked, numbered, or labeled with an indelible marker for future reference.

11. On completion of onsite work, the properly labeled and inventoried drums should be stored within a newly constructed pad or basin until disposal is arranged. This containment area should be constructed of wooden boards with a polyethylene liner, as described above.

12. Materials used in construction of the decontamination basin or pad should be disassembled and placed into a properly labeled drum for future disposal.

13. All drilling equipment and the drill rig should be decontaminated on arrival onsite and before the start of any drilling activity. On completion of site work, the drilling equipment and rig should be decontaminated by the drilling contractor before departure from the site.

Standard Operating Procedure – 20

Sample Shipping Procedures

Materials:

- Suitable shipping container (e.g., plastic cooler or lab supplied styrofoam cooler)
- Chain-of-custody forms
- Custody seals
- WSP mailing labels
- Strapping, clear packing, or duct tape
- Ziploc® plastic bags
- Knife or scissors
- Permanent marker
- Latex or nitrile gloves
- Large plastic garbage bag
- Wet ice
- Bubble wrap or other packing material
- Universal sorbent materials
- Sample container custody seals (if required)
- Federal Express form (with WSP account number)
- Vermiculite (or commercially available cat litter)

Procedures:

For shipping purposes, samples are segregated into two classes; environmental samples and restricted articles (i.e., hazardous materials). Environmental samples can also be categorized based on expected or historical analyte levels (i.e., low or high). An environmental sample is one that is not defined as a hazardous material by the Department of Transportation (DOT, 49 CFR Part 171.8). The DOT defines a "hazardous material" as a substance which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated. Any material of a suspected hazardous nature, previously characterized as hazardous, or known to be hazardous is considered a restricted article.

In general, the two major concerns in shipping samples are protecting the samples from incidental breakage during shipment and complying with applicable DOT and courier requirements for restricted article shipments.

Protecting the samples from incidental breakage can be achieved using "common sense." All samples should be packed in a manner that will not allow them to freely move about in the cooler or shipping container. Glass surfaces should not be allowed to contact each other. When possible, repack the samples in the same materials that they were originally received in from the laboratory. Each container should be cushioned with plastic bubble wrap, styrofoam, or other nonreactive cushioning material. Shipping hazardous materials should conform to the packaging, marking, labeling, and shipping instructions identified in 49 CFR Parts 172 & 173.

Environmental samples shall be packed for shipment using the following procedures:

1. Line the shipping container with a large, heavy-duty plastic garbage bag. Place universal sorbent materials (e.g., sorbent pads) between the cooler and the heavy-duty plastic bag. The amount of sorbent material should be sufficient to absorb the volume of wet ice and aqueous samples. If using a plastic cooler, securely tape the drain plug closed on the outside of the cooler.

2. Place 2-4 inches of bubble wrap or other packing material inside the heavy-duty plastic bag in the bottom of the cooler.

3. The sample packer should wear latex or nitrile gloves when handling the samples during the packing process.

4. Place the bottles in the cooler with sufficient space to allow for the addition of more bubble wrap or other packing material between the bottles. Large or heavy sample containers should be placed on the bottom of the cooler with lighter samples (i.e., VOAs) placed on top to eliminate breakage.

5. Place the "wet ice" inside two sealed heavy-duty zipper-style plastic bags and package the bags of ice on top of or between the samples. Pack enough ice in the cooler to chill the samples during transit. If the cooler is shipped on a Friday or Saturday for Monday delivery, double the amount of ice placed in the cooler (Monday delivery should be used only as a last resort). Fill all remaining space with bubble wrap or other packing material. Securely close and seal with tape the top of the heavy-duty plastic bag.

6. Place chain-of-custody form (and, if applicable, CLP traffic reports) into a Ziploc® plastic bag and affix to the cooler's inside lid, then close the cooler. Securely fasten the top of the cooler shut with tape. Place two signed and dated chain-of-custody seals on the top and sides of the cooler so that the cooler cannot be opened without breaking the seals.

7. Once cooler is sealed, shake test the cooler to make sure that there are no loose sample containers in the cooler. If loose samples are detected, open the cooler and repack the samples.

8. Using clear tape, affix a mailing label with WSP's return address to the top of the cooler.

9. Ship samples via priority overnight express to the contracted analytical laboratory for next morning delivery. If applicable, check the appropriate box on the airbill for Saturday delivery.

10. Declare value of samples on the shipping form for insurance purposes. The declared value should reflect the cost to recollect the samples.

11. Record the tracking numbers from the Federal Express forms in the field notebook and on the chain of custody form. Also, retain the customer's copy of the Federal Express airbill.

Hazardous materials should be packed according to the above procedures with the following additions:

1. Place samples in individual Ziploc® plastic bags and secure with a plastic tie or tape.

2. Place samples in paint cans in a manner which would prevent bottle breakage (i.e., do not place glass against glass).

3. Place vermiculite or other absorbent packing material in the paint can around the samples. The amount of packing material used should be sufficient to absorb the entire contents of the sample if the container is broken during shipment.

4. Secure a lid to the paint can with can clips and label the outside of the can with sample numbers and quantity. Mark the paint can with "This End Up" and arrow labels that indicate the proper upward position of the paint can.

5. Package the paint cans in DOT-authorized boxes or coolers, with appropriate DOT shipping labels and markings on two adjacent sides of the box or cooler.

6. Ship the restricted articles via overnight courier following the courier's

documentation requirements. A special airbill must be completed for each shipment.

Retain a copy of the airbill for WSP records and tracking purposes, if necessary.

Standard Operating Procedure – 21

Field Quality Assurance/Quality Control Samples

Materials:

Field logbook
Personal protective equipment (PPE)
Sample containers
Sample labels
Clear tape
Laboratory analyte free water
Clean or dedicated sampling equipment

Procedure:

1. Use appropriate PPE as specified in the site-specific health and safety plan.

2. Select the appropriate glassware for the field Quality Assurance/Quality Control (QA/QC) samples. Refer to the WSP Standard Operating Procedure for Sample Container, Preservatives, and Holding Times to determine the appropriate bottles to use.

3. Field QA/QC samples include the following:

    trip blanks
    duplicate samples
    equipment blanks

4. Trip blanks should be provided by the analytical laboratory for all projects where samples are being collected for analysis of volatile organic compounds (VOCs). Trip blanks should accompany the sample bottles from the analytical laboratory to the site, accompany the sample containers at all times during the sampling event, and return to the laboratory with the sample containers. One trip blank should be submitted to the analytical laboratory with each shipment containing samples for VOC analysis. The trip blank should be analyzed only for VOCs.

5. One duplicate sample should be collected for every 20 samples of each matrix (e.g., soil and groundwater) collected during each sampling event. Duplicate samples of soil and other solid matrices should be collected by dividing the sample material in half and alternately filling the two sample bottle sets. Duplicate samples of groundwater and other aqueous matrices should be collected by alternately filling the two sample bottle sets from the same sampling vessel (e.g., bailer). The appropriate SOP should be followed for the collection of each sample type (soil, groundwater, sediment, sludge). Duplicate samples should be analyzed for all the analytes that are being analyzed for during the sampling event.

6. One equipment blank should be collected in the field at a rate of one per type of equipment per decontamination event not to exceed one per day. If dedicated sampling equipment is used, the equipment blanks should be prepared in the

field before sampling begins. If field decontamination of sampling equipment is required, the equipment blanks should be prepared after the equipment has been used and field-decontaminated at least once. Equipment blanks should be prepared by filling or rinsing the precleaned equipment with analyte-free water and collecting the rinsate in the appropriate sample containers. The samples should be labeled, preserved, and filtered (if required) in the same manner as the environmental samples. Equipment blanks should be analyzed for all the analytes for which the environmental samples are being analyzed. Decontamination of the equipment following equipment blank procurement is not required.

7. All QA/QC samples should be submitted to the analytical laboratory with unique sample numbers. Therefore, the QA/QC samples should be labeled as separate environmental samples following the same numbering scheme used during that particular sampling event. However, the QA/QC samples should be clearly identified on WSP's copy of the chain-of-custody form and in the field logbook.

Standard Operating Procedure - 22

Soil Head Space Screening (Field Technique)

Materials:

PPE
Field logbook
Photoionization detector (PID) and/or Flame Ionization Detector (FID)
Aluminum foil
Clear 8-oz to 16-oz glass large-mouth containers with lids
Stainless steel spoon
Zipper-style plastic bags

Procedure:

1. Use appropriate PPE as specified in the site-specific health and safety plan.

2. Check PID to ensure that it is working properly.

3. Using WSP's standard operating procedure (SOP) for collecting soil, sludge, or sediment, half-fill a clean glass jar with sample. Place a piece of aluminum foil over the top of the jar and tightly seal the jar. Label the jar indicating the sampling location, depth, and date. Store the jar upside down until the sample is analyzed.

4. If jars are not available, collect the sample using a zipper-style plastic bag (e.g., Ziploc®). Seal and label the bag as specified in item 3.

5. Shake the sample vigorously for approximately 15 seconds.

6. If necessary, warm the sample to room temperature (70°F) by placing the jar in a heated room or vehicle. This step is very important when the ambient temperature is below 32°F.

7. After waiting approximately 15 minutes, carefully unscrew the lid of the jar without disturbing the aluminum foil. Pierce a hole through the aluminum foil using the tip of the PID. If using zipper-style bags, open the bag slightly and place the tip of the probe into the opening. Do not insert the probe into the soil and avoid the uptake of water droplets.

8. Following probe insertion, record the highest meter response. Using the foil seal/probe insertion method, maximum response should occur between 2 seconds and 5 seconds. Erratic PID response may result from high organic vapor concentrations or elevated headspace moisture. If these conditions exist, the headspace data should be qualified or discounted.

9. Record the sample location, depth, soil texture (i.e., clay or sand), and PID reading in the field notebook. Also record the ambient temperature, humidity, and whether moisture was present in the jar or plastic bag. These points are

important because on very cold days volatilization of organic compounds is reduced and water vapor present in the jar may cause the PID to give a false reading. Be consistent in your procedure and in your recording of the data.

10. Duplicate 10 % of the headspace samples by collecting two samples from the same location and following items 2 through 9 above. The headspace screening data from both jars should be recorded and compared. Generally, replicate values should be consistent to plus or minus 20%.

11. Samples collected for headspace screening should not be retained for laboratory analysis. Dispose of the soil and jar appropriately.

Standard Operating Procedure – 23

Underground Utility Locating

Application:

The purpose of this procedure is to ensure that all required and appropriate procedures are followed to locate and mark subsurface utilities (e.g., electrical lines, natural gas lines, communication lines) before initiating any intrusive field activities (e.g., drilling, test pits, trenching). Compliance with this procedure is mandatory before intrusive work can be conducted on a WSP project. This procedure is intended to allow the work to proceed safely and will minimize the potential for damaging underground utilities. Intrusive work includes all activities that require WSP's employees or their subcontractors to penetrate the ground surface. Examples of intrusive work include, but are not limited to probing, drilling, injection, test pit excavations, trenching, and remedial excavations.

Materials:

Record of the communication utility locating form (Attachment 1)
Field logbook
Wooden stakes
Spray paint
Flagging tape
As-built drawings for sub grade utilities (if available)
Hand auger or post-hole digger
Hand-held magnetometer or cable locator (optional, if and only if private utility locator has cleared the area and personnel have been properly trained in the use of the equipment)

Procedure:

Pre-site Mobilization

1. Gather the necessary information to complete the record of communication utility locating form (Attachment 1).

2. Contact the state utility locating service (e.g., One-Call, Miss-Dig). It is imperative to contact the locating service with sufficient lead-time to allow all utility providers to visit the site location. In each case, the state utility locating service will provide the caller with a legal dig date. Under no circumstances will intrusive work begin before the legal dig date provided by the call center. The telephone numbers for the locating service in selected states are listed in Table 1. However, the telephone number is typically listed in the area Yellow Pages. Provide the utility locating service with any information they request concerning the site and work activity in order to locate utilities at the site. Several states, including California, require that the proposed drilling locations be marked with white spray paint before contacting the locating services. The following information provided by the locating service should be documented in a record of communication utility locating form (Attachment 1): utility providers that will be contacted, and a utility clearance ticket number. The ticket number will be used

by the various utility companies to reference the clearance request and to contact the caller with clearance verifications (see note below).

Note 1: Generally, the public utility companies will mark underground lines up to the private property boundary. However, you should request that the utility companies mark their utilities in the work areas on the site. If the utility companies will not provide that service, a private utility locating service **MUST** be contracted.

Note 2:Some utilities (e.g., sewer, water, cable TV) may not be included by the State locating service. The State locating service will provide you with a list of utilities that will be notified based on the information provided regarding the sites location. Compare this list with utilities generally expected at all sites (e.g., sewer, water, gas, communication, electric). If any expected utilities are absent from the contact list, you **MUST** contact the utilities directly for clearance before the start of intrusive activities. Record all contacts on the utility locating record of communication form.

3. Identify a site contact familiar with the utilities on the property (e.g., plant manager, facility engineer, maintenance supervisor), and provide this individual with a site plan showing the proposed locations of all soil borings, monitoring wells, test pits, and other areas where intrusive activities will be conducted. Ask the site contact for all drawings concerning underground utilities in the proposed work areas.

4. No intrusive work should be done before the legal dig date provided by the State utility locating service. No intrusive activities should be conducted along or near public right-of-ways until all utilities have been marked and visually verified in the area of investigation. In addition, **NO** field activities shall be conducted on private property unless the State locating service or a private utility locating service has confirmed the presence or clearance of onsite utilities.

Site Mobilization

1. Locate all proposed drilling and trenching locations, both onsite and offsite, with spray paint, stakes, or other appropriate markers.

2. Verify that **ALL** utility companies listed by the municipal locating service, and any contacted directly by WSP, have either marked the underground lines in the specified work areas or have responded with “no conflict.” Document on the utility record of communication form as each utility mark is visually confirmed.

   Note: When receiving verbal clearances by telephone from utility companies, or their subcontractors, it is imperative that you verify which utilities are being cleared, particularly when dealing with subcontractors that may be marking more than one utility.

3. Review all available as-built utility diagrams and plans with the site contact to identify potential areas where underground lines may be present. The review should confirm the locations marked by the locating services and identify utilities

that may have been omitted by the locating services. If the as-built drawings do not confirm utilities marked by the locating services, follow instructions in Section 6. If possible, obtain a copy(s) of the utility plans for future reference in the field.

Conduct a site walk with the site contact. During the site walk, attempt to obtain a general knowledge of the types of utilities present in the work areas. Furthermore, survey your surroundings to identify features that require electricity (e.g., parking lot lights, pad-mounted transformers) or suggest the presence of underground utilities, such as linear depressions in the ground. Check these items against the utility locating record of communication form checklist. For example, check to see whether major electrical lines are aboveground, or locate underground sewer lines by using the locations of manholes and storm water grates. Keep in mind that many sewer lines can be offset from catch basins.

4. A minimum of 4 feet clearance should exist between utilities and proposed drilling locations, and a minimum of 6 feet between utilities and proposed trenching locations. A minimum distance of 15 feet should be maintained by heavy equipment (e.g., excavator buckets, drill rig towers and rods) from overhead power lines. A safe distance of 25 feet should be maintained from high tension overhead power lines. In the event that work must be conducted within 25 feet of high tension wires, the lines should be wrapped and insulated by the local utilities. If a utility conflict is identified, adjust the proposed location(s) using the criteria given above. These minimum distances should be increased whenever possible to offer additional assurance that utilities will not be encountered.

5. A private utility locating service **MUST** be used for work on private property in cases where the public utility locating service does not mark utilities on the subject property. It is **NOT ACCEPTABLE** to rely on as-built drawings or verbal utility clearances. A private locator may not be necessary in rare instances; however, these cases must be discussed with the project manager **AND** a partner or executive partner of WSP before work may proceed.

   A listing of several private subsurface utility locating firms is provided in Table 2. In addition, a hand-held magnetometer or magnetic-cable locating device can be used to augment, but not replace, clearance for each work area. Use of this equipment is restricted to employees with proper training on the use of hand-held utility locating equipment. Proper training is defined as having working knowledge of the manufacturer's operating procedures, and the completion of at least one successful location under the supervision of a qualified person.

6. In some cases, state and private locating services may not be able to identify all utilities. In areas where uncertainty still exists concerning the presence of underground utilities after clearance by state and private locating services, a hand auger or post-hole digger can be used to probe the shallow subsurface before using any heavy equipment (drill rig, backhoe). The probe hole should be advanced a minimum of 4 feet below ground surface at each proposed drilling or excavation location. A sufficient number of probe holes should be completed so that the area is cleared for the proposed intrusive activity. For drilling, a minimum of three holes installed in a triangular pattern should be advanced at each location. The use of hand digging methods in **NO WAY** replaces the need

State and private utility locating services. Hand digging techniques should only be employed if uncertainty regarding the location of underground lines still exists after clearances by the State locating service and a private locating service.

7. Discuss the site conditions with the subcontractor and recommend that care be used at the start of the intrusive activities. Field personnel should always consider the presence of unidentified utilities at each work area. In addition, field personnel have the authority and responsibility to postpone intrusive activities if insufficient information, as stipulated in this SOP, is available, or if onsite reconnaissance identifies inconsistencies in the findings of utility locators. In these instances, field personnel should contact the project manager or a member of the health and safety committee, and an executive partner or partner of WSP before proceeding with the proposed work. The first priority on every project is to ensure that the work is conducted safely.

   Again, it is the requirement of this SOP to obtain site utility clearances from the State utility locating service. If the State locating service does not provide onsite (i.e., work area) utility clearance, a private locating service must be contracted to clear the work areas before digging, drilling, or probing begins. Although certain instances and site conditions may appear to allow intrusive work without prior clearance, **ALL** deviations from this SOP **MUST** be approved by the project manager and a partner or executive partner **BEFORE** beginning intrusive work.

8. If the scope of the intrusive activity locations changes, the scope of intrusion expands or includes a new onsite or offsite area(s), review the existing information to determine whether the area(s) can be safely cleared of all potential underground utilities. If necessary, contact the state locating service and request another clearance for the new area(s) of investigation and retain a private locator in accordance with Item 5 above. Remember, the new request will provide a new legal dig date before which NO INTRUSVE WORK CAN BEGIN. Additionally, if a clearance ticket will expire while the work is ongoing (typically after 14 days), a new clearance must be requested at before the first ticket expires so that work can continue uninterrupted. Refer to the communication utility locating form for the legal dig date time frame required by the State locating service.

Standard Operating Procedure – 24

Soil Sampling Using GeoProbe® System or Equivalent

Application:

To perform depth-discrete soil sampling with 2-foot or 4-foot long samplers using hydraulically-driven soil sampling equipment (GeoProbe® System or Equivalent).

Materials:

need SOP 19

Stainless steel soil sampler (2-foot or 4-foot long)
Clear acetate liners
Tape measure or expandable ruler
Utility knife
Photoionization detector (PID)
Stainless steel spoons
Aluminum tray or stainless steel mixing bowl[a]
Nitrile or latex gloves
Field notebook

Procedure:

1. Calibrate the PID in accordance to the manufacturer's instructions. Decontaminate all down-hole sampling equipment and the utility knife, spoons, and mixing bowl per SOP 19 before initiating any boring activities. Ensure that the location is clear of all underground utilities and pipelines.

2. Attach a decontaminated 2-foot or 4-foot long stainless steel sampler fitted with a new, clear acetate liner and a decontaminated removable cutting shoe to small-diameter rods. Lower the stainless steel sampler to the top of the desired sampling depth.

3. Advance the stainless steel sampler through the desired sample interval. Record in the dedicated field notebook the interval through which the sampler was pushed.

4. After the sampler has reached the desired depth, retrieve the sampler by first removing the rods and then disconnecting the sampler. Remove the cutting shoe and acetate liner containing the soil column from the sampler. Measure the length of the material recovered relative to the interval the sampler was advanced, and record this information in the field notebook.

5. Cut the acetate liner using a utility knife to expose the recovered soil. Quickly scan the recovered soil with the PID and if necessary, immediately collect samples for VOC analysis. If the plan indicates the collection of samples for headspace analysis, collect this sample after obtaining the sample for VOC analysis per SOP 22. Record the PID readings in the field notebook.

6. For VOC samples, transfer soil directly from the acetate liner into the sample containers with a clean, stainless steel spoon. Fill the VOC sample container

with a representative sample from the entire length of the recovered sample core, or other designated sample interval[a]. Fill the VOC container completely, leaving no headspace.

7. Describe the recovered soil using the Unified Soil Classification System or standard geological descriptions. Record the sample description in the field notebook.

8. If it is necessary to mix the sample, transfer the soil from the acetate liner to a clean aluminum tray or decontaminated stainless steel mixing bowl with a decontaminated stainless steel spoon[b].

9. Examine contents of the tray/bowl and remove rock fragments and organic debris, such as roots, grass, and woody material, with the stainless steel spoon. Use the same spoon to chop apart clumps of dirt and mix the contents of the tray to a homogeneous particle size and soil texture. Transfer the tray/bowl contents to the appropriate sample containers using the stainless steel spoon.

10. The sample container(s) should be sealed, labeled, and placed in a cooler with ice or freezer packs to maintain 4° Celsius for shipment to the analytical laboratory.

11. Complete the chain-of-custody form with the appropriate sampling information.

    a) *NJDEP's Field Sampling Procedures Manual requires the collection of soil samples for VOC analysis from the 0.5-foot interval that exhibits the highest reading during the field (PID) screening.*

    b) *U.S. Environmental Protection Agency (EPA) Region 4 requires a glass bowl for homogenizing soil for sample collection.*